Prevalence of malaria, household coverage with long lasting insecticidal nets and factors associated with bed net use among school children in Butiama district, Tanzania.

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PREVALENCE OF MALARIA, HOUSEHOLD COVERAGE WITH LONG LASTING INSECTICIDAL NETS AND FACTORS ASSOCIATED WITH BED NET USE AMONG SCHOOL CHILDREN IN BUTIAMA DISTRICT, TANZANIA

By

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A dissertation Submitted in (partial) Fulfillment for the Requirement for the Degree of Master of Science (Applied Epidemiology) ofMuhimbili University of Health and Allied sciences

Muhimbili University of Health and Allied Sciences

October2017

CERTIFICATION

The undersigned certifies that he has read and hereby recommends for acceptance by Muhimbili University of Health and Allied Sciences a dissertation/thesis entitled ***"Prevalence of malaria, household coverage with long lasting insecticidal nets and factors associated with bed net use among school children in Butiama District, Tanzania",***in (Partial) fulfillment of the requirements for the degree of Master of Science in (Applied Epidemiology) of Muhimbili University of Health and Allied Sciences.

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(Supervisor)

Date……..

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DrRogathSaikaKishimba

(Supervisor)

Date……..

DECLARATION AND COPYRIGHT

I, **Baraka MatikuNyakuya**, declare that this **dissertation** is my own original work and that it has not been presented and will not be presented to any other University for a similar or any other degree award.

Signature_____ Date_____

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DEDICATION

This dissertation is dedicated to my ever loved father, Mwl. MatikuNyakuya, his wisdom and prayers have made me the man who I am today.

ABSTRACT

Background

Butiama District is among the highly malaria endemic areas in Tanzania. The National Malaria Control Program (NMCP) distributed free Long Lasting Insecticidal Nets (LLINs) to reduce malaria transmission. Available data shows high prevalence of malaria among school pupils in Butiama. No routine health system that monitors malaria control interventions such as LLINs coverage and use. Use of school pupil's report have been shown to be a good proxy for the community estimation of malaria burden and assessing effectiveness of malaria interventions.

Objectives: This study examined the prevalence of malaria, household LLINs coverage and use factors associated with bed net use among school pupils in Butiama district, Tanzania.

Methods:A quantitative cross sectional survey was carried out among primary school pupils in Butiama District. A multi-stage sampling technique was used. Pupils were interviewed regarding LLINs coverage, perceived safety and factors associated with net use. Then a malaria test from a finger prick using malaria Rapid Diagnostic Test (mRDT) and Blood Slide (BS) for microscopy was taken. Data was entered into a computer using Epi data, then transferred to STATA for analysis. Ethical approval was obtained from Muhimbili University of Health and Allied Sciences (MUHAS) Ethical Board before the beginning of the survey.

Results:A total of 590 school pupilsparticipated in this study. The overall ownershipof at least one LLIN was 95.4% with a universal coverage of 69.7%. The average number of nets per household was 3 ± 1.72. The most mentioned source of LLINs was free mass distribution 78.5% followed by School Net Program (SNP) 30%.

In households with at least one LLIN 92.4% of the under-fives slept under LLINs a night before survey compared to 75.6% of school pupils.

The overall malaria parasite prevalence by mRDT in school children at Butiama District was found to be 16.1% CI (13.34, 19.30), (95/590) but by microscopy was found to be

6.44% (68/590), 95% CI (4.72%, 8.74%). Malaria prevalence was significantly lower among pupils who slept under ITNs than those who did not. (P=0.029).

Conclusion: Malaria prevalence has declined inButiama District among school children compared to the previous studies. Universal coverage of LLINs is not yet attained.

Recommendations:

Further studies should be done in Butiama to look at what factors contributes to high malaria transmission in Butiama despite of high ITN coverage and use.

