Prevention and Treatment of Malaria in Nigeria: Differential and Determinants from a Spatial View

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Introduction

One of the major public health challenges in Nigeria is the very high prevalence of malaria. Malaria accounts for about 110 million clinical cases annually in the country. As reported by the most recent estimates, nearly half the Nigerian population annually experience one episode of malaria and the majority of outpatient visits made to the government health facilities can be attributed to malaria, while the disease tolls around 30 percent of the hospital admission (FMOH, 2001). The most vulnerable groups, as have been observed, are the children aged below 5 years and the pregnant women, due to their comparative lower immunity status. These two groups share the country's half the malarial burden. It is estimated that the pregnant women are four times more likely to suffer from complications of malaria than non-pregnant women. Malaria is a cause of pregnancy loss, stillbirth, low birth weight, and neonatal mortality (Jamison et al., 1993). Individuals with sickle cell and other low immune groups are also at higher risk.

The government is committed to free Nigeria from the burden of malaria, a long continued endemic, particularly to upkeep the goal of MDG 4 on health. In the recent times, some particular states from the country were chosen for focused attention to curb down the high prevalence of malaria. The primary goal of national malaria control program is to reduce by half the burden of malaria by 2010. Which if attained is expected to reduce child-mortality in the country by 20 percent through spiral effect. The national malaria control programme of Nigeria is put in place to ensure a massive up scale of vector control interventions for the at risk population with a strong focus on preventive approach against the disease.

The Federal Government policy on malaria control in Nigeria focuses on the following main strategies: 1) management of cases, 2) prevention of malaria with insecticide-treated nets (ITN), and 3) use of intermittent preventive treatment (IPT) during pregnancy.

The *first* strategy entails diagnosis to ensure that at least 80 percent of the people at risk of malaria take prompt and effective treatment within 24 hours of start of illness due to malaria. Under this scheme, the children under five will receive free Artmether- Lumefantrine(AL) through public sector and faith based health facilities. A home based case management strategy has been planned especially for the children less than 5 years of age.

The *second* intervention strategy is called the Integrated Vector Management system. This process is designed to ensure that at least 80 percent of the population at risk of malaria sleeps under insecticide treated nets. Other programmes meant for children such as, Immunization Plus Days (IPDs) and Measles campaigns had been used as an opportunity to reach a larger number of children in the country. Under this scheme it is proposed that the Long Lasting Insecticide Nets(LLINs) be given to pregnant women attending first ante natal care(ANC).

In coherence with the *third* strategy, another program focused on control of malarial prevalence during pregnancy. Two specific drugs, i.e., Intermittent Prevention Therapy (IPT) and Sulphadoxine-Pyrimethamine(SP) have been introduced to fight malaria in pregnant women. The

minister of state for health reiterated an increased access of at least 80% of pregnant women to these drugs.

In connection, some areas of particular states susceptible to very high prevalence throughout the year, have initiated a pilot Indoor Residual Spraying(IRS) programme. This is particularly conducted since, vector population control or suppression has been crucial to effective malaria control program elsewhere in the world. Through Roll Back Malaria programme, Nigeria is committed to drastically reducing by half the social and economic burden of malaria by 2010.

To fight back this high prevalence of malaria in the country, the Federal Government of Nigeria has received a sizable amount of credit from the World Bank. As a measure of malarial prevention it is stressed by the federal government that the country's population at large and women and children in particular should sleep under mosquito net, at all times.

Based on a survey carried out to identify states with extremely high burden of malaria, seven states have been identified; i.e., Akwa Ibom, Anambra, Bauchi, Gombe, Jigawa, Kano, and River state. On a pilot basis several programmes are run to fight back malaria in these states. However, as have been observed that the impediments to curb down the disease so far have been; lack of effective legislation on sanitation control, illiteracy among the residents, poverty, poor environmental health, unsuccessful effort to ensure that larger population sleep under mosquito bed-nets. So far the progress in malarial prevalence had been extremely slow, resulting today in only 30 percent of the children receiving anti-malarial drug, less than one-fifth of these children receiving intermittent preventive therapy and only seven percent of the children below five-years and pregnant women sleeping under bed-nets. It is estimated that a successful target of curbing down the total country malarial prevalence by the half by 2010, would create a spiraling effect of reducing 20 percent of the total child-mortality in the country. Hence, a massive scale up of vector control interventions for all- at risk population has been targeted. It is believed that a strong focus on preventive measures, coupled with the introduction of more effective case management which also includes the use of artemisinin-based combination therapies(ACTs) for treatment of uncomplicated malaria cases, with an initial focus on children under five, will return an immense progress towards this direction.

It is clear from this recent focus of malaria control programme in Nigeria that overall the major at-risk population for malaria in the country had been children under five and the pregnant women; who already had attained the due programmatic attention. As had been believed that, prevention of any disease is more cost effective than the curative measures, where malaria is no exception. The coverage of preventive measures of malaria across different states of the country can provide a clear understanding of the situation, particularly if a focus is maintained on children under five and the pregnant women.

Need for the study

There is a need to understand the differential coverage of preventive and curative measures of malaria across various population groups in Nigeria. The focus should be more on children below five years and on the pregnant women, as they are considered to be the worst affected subsection of the population. There remains a lack of understanding regarding the exposure to preventive and curative measures for malaria among the above-mentioned two groups and its differentials across the various individual, household and community covariates. In addition to this understanding, the determinants of differentials in terms of preventive and curative measures of malaria across regions, remains crucial in order to facilitate a successful malaria eradication programme in Nigeria.

Objectives

The major objective of the study is to provide important insights in understanding the exposure of preventive and curative measures for malaria, specifically for pregnant women and children below five years of age, it's differentials across regions and determinants in terms of various individual, household and community covariates.

Methodology:

The analysis of the paper is based on the DHS-2003 database of Nigeria. In particular, the household member file and the women's file had been used for the purpose of analysis. The Nigerian states surveyed during DHS-2003 have been clubbed in three main regions of malarial prevalence, based on the MARA-MAP project findings on prevalence of malaria across of the states of the country during 2002. The following tables given below, provides a detailed view of the surveyed states and the regionalization as per the malarial prevalence as according to the MARA-MAP project report.

