

# **THE EFFECT OF INSECTICIDE-TREATED-NETS AND SLEEPING PLACE ON MALARIA PREVALENCE IN SCHOOL CHILDREN, ELSSOKI TOWN, SUDAN**

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## **Abstract**

A survey was carried out in Elssoki town, central Sudan to investigate the effect of insecticide-treated nets (ITNs) and sleeping place on prevalence of malaria in primary school children. Using multi-stage sample technique, 394 children involved in the study. Blood samples were collected, prepared and examined by microscope. Other relevant data were obtained from children and their parents. The prevalence of malaria was 10%. Strong statistical significance was revealed between malaria prevalence and use of insecticide-treated nets (Relative risk = 7.76, 95% Confidence interval= 5.64 - 10.68) as well as outdoor sleeping (Relative risk = 18.6, 95% Confidence Interval (CI) = 10.9-31.7). Usage of insecticide-treated nets (ITNs) either outdoor or indoor might give a considerable reduction of malaria infection rate.

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**Keywords:** Insecticide, nets, malaria, prevalence, outdoor

## **Introduction**

Malaria is a parasitic disease cause by *plasmodium* species and transmitted by several species of *Anopheles* mosquitoes. The disease is spread commonly in tropical and subtropical regions. Malaria causes about 400-900 million cases of fever and approximately one to three million deaths Annually, majority of cases occur in children under the age of 5 years (Nwuzo et al, 2013). Malaria is a major disease throughout Sudan, particularly, in areas where irrigation agricultural projects are found. In a study carried out in a rural community around Kenya's largest dam, it was

found that malaria is most prevalent within the people residing nearer to the dam and decrease as we move away from the dam (Kioko and Elias, 2012).

Insecticide-treated-nets (ITNs) are effective at reducing malaria in children and adults (Igwe et al, 2007). World Health Organization (WHO) position statements of 2006 and 2007 supported the use of indoor residual spraying and long-lasting insecticidal nets respectively and recommended their implementation at high coverage for the control and ultimate elimination of malaria (John, 2012). Insecticide-treated-nets not only confer personal protection against infectious bites but can also reduce the survival, feeding frequency, feeding success, and density of vector mosquito populations (Nicodem et al, 2010). In South Central Somalia a study revealed that the protective effect of nets on infection prevalence among the sampled populations was consistent across age-groups (Abdisalan et al, 2008).

Outdoor sleeping pattern may lead to high exposure rate of mosquito biting. It was reported that the propensity for mosquito biting on Bioko Island, Equatorial Guinea was significantly higher outdoors than indoors with  $p < 0.001$  (Hans et al, 2012). Mosquitoes that bite people outdoors can sustain malaria transmission even where effective indoor interventions such as bed nets or indoor residual spraying are already widely used (Nancy et al, 2013).

The proportional rate of Malaria in Sudan is 21% of all diseases (Ibrahim, 2006). Many control measures are implementing in Sudan including distribution of insecticide-treated nets. In a study conducted in Sudan, it was found that the prevalence rate of malaria decreased significantly ( $P= 0.002$ ) in those who used the insecticide-treated-nets (ITNs) on daily bases compared to those who used it during the rainy season (Ibrahim, 2006). To reach effective control program of malaria, the current control measures should subjected to assessment continuously. This study is an attempt to contribute to the field of control of malaria in Sudan.

## **Material and methods**

### **Study area**

Elssocki town is agricultural area located in Sinnar State. The town is populated by 24832 persons and occupied approximately 8 square kilometer. The annual rainfall ranging from 200 to 800 mm, the average of relative humidity is 50%, temperature ranges from 25° C to 40° C during the dry season and 22° C to 35° C during the rainy season. Malaria National Control Program, which supported by Unicef and World Health Organization, distributed impregnated bed nets in the area as malaria control measure.

## Sampling and examination

The study carried out in eight primary schools. Using multi-stage sample technique, 394 children were selected out of 1331 children. The study group included 182 boys' and 167 girls.

Blood samples were collected, prepared and examined by microscope in malaria referral lab at Singa town, Sinnar State. Other data were collected from children and their parents.

## Results

In table one, 35 out of 349 primary school children were malaria positive which they represented 10%. Children who were not using insecticide-treated nets were more affected with malaria 32(46.4%) than children who were using nets 3(1.1%) as shown in table 2 (relative risk (RR) = 7.76, 95% Confidence Interval (CI) = 5.64 - 10.68). The highest percentage 29(67.4%) of malaria was observed among children who were sleeping outdoors as displayed in table 3 (Relative Risk (RR) = 18.6, 95% Confidence Interval (CI) = 10.9 - 31.7).

**Table (1): Prevalence of Malaria in Primary School Children, Elssoki Town, Sudan.**

Result	No	%
Positive	35	10
Negative	314	90
Total	349	100

**Table (2): Relationship between using insecticide-treated nets (ITNs) and Malaria infection in Primary School Children, Elssoki Town, Sudan.**

bed nets	Malaria					
	Infected		Non-infected		Total	
	No	%	No	%	No	%
Not use	32	46.4	37	53.6	69	19.8
Use	3	1.1	277	98.9	280	80.2
Total	35	10	314	90	349	100

Relative Risk (RR) = 7.76

95% Confidence Interval (CI) = 5.64 - 10.68

**Table (3): Relationship between sleeping place and Malaria infection in Primary School Children, Elssoki Town, Sudan.**

Place	Malaria					
	Infected		Non-infected		Total	
	No	%	No	%	No	%
Outdoor	29	67.4	14	32.6	43	12.3
Indoor	6	2	300	98	306	87.7
Total	35	10	314	90	349	100

Relative Risk (RR) = 18.6

95% Confidence Interval (CI) = 10.9 - 31.7

## **Discussion**

Children are considered a vulnerable group for many infectious diseases, particularly, in developing countries. Many studies throughout world have studied potential health risks that children expose to. Malaria infection in tropical regions is one of these risks. The present study found that the prevalence of malaria in primary school children was 10%. In a previous study in Sinnar town, malaria load out of total paediatric admissions was 45% (Zeidan et al, 2005). In eastern Sudan, the malaria prevalence ranged from zero to 11.7% (Yousif et al, 2005).

The present study revealed strong statistical significance between insecticide-treated nets (ITNs) and malaria prevalence (Relative Risk = 7.76, 95% Confidence Interval = 5.64 - 10.68). In Blue Nile State, Sudan, using of insecticide-treated nets lead to reduction of malaria prevalence with p value=0.002 (Ibrahim, 2006). This finding also documented in southeast Nigeria ((Igwe et al, 2007) as well as in Central Somalia (Abdisalan et al, 2008). In addition to protection of human from mosquito bites, insecticide-treated nets also offer considerable reduction in mosquito density via killing action (Nicodem et al, 2010). Despite the efficacy of these nets, most of people either neglect or ignore usage of bed nets. Malaria vectors start biting by late evening when people are not yet go under bed nets, this represent an opportunity to transmit the disease.

Outdoor sleeping is a common habit in Sudan; people who sleep outdoors are exposed to mosquito bites result in developing malaria infection. Our study illustrated statistical association between malaria infection and outdoor sleeping (Relative Risk= 18.6, 95% Confidence Interval= 10.9 - 31.7). This might attribute to that the activity of mosquito biting outdoor more than indoor (Hans et al, 2012).

## **Conclusion**

Primary school children in Sinnar town, Sudan, are exposed to develop malaria with high percentage. The use of insecticide-treated nets (ITNs) and outdoor sleeping are factors associated with malaria infection. The usage of nets should be encouraged; this role can be done by community-based organizations and community opinion leaders in the area.

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