TABLE OF CONTENTS

CERTIFICATION ii
DECLARATION AND COPYRIGHT iii
ACKNOWLEDGEMENTS iv
DEDICATION v
ABSTRACT vi
TABLE OF CONTENTS viii
LIST OF FIGURES xii
ABBREVIATIONS xiii
DEFINITION OF TERMS xiv
CHAPTER ONE 1
1.0 INTRODUCTION 1
1.1Background 1
1.2 Problem statement 3
1.3 Conceptual framework 4
1.4 Rationale of the study 5
1.5 Research question 5
1.6.0 Objectives 5
1.6.1 Broad objective 5
1.6.2 Specific objectives 5
CHAPTER TWO 6
2.0 LITERATURE REVIEW 6
2.1 Prevalence of malaria in school children 6
2.2 Household net ownership 7
2.3 Net use in school children 8

2.4 Factors affecting net use among primary pupils 9
CHAPTER THREE 10
3.0 MATERIALS AND METHODS 10
3.1 Study area 10
3.2 Study population 10
3.3 Study design 10
3.4 Sampling procedure 11
3.5 Sample size calculation 11
3.6. Selection criteria 12
3.6.1 Inclusion criteria 12
3.6.2 Exclusion criteria 12
3.7 Variables 12
3.8 Data collection tools 12
3.8.1Testing procedures and treatment of children with malaria 12
3.8.2 Quality control of BS malaria tests 13
3.8.3 Malaria treatment 13
3.9 Required resources 13
3.10 Data management and analysis 13
3.12 Dissemination plan 14
CHAPTER FOUR 15
4.0 RESULTS 15
4.1 Characteristics of the study population 15
4.2 Household ownership and sources of LLINs 16
4.3 Reported household use of LLINs 17
4.4 Malaria prevalence by mRDT 18
4.5 Malaria prevalence by microscopy blood slide (BS) 19

4.6 Reported other uses of LLINs 19
4.7 Safety perception of LLINs 19
4.8 Factors associated with net use among primary school pupils 20
CHAPTER FIVE 22
5.0 DISCUSSION 22
5.1 Prevalence of malaria in school children using mRDT 22
5.2 Net ownership and use 23
5.3 Factors associated with net use 24
6.1 CONCLUSION 26
6.2 RECOMMENDATION 26
Reference 27
8.0 ANNEXES 33
8.1. Informed consent form, English version 33
8.2: Informed consent, Swahili version 35
8.3: Questionnaire English version 37
8.4: Questionnaire Swahili version 43

LIST OF TABLES

Table 1: Distribution of study population according to socio-demographic characteristics 15
Table 2: Reported household ownership and source of LLIN in Butiama during the study period. 16
Table 3: Reported use of LLINs among members of the household at Butiama District during the study period. 17
Table 4: Malaria prevalence by sex among pupils who slept under LLIN a night before survey 18
Table 5: Factors associated with net use among school pupils 21

LIST OF FIGURES

Figure 1: Conceptual framework 4
Figure 2: Mara Region map showing Butiama District 10
Figure 3: Reported other uses of LLINs by school pupils in Butiama during the study period 19
Figure 4: Reported feared effects of using LLINs among primary school pupils in Butiama district during the study period 20

ABBREVIATIONS

ALU	Artemether-Lumefantrine
BS	Blood slide for malaria
DED	District Executive Director
DEO	District Education Officer
DHS	Demographic and Health Survey
DLT	District Laboratory Tecknologist
DMO	District Medical Officer
IPTp	Intermittent preventive treatment in pregnancy
ITN	Insecticide Treated Nets
LLIN	LongLasting Insecticide Treated Nets
mRDT	Malaria Rapid Diagnostic Test
MUHAS	Muhimbili University of Health and Allied Sciences
NMCP	National Malaria Control Program
RBM	Roll Back Malaria
SMPS	School Malaria Parasitological Survey
SNP	School Net Program
TFELTP	Tanzania Field Epidemiology and Laboratory Training Programme
TDHS-MIS	Tanzania Demographic and Health Survey and Malaria Indicator Survey
THMIS	Tanzania HIV/AIDS-Malaria Indicator Survey
UCC	Universal Coverage Campaign

DEFINITION OF TERMS

Household refers to the people sharing the same cooking pot for their meal

Universal coverage means achieving an overall ratio of 1 LLIN for every 2 persons per household.

Insecticide Treated Net (ITN) is a mosquito net that repels, disables and/or kills mosquitoes coming into contact with insecticide on the netting material. Two categories of ITNs are conventionally treated nets and long lasting insecticidal nets.

Long Lasting Insecticidal Nets (LLINs) are mosquito bed nets that have been industrially treated with insecticides and they may last 3-5years without losing its potency even after 20washes.