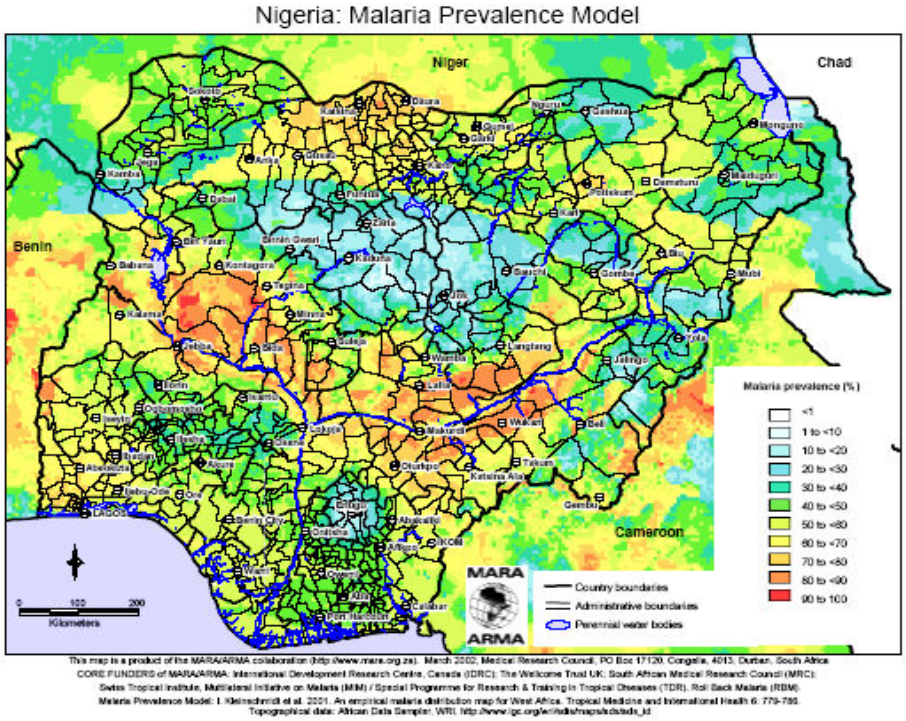
As shown (Table 1) a total of 35,820 household members have been surveyed from the entire states of the country during DHS-2003.

Table 1 : Nigeria DHS-2003: States Clubbed in Regions and their Corresponding Sample Size of Household Members

	DHS Regions					
State name	North Central	North East	North West	South East	South South	South West
Benue	1659					
Kwara	674					
Niger	1117					
Plateau	1048					
Kogi	981					
Nassaraw a	508					
Abuja (FCT)	236					
Bauchi		2384				
Borno		1493				
Adamaw a		906				
Taraba		781				
Yobe		841				
Gombe		710				
Kaduna			1985			
Kano			2023			
Katsina			1295			
Sokoto			656			
Jigawa			839			
Kebbi			682			
Zamfora			796			
Anambra				1059		
Imo				920		
Abia				671		

Enugu				1050		
Ebonyi				765		
Akwa Ibom					953	
Edo					601	
Cross River					695	
Rivers					1285	
Delta					833	
Bayelsa					329	
Lagos						1618
Ogun						749
Ondo						500
Oyo						1066
Osun						678
Ekiti						434
Total (N)=	6223	7115	8276	4465	4696	5045

As per the MARA-MAP project findings, the prevalence of malaria across the country was not uniform in the year 2002. A graphical representation differential malarial prevalence in the country had been shown borrowed from the MARA-MAP project. As seen the figure below,



greater incidence of malarial had been observed northern and southern part of the country had been observed better in terms of malarial prevalence, while central part of the country had been worst affected. Going by the project findings, we further club the states into three major regions of malarial prevalence (Table 2). Table 2 shows that the states lying in DHS region North-East and North-West have been clubbed under low malarial prevalence, while states in South South and South West have

been categorized under medium prevalence. And the high malarial prevalence states as have been shown in the Table 2, clubs the states lying in the DHS region North Central and South East.

Table 2: DHS Regions Categorized based on Prevalence of Malarial according to MARA-MAP Project (2002)

Regions given by DHS-2003	Number of HH member surveyed , based on regions Malaria Prevalence			Total No. of HH member Surveyed
	Low	Medium	High	
North Central			6223	6223
North East	7115			7115
North West	8276			8276
South East			4465	4465
South South		4696		4696
South West		5045		5045
Total	**15391**	**9741**	**10688**	**35,820**

For the purpose of meaningful analysis and discussion, the paper is separated into two parts. *First*, we have concentrated on the coverage of preventive measures of malaria with a spatial focus across the malarial prevalence regions and in the *second part* a focus had been paid on the coverage of curative measures. The differentials across the above mentioned malarial prevalence regions and their determinants have been studied, maintaining a special focus on children less than five years of age and the pregnant women.

Both bi-variate and multivariate methods have been used to understand the differentials and determinants of the coverage of preventive and curative measures across the regions.

Profile of Household Members

Table 3 shows that 16 percent of the total household member surveyed during DHS-2003 aged below five years, while a majority were from 15-59 years of age, as per the sampling design (*for further information on sample design please refer to DHS-Nigeria Report 2003*). Representation of male and female household members had been nearly equal. As shown, a majority of these members (87 percent) belonged to the household headed by males. Nearly two-third aged 7 & over reported to be literate. A total of 11 percent of the total women aged 15-59 years have been found pregnant at the time of survey. Overall, 18 percent of the household had either pregnant woman member or children below 5 years of age, at the time of survey.

Table 3: Demographic and Social Profile of Household Member, Nigeria DHS-2003

	Percentage	No. of Cases (Unweighted)
Age group		
<5 years	15.9	5694
5-14 years	26.3	9425
15-59 years	51.1	18277
60+	6.7	2399
Sex		
Male	49.7	17798

Female	50.3	18022
Sex of the hh head		
Male	86.6	31021
Female	13.4	4799
Literacy (7+ population)		
Illiterate	38.3	10626
Literate	61.7	17086
Pregnant women (15-49)	11.1	3392
Total	100.0	32,820

Based on wealth-index scores provided by the DHS-2003, the household members were categorized under three equal groups, particularly for the purpose of further analysis.

