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MALARIA PREVALENCE IN UNDER FIVE CHILDREN UTILISING INSECTICIDE TREATED NETS THROUGH VOUCHER SCHEME PROGRAMME IN MTWARA MUNICIPALITY
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ABSTRACT

***Objective*: To determine the malaria prevalence in under five year old children, comparing those utilising with those not utilising insecticide treated nets in Mtwara Municipality.**
***Design*: Descriptive cross-sectional study.**
***Setting*: Five streets that were randomly selected in Mtwara Municipality.**
***Subjects*: Three hundred and ninety eight (398) under five year old children.**
***Results*: In the 398 under five year old children in this study, 18(4.5%) and 20(5.0%) tested positive by RDT and microscopy, respectively. Of the 385 who always used Insecticide Treated Nets (ITNs), 16 (4.2%) had malaria, compared to four among the 13 who rarely/or never used nets (30.8%). Thus there is a relationship between the use of the treated nets and prevalence of malaria (x^2 P-value 0.002). Inspite of the decline in malaria prevalence anaemia remain a big problem as among those 378 who tested negative for malaria, 81% had haemoglobin level below normal (8 and 11g/dl).**
***Conclusion*: Malaria infection has been prevented by the ITNs in under five years children as the prevalence of malaria is only 4.2% among net users compared to 30.8% non net users. The ITNs are useful since the overall five percent prevalence of malaria is less than expected in Mtwara region which had the prevalence of 33.6 percent in 2007 and less to the overall national prevalence of seven percent in under fives in urban areas in 2009. *Plasmodium falciparum* species is still a notorious cause of the disease among under fives compared to other types, thus the preventive measures should scientifically target this species at large.**

INTRODUCTION

Malaria is a parasitic disease transmitted by the bite of a female Anopheles mosquito and in Tanzania it is mainly caused by *Plasmodium falcipram*. Other parasites causing malaria include *P. vivax, P. malariae* and *P. ovule* all transmitted by the bite of a female anopheles mosquito at night. The disease is spreading even to the areas where not previously reported or where it had been eliminated (1). The transmission is determined by environmental factors which favour the breeding of the mosquitoes and poor socio-economic status (2). It causes more than 300 million acute illnesses and one million deaths annually worldwide, and ninety per cent of mortalities are in sub-Saharan Africa. An African child dies due to malaria every 30 seconds, making a mortality of 3,000 children each day or totaling to more than one million per year (3).

More than 40 percent of all outpatient attendances are attributed to malaria (8) and the high prevalence is in children of six months up to 59 months. By region, prevalence of malaria in Kagera is 41.1%, Lindi 35.5 %, Mtwara 33.6%, Mwanza 31.4% and Mara 30.3% (9).

Moreover severe malaria in children below five years in Africa is often complicated by severe anaemia, cerebral malaria and other symptoms(4). The survivors of an episode of severe malaria may suffer from mental impairment, chronic renal failure and enlarged spleen. In Tanzania, under five mortality rates are 91 per 1000 live births, that is approximately one in ten children die before their fifth birth day (7). In Zanzibar the prevalence of malaria has declined (6). Tanzania has the third largest population at risk of malaria in Africa after Nigeria and the Democratic Republic of Congo (7). Since 2004 a serious malaria control strategy using ITNs has been implemented in Tanzania including Mtwara. A total of 2,209,926 ITNs

has been distributed national wide since 2004 (8).

MATERIALS AND METHODS

The study was a descriptive cross-sectional quantitative and the study subjects were all under five children in randomly selected streets of Mtwara Municipality (area about 163 sq kms). This is one of the five districts in the Mtwara Region, Tanzania, situated along the coast of the Indian Ocean. The Municipality is neighboring with Mozambique to the south and with Mtwara Rural District to the north and west.