Malaria is a disease caused by the parasite of the genus *Plasmodium* that is transmittedby the female *Anopheline* mosquitos.

Pupils means children studying in primary schools

Prevalence means the proportion of a population that is affected by disease at a given time

CHAPTER ONE

1.0 INTRODUCTION

1.1Background

Malaria poses a tremendous public health problem across the globe with an estimated 3.3 billion, or 40 percent of the world's population, living in areas of malaria risk. Worldwide, an estimated 219 million malaria episodes and 660,000 malaria deaths occurred in 2010 (1).After many years of poorly coordinated and insufficient global response to malaria, the Roll Back Malaria (RBM) was founded in 1998. The main goal was to advocate, raising political commitment, developing appropriate agendas and engaging all stake holders in the fight against Malaria by increasing access to the most effective and affordable protective measures(2).These measures includes the scaling up coverage and use of Long Lasting Insecticidal Nets (LLINs) and increased coverage of prompt and effective malaria treatment.

In the year 2013, the World Health Organization (WHO) urged all Malaria endemic countries to apply different methods to make sure that universal coverage of LLINS is achieved and maintained (3).This was after the observed remarkable reduction in the burden of Malaria in areas with good coverage and use of LLINs.The last decade witnessed a rapid scale up of mosquito bed net coverage in sub Saharan African countries targeting at first the most vulnerable groups, i.e. the under-fives and pregnant women and more recently aiming at achieving a universal coverage of Long Lasting Insecticides Treated Nets to cover over 80%of the total population at risk of malaria in Africa.

In Tanzania, the recommendations of the RBM Initiative were implemented through the National Malaria Control Strategy(4). The National Malaria Control Strategy also includes other vector control measures such as indoor residual spraying (IRS) in highly endemic Districts and epidemic prevention and control. The Government of Tanzania, primarily through the Ministry of Health, Community Development, Gender, Elderly and Children (MOHCDGEC) is committed to the control and prevention of malaria through its National

Malaria Strategic Plan (NMSP) for 2014 – 2020 with the general goal of halving malaria prevalence from 10% in 2014 to 5% by 2016 and to less than 1% by 2020 (5).

Insecticide treated nets (ITN) have proven to be one of the most effective measures for preventing malaria (6).They have been shown to reduce the incidence of uncomplicated malaria episodes in both areas of stable and unstable malaria, reduce malaria severity, reduce parasite prevalence, reduce parasite density, reduce splenomegaly rate and improves hemoglobin levels in children (6).

Since the year 2000, NMCP through National Insecticide Treated Nets program had been using different methods to deliver ITNs. It started with the Tanzania National Voucher System which provided ITNs to pregnant women at antenatal clinics at a subsidized price(7). In the year 2009 NMCP distributed ITNs to the under-fives through the under-five catch-up campaign which was followed by the first Universal Coverage campaign in2011 intended to achieving universal coverage of 80%(8).

Continuous distribution channels need to be in place to maintain universal coverage at 80% otherwise population access to LLIN acquired through Universal Coverage Campaign (UCC) will drop below threshold of 60% in three years (9). After the 2011 UCC in Tanzania, there was an interim period in 22 of the 25 regions during which an assessment of which keep-up mechanism should be used to keep the universal coverage at 80% while waiting for the results of a pilot study which was going on in three regions of Southern Zone. Later on, the accepted model was replacement distribution campaign followed by a keep-up mechanism within one year with a combination of school-based distribution together with targeted distribution to pregnant women and infants (9). In 2015 an implementation of the accepted model was brought into action by country wide UCC followed by the above keep up mechanisms in areas of high malaria endemicity in Lake Zone.The initial LLIN distribution mechanism gave a special priority to pregnant women and the under-fives. This has led to a shift in malaria burden from the under-fives to the older primary school pupils.

The burdenof malaria among primary school pupils in Tanzaniavaries depending on the geographical location (10). The commonest species which causes malaria in Tanzania is *Plasmodium falciparum*. Previous studies in Lake Zone showed high prevalence of malaria in school children as compared to other areas of the country(11–13).

It has been postulated that LLINs is associated with an average 20% reduction in overall parasite prevalence across a number of different geographic contexts accompanied by precipitous drops in certain *Anopheles* vector species(14).Universal coverage of LLINs remains the goal for all people at risk of malaria.