Preventive Measures of Malaria: Differential Coverage and its Determinants across Malarial Prevalence Regions

Since 1999, DHS collected information on possession of preventive measures of malaria by the households. The main information collected in this respect include possession of, bed-nets, insecticide treated bed-nets (ITN) and other methods such as, coil, insecticide spray, ware gauz, Ota piapia, broom/local fan, local leaves or whether covering with cloths is followed as a measure against mosquito bites. Apart from the possession of these methods by the household members, we checked out the contextual exposure which might increase the chances of mosquito bites. The selection of these contextual factors follows the logic mentioned below-

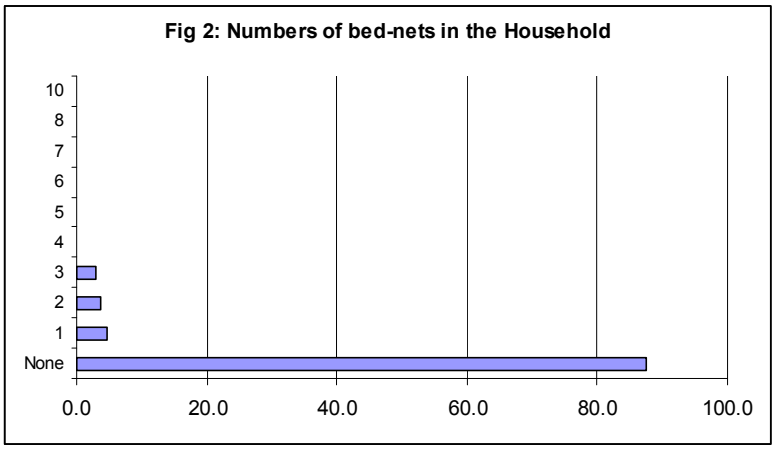
a) *Floor materials*: we conceptualized that the members belonging to kuchha households would be more exposed to mosquito bites, comparing those living in houses with pucca floor material, reason being the type of materials used for construction of the floor.

b) *Toilet facility*: it was conceptualized that if the household does not have a modern/improved toilet facility, the members are more susceptible to mosquito bites at using traditional pit toilet or other places open-air.

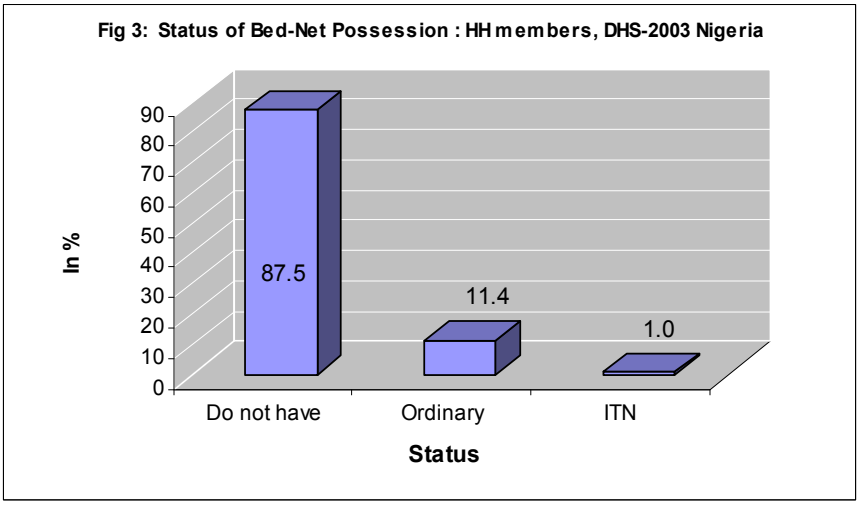
c) *Source of drinking water*: the logic said that the storage of drinking water in the house or existence of open well within yards will increase the chances of mosquito breeding within the household premises.

d) *Possession of electric fan*: the assumption being, electric fan will have the potential to drive off mosquitoes, at least within the rooms. Though it is subjected to the supply of electricity to the household, and sufficiency of electric fans in the household for all the members.

Household possession of mosquito repelling methods, i.e., bed-nets, ITN and other methods are shown below. As recorded by DHS- 2003, only 12.5 percent of the total 32,820 household members in Nigeria reported to have bed-nets. Almost universally the members reported to have only one bed-net in the household.

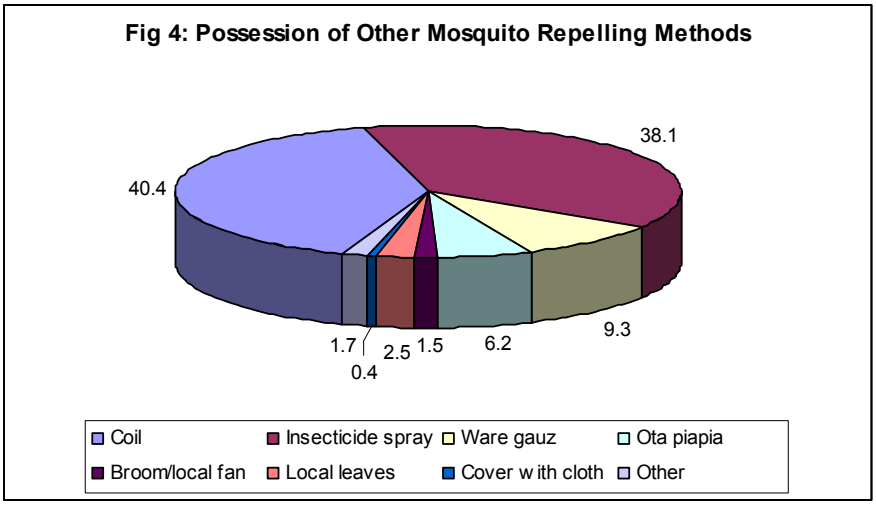


This result reflects overall a discouraging scenario is relation to the coverage of bed-nets in the country, which is the most important precautionary method for safeguarding against mosquito bites. DHS also collected information, on those who reported to have at least one bed-net, that whether it was ITN. Figure 3 shows that of those who reported have bed-nets, a larger proportion (11.4) have ordinary bed-nets. The result shows further restricted coverage of ITN across the country; which has been one of the major steps of the government towards eradicating malarial prevalence.