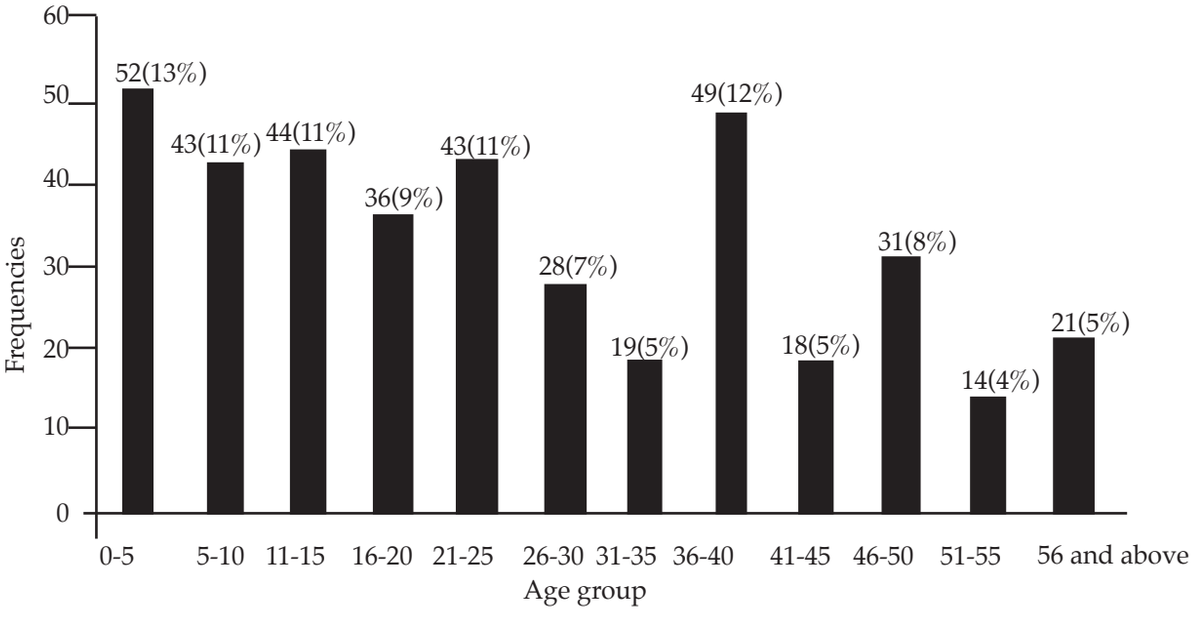
All under five children whose parents consented for examination were enrolled; seriously ill children were excluded. A structured questionnaire in Kiswahili was used. Malaria Rapid diagnostic tests (RDT), microscopy and haemoglobin machine were used. Ethical clearance was given by the International Medical and Technological University, Municipal Medical Officer, Ward executive officers and Street Leaders. Data processing and analysis was by computer software SPSS 15 version. In this study, the limitation was the representativeness. The data was representative of an urban community in Mtwara and cannot be generalised to the whole region or Tanzania.

RESULTS

0f all 398 under five year old children, 225(57%) were male and the rest 173(43%) were females with the age of the majority 52(13%) being less than five months and were the turget to use ITNs through HATI PUNGUZO.

One hundred and ninety four (48.74%) of under five children involved in the study weighed between seven and eleven kilograms and the minority 24 (6.03%) were 17 and 21 kilograms and 306 (76.9%) were in the green zone reflecting normal growth, 26 (6.5%) grey, and three(0.8%) red zones were stunted grown. Young parents 42.2% found to be responsible rather than elderly 1.3% and more than half 236(59.3%) were married , 67(16.8%) coharbiting this shows the stabilty of the family and fully participation of child care. Many of the parents 269(72.7%) were house wives not engaging in any activity to earn money and this reflected the limited income of the family.