Mass campaigns are a cost-effective way to rapidly achieve high and equitable coverage, but coverage gaps start to appear almost immediately post-campaign through net deterioration, loss of nets, and population growth, requiring complementary continuous distribution channels(3). Seasonal changes has been shown to influence net usage, more usage seen during the rainy season(15). Other studies in Africa found education level, significant number of nuisance mosquitoes, indoor low temperatures, place of resident, residing in households sprayed with IRS, fewer number of children and buying rather than receiving net for free being factors associated with net use(16,17).

1.2 Problem statement

In the year 2015, the National Malaria Control Program (NMCP) conducted a country wide primary School Malaria Parasitological Survey (SMPS). Butiama District which is in Lake zone was found to have a high malaria prevalence of 62% among primary school children(10).The high prevalence of asymptomatic malaria parasitaemia in school children was presumed among other factors to be attributed to sleeping without mosquito treated nets. There have been an ongoing distribution of LLIN in the district through various channels as part of the National campaign to achieve a universal coverage.

Routine health system that routinely monitor malaria control interventions such as LLINs coverage and use are not available (18). Monitoring and evaluation of these interventions had been done using household surveys. Household surveys such as Demographic Health Surveys (DHS) and Malaria Indicator Surveys (MIS) that monitor and evaluate malaria control interventions do not give the status at the lower administrative levels and are

expensive and time consuming (19). These surveys are done at an interval of several years and therefore may not be an ideal means for routine monitoring of malaria interventions (20).An assessment of the current malaria burden, LLIN coverage and use and factors affecting net use following the implementation of a combined control interventions was thus needed.

Moreover, an epidemiological transition with a possible shift in malaria burden from the under-fives to primary school children has been postulated. This postulate has not been answered in Butiama District.