Apart from the household possession of bed-nets, as mentioned earlier, DHS also collected information on whether the household had any other methods to protect against mosquitoes. As observed from the data, overall, three-fourths of the total household members surveyed during DHS-2003 reported possession of other protective methods in the households.

As shown in the figure below, the major alternative method to protect against mosquito was coil (40 percent), followed by insecticide spray (38 percent). Information was however not collected on whether insecticide spray was a part of in-house-spray programme of the state government, or have been acquired by the household on their own.



Possession of either bed-nets or other methods combined together showed, almost 80 percent of the household members had any of these methods. However, the differentials across malarial prevalence regions across the country showed that the possession of any method against mosquito was lower in case of household members belonging to high-malaria prevalence areas, comparing low malarial prevalence areas (90 percent as comparing 65 percent). The differential was even sharp in case of possession of bed-nets, comparing other methods (Table 4). To elaborate, while nearly 17 percent of the household members reported having bed-nets if belonged to low prevalence areas, only 11 percent and 7 percent reported such, from high and medium prevalence areas respectively. Overall, 90 percent of the members from low prevalence areas reported to have any method, comparing only 65 percent from the high prevalence areas.

Table 4: Differentials in Possession of Mosquito Repelling Methods, across Prevalence Regions

Malaria Prevalence	Possession of		
	Bed-net	Other methods	Any method
Low	17.2	83.9	90.3
Medium	7.0	75.7	79.2
High	10.6	61.2	65.4
Total	**12.5**	**74.9**	**79.8**
Chi2	623.6	1714.5	2429.2
p=	.000	.000	.000

We checked for some selected determinants of this differential possession of methods to protect against mosquito, through multiple logit regression. The predictor variable chosen in this regard include urban/rural place of residence, sex of the household head, wealth index and malarial prevalence regions. The result of logit regression considering possession of any protective method against mosquito (0=no and 1=yes) as the dichotomous dependent variable is shown in the Table 5.

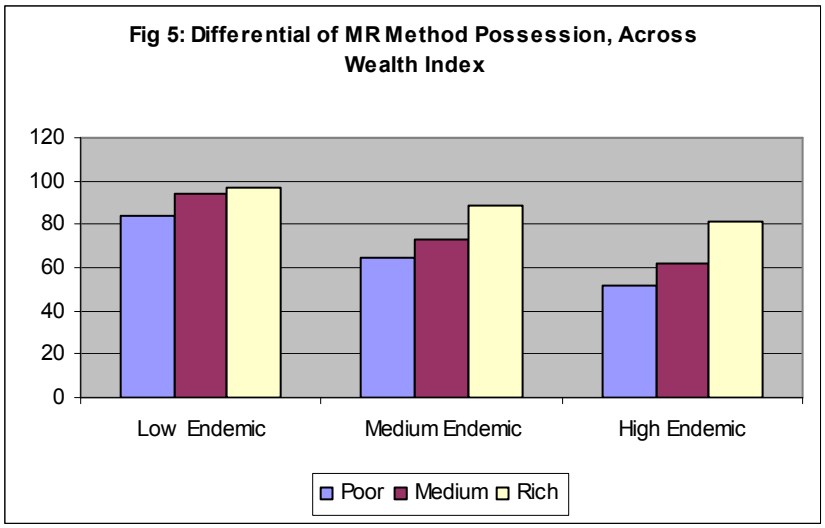
Table 5: Predictors of Differential Possession of Mosquito Repelling Methods

Predictors	Exp (ß)
Place of residence	
Urban [R]	
Rural	.802*
Sex of HH Head	
Male [R]	
Female	.779*
Wealth Index	
Poor [R]	
Medium	1.797*
Rich	4.189*
Prevalence areas	
Low [R]	
Medium	.292*
High	.162*
Presence of Prg. woman or Children below 5 years	
No [R]	
Yes	1.056
Constant	7.384*

* p=.000

As shown in the table, controlling for other variables in the model, members from rural household, with reference to urban households had lesser chances of having any method. While, female headed household showed lower chances of possessing any mosquito repelling method, with reference to the male headed households. Overall, the members belonging to medium or higher wealth index household showed better chances of having any method, with reference to the low wealth index household members. The household members showed lesser chances of having any method for mosquito repelling, if belonged to medium or high endemic areas. But when checked for presence of pregnant woman or children below five years in the household, the result was not found significant.

Though the result of the above logit regression, controlling for other variables in the model showed overall a positive impact of wealth index on the possession of mosquito repelling method, the differentials across wealth index was sharp in regard to the prevalence regions. As shown, while in the low-endemic areas, 83 percent of the members belonging to household having low wealth-score reported having any method of mosquito repelling, only 51 percent from the similar wealth bracket reported such from the high-prevalence areas.



When checked for the representation of household members belonging to different wealth brackets across malarial prevalence regions, the result showed an interesting observation. Overall, 42 percent of the household members reported to belong from poor wealth index households from the low-malaria prevalence area, comparing only 29 percent members from poor household in high-endemic areas, the result was statistically significant (p=.000). It might be inferred that in-spite of having a higher burden of poor-wealth household, the areas with low-malarial prevalence had better possession of any mosquito repelling method. Probably, universal possession of preventive methods against mosquito bites, cross-cutting economic classes was the very reason behind this comparatively low prevalence of malaria in these states. Hence, probably it can be stated that independent of selected household factors, possession of protective methods against mosquito, had have the shared a dominant spatial neighborhood effect. Where living in a neighborhood where a lower proportion was safeguarded against mosquito; even those households, who could afford such measures, were defaulters.

As mentioned above, we were also interested in checking out some selected contextual factors which might reason greater exposure of mosquito bites for the household members (Table 6).