Figure 1
60 Age of children in months



Of the 398 respondents 301 (75.6%) did not receive Hati Punguzo (HP) from the RCH Clinics during their visists. However, the low percentage coverage of HP can be atributed to the study covering even those children below nine months who are not eligible to receive the HP. The use of ITNs was, however, found to be 385 out of 398 (96.7%) among under fives. Probably the mother received HP during pregnancy as well as other nets during community distribution. The study found fever 188(47.2%) and cough /difficulty in breathing being the cardinal symptoms reported, one (0.3%) reported to have dysentery and none of them found to have spleen palpable implicating absence of persistence of malaria in a community and of course other diseases that may cause splenomegally.

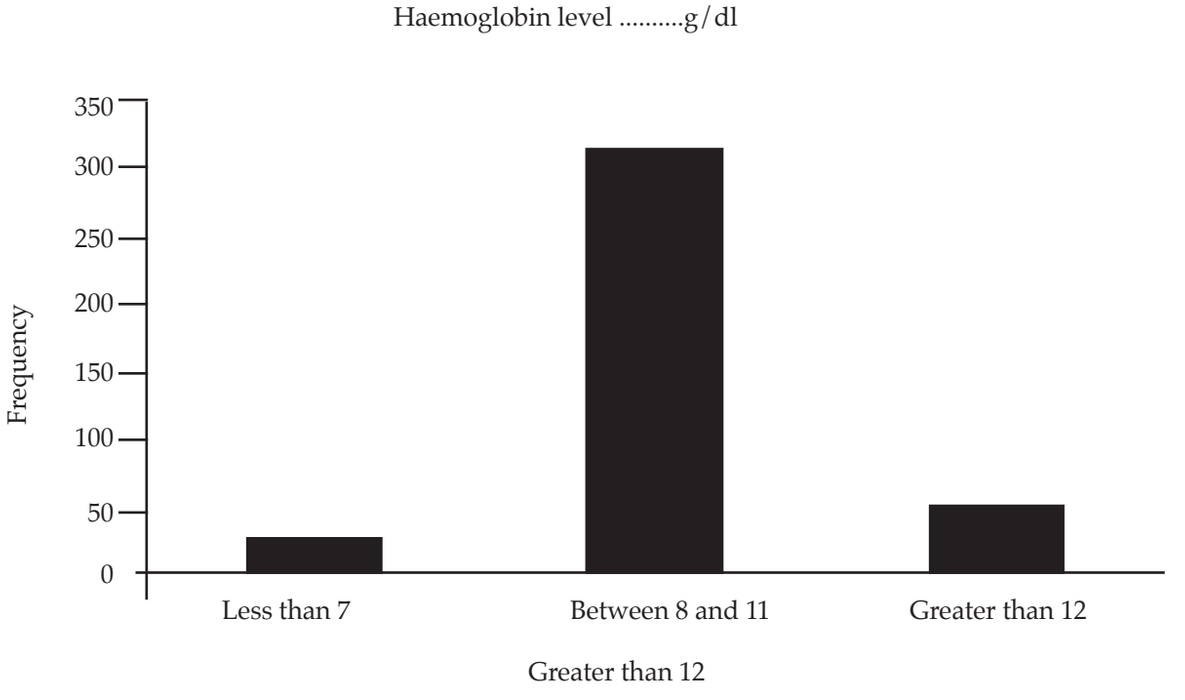
P. falciparum Malaria cases were 18(4.5%) of all 398 tested by MRDT. By microscope check, malaria positive were 20(5%) of all 398 respondents. Among

385 who always use treated nets 16 (4.2%) were positive for Malaria, compared to four (30.8%) positive test for Malaria among 13 who rarely / never used nets.

The relationship between the prevalence of malaria and uses of the treated nets is significant at k^2 p-value 0.002(Fishers exact Test). *Plasmodium parasitaemia* is statistical significantly associated with the use of ITNs k^2 at p-value (Pearson Chi-Square) 0.000. Only two species were found to infect the children, and majority 80%were infected by *p.falciparum* species and the rest 20% by *p.vivax*. The relationship between the prevalence of malaria and uses of the treated nets is statistical significant associated k^2 at p-value 0.002 (Fishers exact Test).