1.3 Conceptual framework

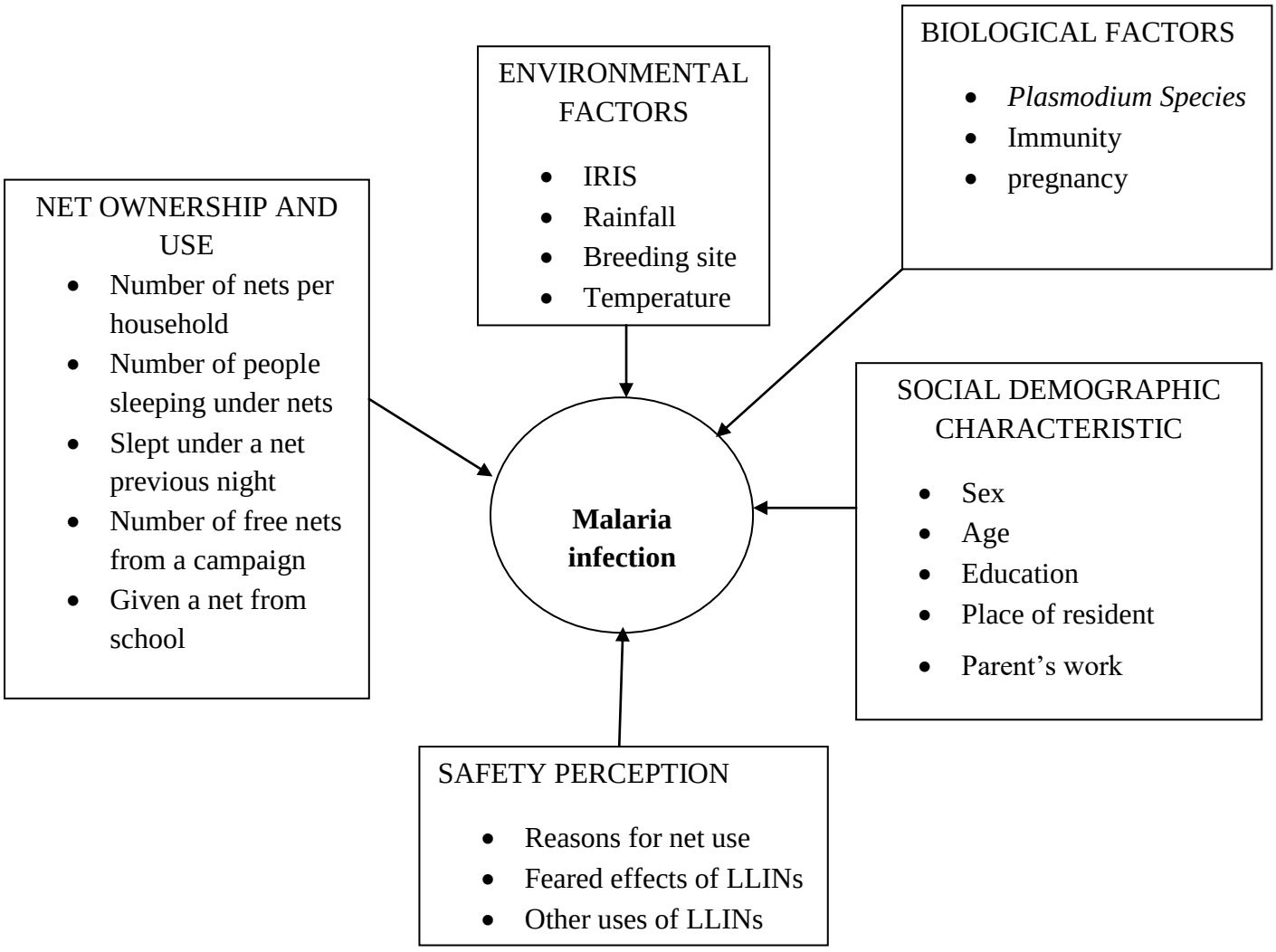


Figure 1: Conceptual framework

1.4 Rationale of the study

The burden of malaria in primary school pupils inButiama needed to be established to help the delivery of appropriate interventions to control malaria transmission among school pupils and in the community at large. School surveys provides an easy and accessible infrastructure for monitoring malaria control interventions at the community level.School surveys are used as a rapid appraisal method to evaluate malaria burden in the community and assess LLINs coverage and use.

The results of our study will be used by the NMCP, implementing partners and local health authorities (the Council Health Management Team)to know the current prevalence of malariaamong school children,ownership and use of LLINs at household level and factors affecting net use in Butiama District. This information is importantin planning malaria specific interventions which are evidence based.

1.5 Research question

What is the prevalence of malaria, household coverage with long lasting insecticides treated nets and factors associated with bed net use among school children in Butiama District?

1.6.0 Objectives

1.6.1Broad objective

To determine the prevalence of malaria, household LLINs coverage and factors associated with bed net use among school pupils in Butiama district, Tanzania.

1.6.2 Specific objectives

i. To determine the household source, ownership and use of LLINs using school children report as a proxy in Butiama District.
ii. To determine the prevalence of malaria among school pupils inButiama District
iii. To determine household safety perception of LLINs for malaria control using school children’s reports as a proxy in Butiama District.
iv. To determine the factors associated withLLINs use among school children in Butiama District.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Prevalence of malaria in school children

Children between 5 and 15 years of age account for 27.8 of population (12 million) in Tanzania. Among them only 3 million are living in areas with no malaria transmission or live in very low risk. Another 2.9 million are expected to live in the defined urban councils while the rest are located in the remaining hypo-endemic, meso-endemic and holo-endemic areas(5). Little is known about the burden of malaria in African school children but available evidence suggests that malaria causes up to 50% of all deaths in this group and may have profound consequences for learning and education achievement (21). As a consequence of the current epidemiological transition and the low acquired immunity, a possible shift in malaria incident should be considered from U5 children to school age group especially in low transmission areas (22). Knowing the prevalence in this age group could help set interventions that could reduce malaria burden among school children. One of the interventions found to be effective is administration of a full course of anti-malarial drugs to school children once a term despite of infection status. It has also found to reduce anemia and improve cognitive ability (22).

Other interventions that can be initiated from the findings of school malaria prevalence surveys are IRS in remaining high endemic areas, Intermittent Preventive Treatment for pregnant women (IPTp) and/or providing seasonal chemoprophylaxis in certain climatic zones.

In epidemic prone areas school prevalence surveys may provide useful sentinels for epidemic detection and strengthening of medical supplies in health facilities(21). Tanzania NMCP has strategic intervention to improve malaria services focuses on the standard malaria case management approach, but it should be considered that school children in low transmission areas might be immunologically naïve and prone to abrupt severe malaria forms. School children can provide an ideal platform for regular prevalence surveillance(9).