Table 6: Contextual factors for Mosquito Bites, across Malarial Prevalence Areas

	Contextual factors								
Prevalence Regions	**Type of toilet**		**Main floor Material**			**Source of drinking water**			**Have electric fan**
	Modern/ improved	Traditional pit/no facility	Kuchha	Pucca	Carpet	Piped or covered well- house or yard	Open well-house or yard	Required storage	
Low	6.7	93.3	48.1	43.8	8.0	11.6	21.3	67.1	26.2
Medium	30.1	69.9	21.9	42.1	36.0	10.6	6.0	83.4	52.5
High	16.2	83.8	27.8	53.3	18.9	15.2	9.0	75.8	38.7
Total	15.9	84.1	35.0	46.2	18.9	12.4	13.5	74.1	37.1
	Chi2= 2459.097, p =.000		Chi2= 4013.378, p =.000			Chi2= 1575.636, p =.000			Chi2= 1784.374, p =.000

As shown in the Table 6, overall in the country, nearly 84 percent of the total household members reported to have traditional pit toilet or no facility in the household. Going by our logic, the fact put the household members at greater risks of mosquito bites. However, the differentials possession of improved toilet conditions was found better in case of high malaria prevalence regions. This region also showed better condition with regard to better floor materials and the possession of electric fans. This is not surprising since as mentioned earlier this region was superior in terms of economic conditions of the households. Nevertheless, a larger proportion from the high-malaria prevalence region were found required to store drinking water in the house, since the water as stated was brought from distant places. And hence this larger storage of drinking water in the household seems to increase the risk of in-house breeding of mosquitoes, in high malaria prevalent areas.

Possession of bed-net is likely to be positively correlated with the incidence of sleeping under bed-nets. As discussed earlier (Table 5), we observed no significant impact of the presence of pregnant woman member or children below 5 years of age in the household on the possession of any protective method against mosquito bites. However, we now try to understand the pattern of use of bed-net, with a special focus on pregnant women and children. As have been already mentioned in the profile subsection, a total of 16 percent of the household members were aged below 5 years, while 11 percent of the female members reported as pregnant at the time of survey. The table below shows the overall pattern of sleeping under bed-nets across the age-group of the household members.

Table 7: Reported Pattern of Sleeping under Mosquito Bed-nets, across Broad Age Groups

	recoded age-group				
	<5 years	5-14 years	15-59 years	60+	Total
Without bednet	94.4	96.4	95.5	95.6	95.6
Under treated bednets	1.1	0.8	1.1	1.0	1.1
Under untreated bednets	4.4	2.7	3.4	3.3	3.4
Total	5694	9425	18277	2399	35795

As shown in the table, overall 96 percent of the household members reported that they do not have any bed-net to sleep under. However, the rest had either slept under untreated or ITN in the previous night of the survey. The children under five shows almost similar pattern of sleeping under bed-nets. The differentials across three prevalence areas are shown in Table 8.

As shown in the table, a marginally higher proportion of children aged below 5 years slept under any bed-net last night in high malaria prevalent areas (6.3 percent), comparing the low malaria prevalent areas (5.7 percent), the difference is however statistically insignificant.

Table 8: Differentials in Pattern of Sleeping under Bed-nets, across Malaria Prevalence Regions

Prevalence of Malaria	Slept last night:	Recoded Age-Group				Total
		<5 years	5-14 years	15-59 years	60+	
Low	Without bednet	94.3	96.7	94.8	95.3	95.3
	Under treated bednets	1.1	0.5	1.1	0.5	0.9
	Under untreated bednets	4.6	2.8	4.1	4.1	3.8
Medium	Without bednet	95.8	97.0	96.7	96.4	96.6
	Under treated bednets	0.3	0.4	0.6	0.6	0.5
	Under untreated bednets	3.9	2.5	2.7	3.0	2.9
High	Without bednet	93.7	95.6	95.1	95.2	95.0
	Under treated bednets	1.9	1.7	1.7	1.9	1.8
	Under untreated bednets	4.4	2.7	3.2	2.9	3.2
Total		5694	9425	18277	2399	35795

While in case of pregnant women, of the total 3392 women found pregnant at the time of survey, only 6.4 percent had slept under bed-net at the previous night of the survey. Almost identical pattern was observed across the three different regions of malarial prevalence. The proportion was similar in case of low and high prevalence areas; while the proportion was comparatively lower in case of medium prevalence areas.

The predictors of sleeping under bed-net particularly for children below 5 years of age is checked through the logistic regression model below.

Table 9: Predictors of Differential Status of Sleeping under Bed-nets for Children below five years

Predictors	**Exp (ß)**
Number of children < 5 years ©	.661**
Place of residence	
Urban [R]	
Rural	1.207
Wealth Index	
Poor [R]	
Medium	.858
Rich	.680
Prevalence areas	
Low [R]	
Medium	1.891*
High	2.226**
Number of mosquito nets in the household	4.668**
Constant	.023**

** p=.000, * p=.01

The logit regression takes into consideration pattern of children below five years sleeping under bed-net at the previous night of survey, as the dependent dichotomous variable (0=no, and 1=yes). The predictor variables taken into accounts are; the number of children aged below five years in the household, place of residence, wealth index, malaria prevalence regions, and number of mosquito nets

possessed by the household. As can be observed from the Table 9, the children showed lower chances of sleeping under bed-nets, with increasing number of similar age-group children in the household. This result is complemented with the finding from the same table, that, with increasing number of bed-net possessed by the household, the children showed higher chances of sleeping under bed-nets. Hence, it can be inferred that since most of the household reported of having only a single bed-net, that was not proved sufficient when more than one children aged below 5 were present in the household. Wealth index however, did not show any significant impact on the children's sleeping pattern under bed-nets. But another interesting observation made from Table 9 shows that, children had higher odds of sleeping under bed-nets when belonging from medium or high malaria prevalence areas, with reference to those from low prevalence areas. The finding is encouraging, as it reflects awareness of the household to protect children against mosquito bites.

Another logit regression is run to understand the pattern of sleeping under bed-nets by the pregnant women (0=no, and 1=yes), considering the same set of predictor variables as earlier.