Of all 398, 320(80.4%) had HB level below normal range and among 378 who tested negative for Malaria by blood smear 87.1% had Hb level less than 12g / dl. There is a statistical significant relationship between malaria and haemoglobin level (Pearson Chi-Square) p-value 0.004.

Figure 2
Indicating Haemoglobin level(g/dl) in under fives



DISCUSSION

A total of 398 (100%) under five children selected for the study, in which all 398, 4.5 and 5.0% tested positive by RDT and microscope respectively. This is 2% less than that reported by DHS in which 7% of children in urban areas had malaria compared to 20% in rural areas and also that there is a decline of the malaria prevalence from 33.6% to just 5% in Mtwara Municipality (Demographic Healthy Survey, March 2009). Dar es salaam had malaria prevalence of 24% in 2004 and four years later after ITNs utilisation felt to just four percent (8). This indicates that in Mtwara the prevalence of malaria can reduce after the use of ITNS. These results also differ from those of the study conducted in rural pastoralist communities and rural riverine communities in Somalia in 2008 that showed the prevalence of *P. falciparum* in under five children utilising ITNs as 19.6% (13). Only two species were found to infect the children in which 16 (80%) of 20 tested positive by microscope had *Plasmodium falciparum* species and the rest 20% *Plasmodium vivax*.

Of all 385 who always use Insecticide Treated Nets (ITNs) only 16 of them equivalent to 4.2% have positive test for Malaria, compared to among 13 who rarely / never used nets 4 of them (30.8%) have positive test for Malaria. This means that, none net users among under five children are more likely to be infected by malaria by 30.8% and net users are likely to be infected by 4.2% reflecting protective efficacy of ITNs. Similar results were found in Luangwa District, Zambia, in 2008 and 2010 in which a total of 1,595 households sampled in 2008 and 2010, 1,190 children had blood tested for malaria parasites. The overall parasite prevalence infection was 9.7% among under five children utilising ITNs (12). The prevalence of malaria among net users (4.2%) is similar also to that found in Somalia rural areas in 2008 in which the overall infection prevalence was significantly lower (6.9%) among net users compared to 17.0% in on-net

users. Age wise, malaria prevalence among net users and non-net users was 10.0% and 20.9% respectively in Somalia under five year olds.

There were no spleen palpable among respondents, correlating with the study done by Salim Abdulla *et al* (11), which showed a higher splenomegally protective efficacy of 71% (39% to 87%) for children with untreated nets and 76% (52% to 88%) for those with treated nets (10).

Inspite of the decline in malaria prevalence anaemia remain a big problem. Of all 378 who tested negative for malaria, 81% had haemoglobin level between 8 and 11g/dl. Other reasons for anaemia, such as hookworms and diet should be investigated. Indeed this problem is unlikely to be caused by malaria only.

In conclusion, malaria infection can be prevented by the ITNs in under five years children as the prevalence of malaria is only 4.2% among net users compared to 30.8% non-net users. The ITNs are useful since the overall five percent prevalence of malaria is less than expected in Mtwara region with prevalence of 33.6 percent in 2007 and less to the overall national prevalence of seven percent in under fives in urban areas in 2009. *Plasmodium falciparum* species is still a notorious cause of the disease among under fives compared to other types, thus the preventive measures should scientifically target this species at large.

The 4.2% prevalence among net users may be explained in terms of improper use of nets on the beds, size of the nets/beds. So the proper use of ITNs and continuum offering of nets in triad of sources should be advocated. However, it is difficult to extrapolate the exact time when malaria was contacted among positive children, that is if they were infected indoor or outdoor.

There were no indicators for the persistence of malaria infections among children like slenomegaly, thus the infection is either periodical or seasonal and timely intervention is mandatory. ITNs are essential tools to combat the severity of malaria infection in under fives and thus increasing welfare of the community.

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