School Malaria Parasitological Survey (SMPS) 2014-2015 in Tanzania found an overall malaria prevalence of 22% in Tanzania but a high prevalence of malaria of 62% at Butiama District. This high prevalence is almost similar to the findings seen in school survey done in Southern-Malawi with the overall prevalence of 60%(24). Findings of school malaria parasitological surveys are intended to update the existing malaria epidemiological profile. It has been recommended to increase malaria control interventions to children above five years of age as malaria transmission intensity decreases and becomes more heterogeneous (25).

School Malaria Surveys have gained increased attention as a complementary approach for providing malaria surveillance data (26) and many school malaria surveys have been conducted in different African countries, such as in Ghana, Ethiopia and Malawi(24,27,28).

2.2Household net ownership

ITNs have been shown to be the most cost-effective measure to reduce malaria transmission in high transmission areas(17).Insecticide treated nets have shown to lower malaria transmission by 90%, malaria incidence by 50% and all case child mortality by 18 % (2). In most Sub Saharan African countries people are economicallyincapable to afford buying ITNs to suffice their household need and hence they need support from free mass distribution campaign.Tanzania National Malaria Control Program in collaboration and support from international donorshave been distributing free LLINs with the aim of achieving universal coverage(2,7).Net ownership and use has been shown to increase following universal free distribution campaigns. A study done in Kagera 2012 showed that the proportion of households with at least one ITN increased from 62.6% before the UCC to 90.8% after-wards and the mean number of ITNs owned per household almost doubled(29). An evaluation done in Western Kenya after UCC also shows increased ITNs coverage from an average of 46.0% in 2010 to 69%, 77.0% and 83.2% in 2011, 2012 and 2013, respectively following free distribution. ITN ownership and coverage varies from place to place depending on the modes of distribution and other social economic factors (3, 4).

In Tanzania mainland household ownership of at least one ITN varies from 22% in Manyara to 98% in Simiyu region(30). The same survey shows that the proportion of all ITNs that were used on the night before the survey was 81.2% before the UCC but was reduced to 63.8% after the UCC. The mass distribution campaigns has been associated with high levels of net ownership and use although these tend to decline rapidly over time (17). A survey done in Niger reported disappointingly low usage, leading some to conclude that free LLIN distribution through campaigns alone is not an effective way to increase its usage(31).

Resent report of the 2015-16 TDHS-MIS shows universal net coverage of 39% which is lower than that found in the 2011-12THMIS 56%(32,33). The survey found no differences between urban and rural residents with regard to ownership of at least one ITN for every two persons who stayed in the household the night before the survey(30). Studies have shown that using school pupil's reports gave a good estimate of household ownership of bed net and coverage at community level at large and could be used for routine monitoring of malaria control programs(20).

2.3Net use in school children

Until recently, school children were neglected by the malaria control programs where insecticide-treated nets (ITNs) and other interventions were mainly targeted to under-fives and pregnant women(15, 2).But recently efforts have been made to provide universal coverage of ITNs, specifically citing schools as a key delivery platform(15,16). The Tanzanian National Malaria Control Program distributed LLINs to school children in August 2016 in Lake Zone as a keep up mechanism in primary schools. This mechanism will allow the households to maintain high net ownership and use as the old and torn nets will be replaced through school net program.

ITNs usage is disproportionately low in school age children despite of living in households that reported use of LLINs(11,18,19). A study done in Iringa found only 16.1% of school children slept under a mosquito net during the previous night and indicated that about three quarters of schoolchildren who had malaria parasites were not using mosquito nets(36).

Although the proportional of school children sleeping under ITNs seems to be low in several studies, but if other house hold members were using ITNs it would still provide some residual benefit from reduced vector abundance in households with LLINs hanging(37). Hence we need also to explore net use in other members of the household in comparison to school children.

2.4 Factors affecting net use among primary pupils

High net ownership does not mean usage; For instance, a study conducted in a Southwestern State in Nigeria reported 95.3% ownership and a utilization rate of 59%(38). This is in line with a study done in RufijiTanzania which found a significant number (39.8%) of respondents with the perception that LLINs were not safe or they were uncertain on the safety of ILLNs(39). Contrary to these findings, a study conducted inKenya shows high acceptability and utilization of ITNs(40).