Table 10: Predictors of Differential Status of Sleeping under Bed-nets for Pregnant Women

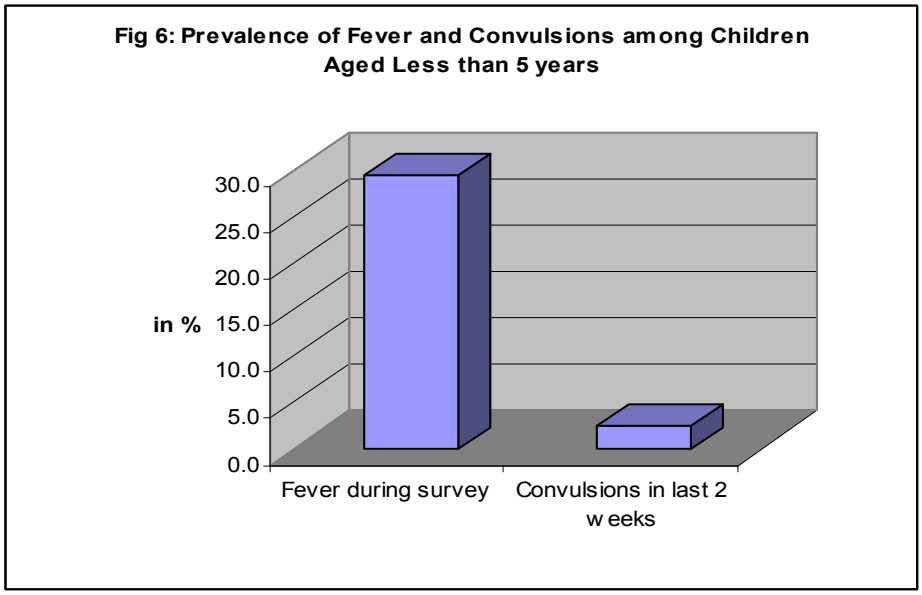
Predictors	Exp (ß)
Number of children < 5 years	.563**
Place of residence	
Urban [R]	
Rural	1.678
Wealth Index	
Poor [R]	
Medium	1.412
Rich	.993
Prevalence areas	
Low [R]	
Medium	.773
High	2.213
Number of mosquito nets in the household	7.518**
Constant	.012**

** p=.000, * p=.01

Table 10 shows, with the increasing number of children below age 5 in the household, the pregnant women members showed lower chances of sleeping under bed-nets. While the chances was increased when the household had more than one bed-net. This clearly showed, that in case when at least one bed-net was available, children below five years in the household were better preferred over the pregnant woman. The findings suggest that if all the target groups are to be protected against mosquito, the coverage of mosquito nets is to be expanded to a much wider extent. From the preventive aspects of malaria, we now move on to understand the curative management of malaria in the country.

Curative Measures against fever: Differential Coverage and its Determinants across Prevalence Regions

In this section we have attempted to understand receipt of malarial treatment with regard to the children less than five years of age and the pregnant women. Figure 6 below shows the prevalence of fever among children under five at the time of survey and the prevalence of convulsions among the same group in the last two weeks. The figure shows, out of total 5694 children aged below 5 years; 29 percent was suffering from fever during survey and 2 percent reported to have suffered from convulsions within past two weeks.



Across the different regions of malarial prevalence, differentials could be observed in terms prevalence of fever at survey point. As shown in the Table 11, both in case of medium and high malarial prevalence regions recorded 35 percent cases of fever at the time of survey, compared to 26 percent in case of low prevalence region. Though, the differential is non-existent and insignificant for the prevalence of convulsions.

Table 11: Prevalence of Fever and Convulsions among Children, across Malarial Regions

Malaria prevalence region	**Prevalence**	
	Fever	Convulsions
Low	25.6	2.6
Medium	35.3	2.2
High	35.4	2.1
Total	**29.3**	**2.4**
Chi 2	17.230	5.536
p	0.000	0.237

We attempted to understand the predictors of the differential status of prevalence of fever among children. A logit regression model has been engaged in this respect, where the dependent variable being, the child had fever at the time of survey (0=no, 1=yes). The predictors used in this respect include; zone of malarial prevalence, contextual factors (i.e., type of toilet, source of drinking water), possession of bed-nets, type of bed-net child last night slept under, number of children below 5 years in the household wealth index and place of residence.

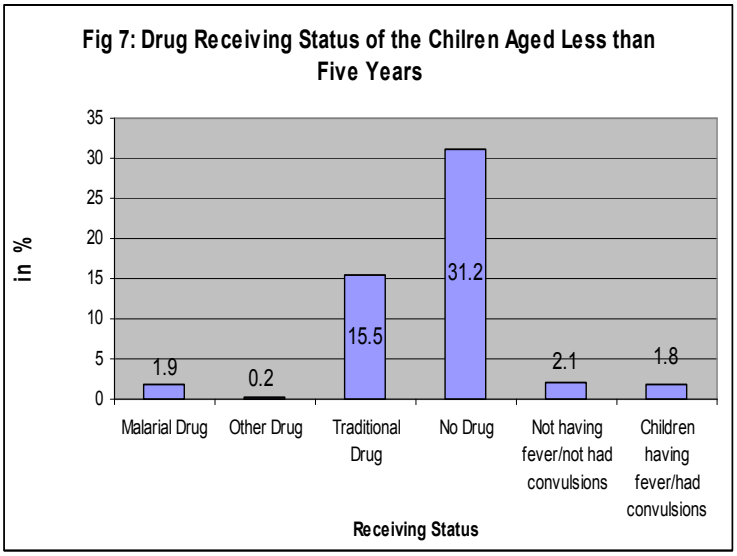
Table 12: Predictors for Prevalence of Fever among Children

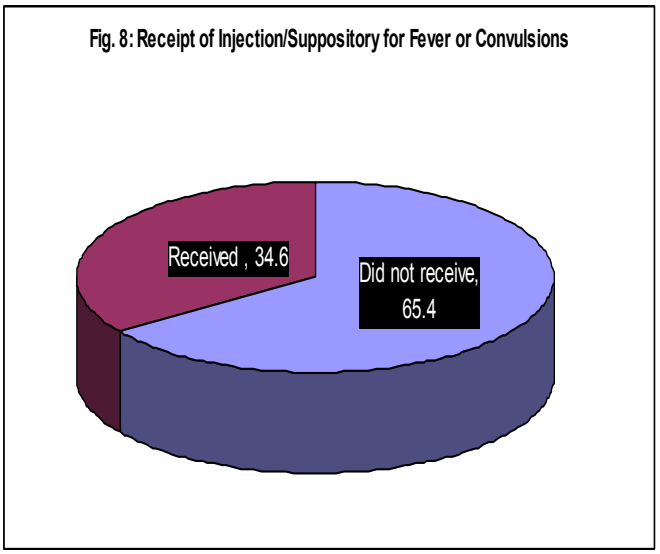
Predictors	Exp (ß)
Demographic, Socio-Economic	
Number of children < 5 years	1.076
Place of residence	
Urban [R]	
Rural	.986
Wealth Index	
Poor [R]	
Medium	.734*
Rich	.514**
Contextual Factors	
Type of toilet	
Improved/ Modern [R]	
Traditional pit/no facility	.944
Source of drinking water	
Piped or covered well- house or yard	
Open well- house or yard	.937
Required storage	.961
Prevalence areas	
Low [R]	
Medium	1.785***
High	1.748***
Proximate variables	
Possession of bed nets	
No [R]	
Yes	1.130
Child slept under bed-net last night	
No [R]	
Yes	.996
Constant	.390*

*** p <.001, ** p <.01, * p <.05

As shown in the Table 12, controlling for other selected parameters, the children belonging to medium or rich households showed lower chance of having fever, with reference to the children from poor households. Interestingly, the children from medium or high malarial prevalence region had higher chances of suffering from fever, comparing those from low prevalence regions. However, other predictors do not show significant impact in this respect. Unfortunately, DHS did not collect any information on the prevalence of fever among pregnant women. Hence no analysis could be carried out to understand the determinants of fever among this group of samples.

Regarding receipt of malarial treatment among children aged less than 5 years, as shown in the Figure 7, a total of 2 percent of the total respondents could receive malarial drug. Overall, as the Fig.8 shows, 65 percent of the children received no drug for fever or convulsion experienced recently.





Going more in-depth, it was interesting to understand for those who received drugs that, what type of malarial drugs the children received during their spell of fever and when was the drug started.

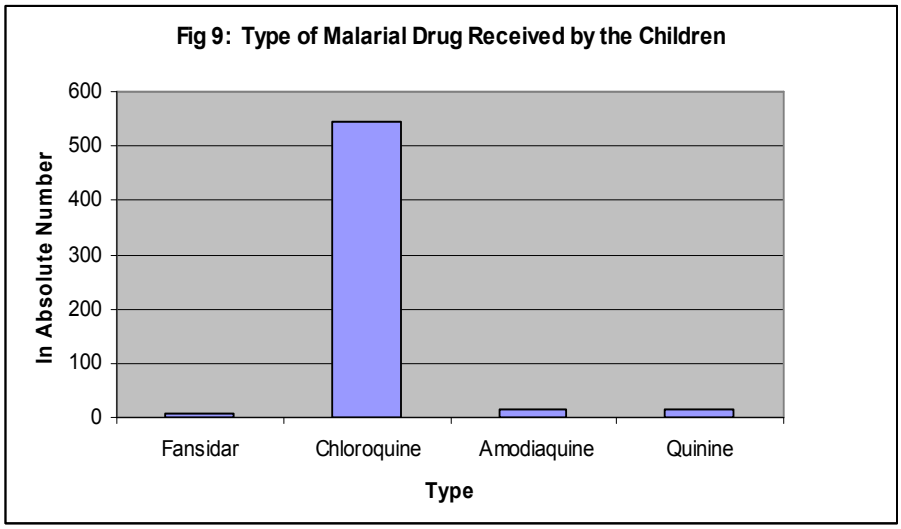
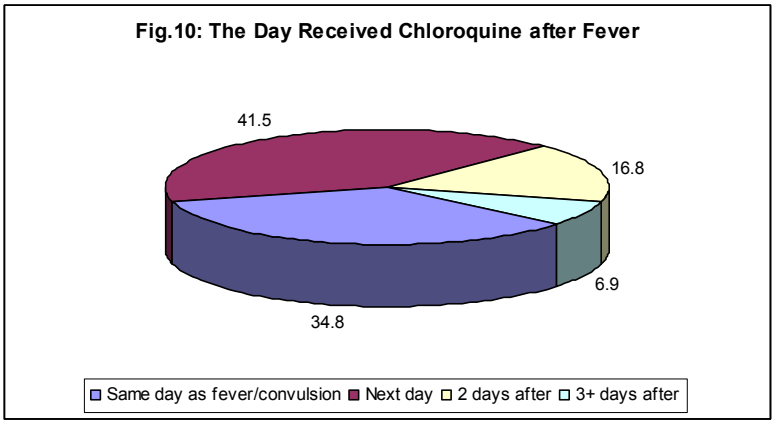


Table 9 shows, that the mostly received malarial drug was Chloroquine.



The first dose of Chloroquine was received on the same day or on the next day of the onset of fever/convulsions (Figure 10). Tthe major source of receipt of Chloroquine was health facilities. We checked for the predictors of receiving any malarial drug through a logit regression.

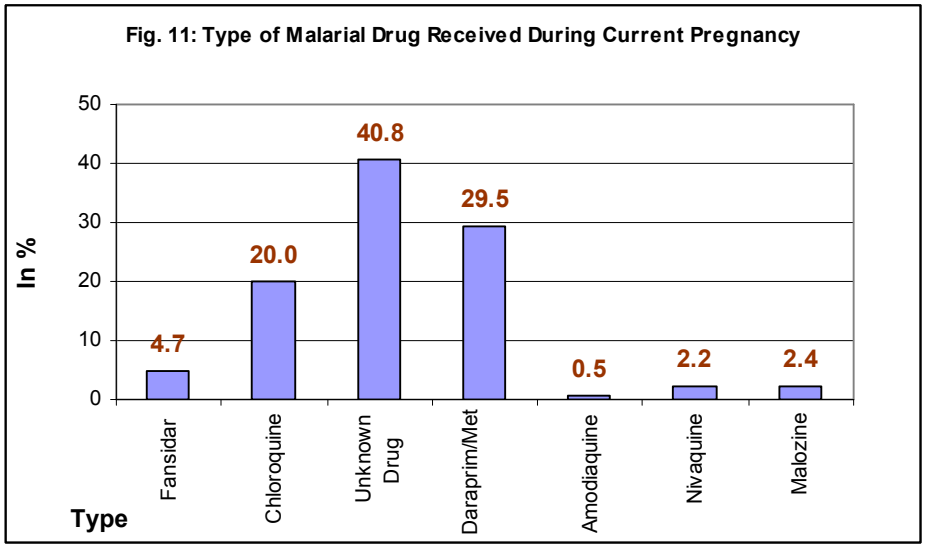
Table 13: Predictors of Receipt of Malarial Drugs among Children