Community perception on safety and effectiveness of LLINs use needs to be explored and appropriate message given. If misconceptions areleft unclear; net use may decrease once safety profile is questionable and may lead to disease resurgence.We should address these communities concerns through information, education and communication to improve the LLIN usage(41).People should get the message that ITNs are safe for use in humans (42).
Other factors that had been found to influence net use include number of ITNs in the house hold, social economic status, condition of the net, education level, knowledge about malaria transmission, place of residence, ITN status and whether received ITN during distribution campaign(15,16,43).

CHAPTER THREE

3.0 MATERIALS AND METHODS

3.1 Study area

We conducted our study at ButiamaDistrict, one of the seven districts of Mara Region in Lake Zone Tanzania. Its administrative centre is the town of Butiama. According to the 2012 Tanzania National Census, the population of Butiama District was 241,732.Generally the district is considered rural with a mixed Pastoralists and small scale agriculture.



Figure 2: Mara Region map showing Butiama District

3.2 Study population

The study involved primary school pupils aged 6-18. This is because primary schooling in Tanzania usually begins at the age of seven and ends at thirteen. But in some rural settings, the beginning may be above seven years of age and this explains the extension of our upper age limit to 18 years

3.3 Study design

This was a cross sectional School survey with a multistage random sampling of wards, villages and schools.

3.4Sampling procedure

A multi-stagesampling technique was carried out. The first stage consists of a random sampling of wards (6 out of 18 were selected)and the second stage involved random sampling of one village from each ward followed by a random sampling of oneschool from each village in case the village had more than one school (6 schools were selected). Forth stage involved systematic random sampling of 100 pupils from each school.Pupils were selected prior to the day of school survey from school attendance registers using systematic random sampling.Allocation of student was proportional to the number of students in each class. Every K^{th} study subject was selected for the study from student's register depending on the number of pupils per school.

3.5Sample size calculation

The prevalence of malaria among school children inButiama was 62% from the 2015 SMPS.Much had been done since the last 2015 SMPS including free ITN distribution in the district, IRS, consistence availability of mRDT for malaria diagnosis and Artemisinin based anti-malaria and School net distribution in primary school in the district.We therefore estimated the prevalence to be about 22%,absolute precision of ± 5% and a 95% confidence interval. We also considered a design effect of 2 and hence the sample size is calculated using the following formula;

$$N=\frac{g\,[z^2p\,(1-p)]}{d^2}$$

N: required sample size
g: design effect
z:alpha risk expressed in z-score
p:expected prevalence
d:absolute precision

$$N=\frac{2[\mathbf{1.96^2}22(100-22)]}{\mathbf{5^2}}$$

This gives a sample of 527 school children. Considering refusal rate of 10% we get 1/9×527 which is equal to 59.The estimatedsample size was 600 school pupils.

3.6. Selection criteria

3.6.1 Inclusion criteria

1. Primary school children aged 6-18 years willing to participate in the studyand whose parents have consented to participatein the study.

3.6.2 Exclusion criteria

1. Pupils who were absent on the day of sampling prior to the day of survey.
2. Pupils whose parents did not give informed consent or pupils refused to participate

3.7Variables

Dependent variables: Malaria infection status in school pupil, use of bed nets

Independent variables: age, sex, pupil's place of resident, safety perceptions of LLINs, use of bed net,number of bed nets in the households, IRS, parent occupation, school name

3.8Data collection tools

We used provider administered structured questionnaire developed in English and then translated into Swahili language which is spoken by most of the Butiama residents. Our questionnaire was based on the Tanzania Malaria Indicator Survey (MIS) model developed based on the objectives of RBM partnership monitoring and evaluation reference group. Pre testing of the questionnaire was done in selected schools at Musoma rural district.
A questionnaire contained demographic characteristics of the pupil, any history of fever in the past two weeks, any history of a malarial test in past two weeks, use of mosquito nets at home, total number of household members and finally mRDT and BS tests was taken.

3.8.1Testing procedures and treatment of children with malaria

Trained medical personnel took finger prick blood for malaria test after he/she had explained the purpose and obtained an informed consent from the pupil. SD Bioline Malaria Ag P. f /Pan rapid diagnostic test (RDT). The other part of the specimenwereused

to form the thick smear on the microscope glass slides, which ware left to air dry and packed in slides boxes. The blood slides were sent to MUHAS Laboratory where staining and reading was done. The smears were stained by 10% Giemsa stain for ten minutes then washed with distilled water and left to dry. The slides were thenexamined for malaria parasites under the light microscope 100 X oil immersion objective.