Predictors	**Exp (ß)**
Demographic, Socio-Economic	
Place of residence	
Urban [R]	
Rural	1.286*
Wealth Index	
Poor [R]	
Medium	1.450***
Rich	1.845***
Contextual Factors	
Prevalence areas	
Low [R]	
Medium	.635***
High	.442***
Proximate variables	
Possession of bed nets	
No	
Yes	.726
Child slept under bed-net last night	
No	
Yes	1.451
Constant	.109***

*** p <.001, ** p <.01, * p <.05

As shown in the Table 13, controlling for other parameters in the regression model, the children from medium or high malarial prevalence areas showed lower chances of receiving malarial drugs. This leaves a major concern for the effective implementation of malarial eradication programme in the country.

In case of 11 percent of the women was found pregnant at the time of survey, information was collected on their status of receiving malarial drugs. As mentioned earlier, in terms of preventive measures of malarial, pregnant women in Nigeria, across the regions shows a considerably discouraging result. While, only 6.4 percent of them slept under bed-net on the previous night of the survey. However, in terms of curative measures of malaria, a total of 31 percent of the total pregnant women reported to receive any malarial drug during the current pregnancy. Figure 11 shows that a majority of the currently pregnant women reported to receive unknown drugs for malaria (40 percent) followed by country specific malarial drug Daraprime/Met (30 percent) and Chloroquine (20 percent).



We attempted to check for the predictors of receiving malarial drugs in case of pregnant women. Table 14 shows, controlling for other selected parameters used in the model,

Table 14: Predictors for Receipt of Malarial Drugs among Currently Pregnant Women

Predictors	Exp (ß)
Demographic, Socio-Economic	
Number of pregnancy ©	1.093***
Place of residence	
Urban®	
Rural	.511***
Wealth Index	
Poor ®	
Medium	1.527***
Rich	2.859***
Contextual Factors	
Prevalence areas	
Low ®	
Medium	3.222***
High	1.412***
Proximate variables	
Possession of bed nets	
No®	
Yes	.891
Pregnant women slept under bed-net last night	
No®	
Yes	1.426
Constant	.109***

*** p <.001, ** p <.01, * p <.05

the pregnant women showed higher chances of receiving any drug for malaria, with the increasing number of pregnancy. It probably can be interpreted as the women became more experience with succeeding pregnancy, they probably generated better awareness to ask for malarial drugs during their ANC visits. The model shows that the rural women showed lesser chances of receiving malarial drugs during pregnancy, comparing their urban counter part. The women from better wealth index had better chances of receiving malarial drugs, with reference to the poor women. Women belonging from medium or high prevalence malarial regions were much likely to receive the drugs. While the variables considered as proxy for better protection against mosquitoes, such as, possession of bed-nets in the household and the status of sleeping under bed-nets last night; showed no significant impact on women's status of receiving malarial drugs during pregnancy. This probably denotes that though some women received malarial drugs during their pregnancy, however no comprehensive information was provided on preventive measures of malaria during pregnancy terms. This again can be taken a lesson for the malarial eradication programme in the country.

Conclusion

The Government of Nigeria had been multifaceted in their approach to make the country free from malarial. However, a major observation of the paper indicates that till date there remains only a partial coverage of bed-nets across the country. The differential in this respect, across malaria prevalence regions shows further discouraging facts. Where, the households belonging to high and medium malarial regions register further lower possession of bed-nets, comparing the low prevalence regions. The paper shows, that in-spite of the government's proactive steps towards distribution of ITN in the country, only a marginal proportion of the population could have been covered under the scheme. It can be inferred that though the possession of bed-nets is still considerably low in the country, however possession of other protective methods against mosquito bites are not very rare. However, again a sharp differential exists across the regions of malarial prevalence. A neighbourhood effect is observed in terms of possession of protective method against mosquito bites. To elaborate, a much higher proportion of household members from low income brackets, belonging to low-malaria prevalence regions reportedly possess any protective method against mosquito, comparing their counter part from high malaria prevalence areas. On the other hand, though logically the household members from rich households could afford to possess the methods, a considerably lower proportion reported to possess such, if belonged to the high malarial prevalence regions.

Additionally, a much higher proportion of the household members belonging to high prevalence regions reported to store drinking water in houses, exhibiting larger chances of in-house breeding of mosquitoes. Overall, only 6 percent of both children below age five and pregnant women were found used bed-net at the previous night of the survey. The result confirmed that the possession of bed-nets was not sufficient to cover all the children or pregnant women members of the households. As a result, the children were better preferred over pregnant women for sleeping under bed-nets at night. The fact should be taken as a serious concern.

Overall, the reported prevalence of fever during the survey was higher among the children belonging to medium and high malarial prevalence households. With regard to curative measures against malaria, a marginal proportion of children reported suffering from fever or convulsions, received malarial drugs. The children from high and medium malaria prevalence areas showed lower chances of receiving malarial drugs, comparing their counterparts from low prevalence areas. This is obviously matter of concern. Surprisingly, a majority of the pregnant women reportedly received unknown drugs for malaria during their pregnancy. This leaves doubts on whether the women failed to recall the name of the received drugs or indeed the drug distributed among them during pregnancy was not among the usual scheduled drugs for malaria during pregnancy? An interesting observation shows that with higher number of pregnancy, the women showed better chances of receiving malarial drugs. Pregnant women belonging to high and medium malaria prevalence areas however showed better chances of receiving known drugs for malaria. However, the results indicate that probably no

comprehensive information is provided to the women during ANC regarding prevention of malaria during pregnancy terms, which could be used as an effective way to curb down the prevalence of malaria among this targeted group.

Overall based on the analysis of DHS-2003 dataset, it can be inferred that the Government of Nigeria still has a long way to go if to eradicate malaria from the country. Coverage of protective methods against mosquito bites and in-house spraying of insecticides may pose a simple solution to the problem, but till date remains illusive.

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