3.8.2 Quality control of BS malaria tests

Ten percent of the microscopy slides were re-read by an independent examiner other than the previous examiner. The stained malaria microscope slides were also sent for quality control at National laboratory where in the series of the slides list, every tenth slide was picked and then re-examined.

3.8.3Malaria treatment

Following the National Guidelines for Malaria Diagnosis and Treatment, those children who tested positive for malaria usingmRDT were provided with a full course of the anti-malarial drugsArtemeter-lumefantrine (ALu).

3.9 Required resources

Four research assistants, provider administered questionnaire, Artemether-Lumefantrine (ALU), Malaria rapid diagnostic tests, blood slides, Lancet, alcohol swab, dust bin, mRDT students register, two laptop computers, mobile phones for communication, pens and pencils.

3.10 Data management and analysis

The filled questionnaires were checked for completeness before the investigator at the end of the day everyday to make sure that all collected was of good quality.Data entry was done in Epi data software and analysis was carried out using the statistical package STATA Version 13.0 (Stata Corporation, College Station, Texas, USA) software. Theprimary outcome of interest was Malaria status and net use. Bivariate and multiple logistic regression (using back ward elimination) models were built to identify significant covariates associated with net use among school children.Chi squared test was used to compare proportions and Odds ratio (OR) was used to quantify association. A 95%

confidence interval with alpha level of 0.05significancewas used. Factors with p-value ≤0.2 at bivariate level was included in the full model.

3.11Ethical issues

Approval was obtained from Muhimbili University of Health and Allied Sciences Ethical Review Board before data collection started.District Executive Director, District Medical Officer, District Education Officer,Ward and Village leaders were informed about the study for their permission before conducting the study in their respective administrative units.

In collaboration with the head teacher and class teacher an informed consent was given to the selected pupils to take to their parents or guardians explaining the purpose of the study in Swahili language and parents/guardians were asked to sign or put a tick if they accept or refuse their children to participate in the study. For illiterate individuals or those who did not want to sign but willing to participate, oral informed consent was acceptable. The signed informed consent forms were taken backto school by the pupils on the next day. Pupils were not coerced to participate in the study.

3.12 Dissemination plan

After completion of the study, dissemination of research findings has been done at all levels. The results ware disseminated to Muhimbili University College of Health and Allied Sciences, NMCP, Mara RegionalMedical Office and Butiama DMO office

CHAPTER FOUR

4.0 RESULTS

4.1 Characteristics of the study population

A total of 590school pupils with a response rate of 98.33% participated in this study.Among the pupils who participated in the study, 277 (47%) were males. A high percentage of the children were aged between 10- 13 years 322 (54.6%) followed by the children aged 6-9 years 191(32.4%). The mean age of school pupils was 10.73±4.46 years. Majority of the children 436 (73.9%) their parents were peasants, 42 (7.1%) were employed, 4.1% were pastoralists and 88(14.9%) had other jobs mostly boda-boda drivers and small business (**Table 1**).

Table 1: Distribution of study population according to socio-demographic characteristics

Back ground characteristics	N	%	95% CI
Gender			
Male	277	46.95	42.94-51.00
Female	313	53.05	49.00-57.06
Age group			
6-9	191	32.37	28.71-36.27
10-13	322	54.58	50.53-58.57
14+	77	13.05	10.56-16.03
Parent occupation			
Employed	42	7.12	5.30-9.50
Pastoralist	24	4.07	2.74-6.00
Peasant	346	73.9	70.19-77.29
Other	88	14.92	12.26-18.03
Student class			
Class I	49	8.31	6.33-10.83
Class II	119	20.17	17.12-23.61
Class III	105	17.80	14.91-21.10
Class IV	81	13.73	11.17-16.76
Class V	71	12.03	9.64-14.94
Class VI	91	15.42	12.72-18.58
Class VII	74	12.54	10.01-15.48

4.2 Household ownership and sources of LLINs

A total of 563 (95.4%) occupy at least one LLINs. The average number of nets per household was 3 ± 1.72.Universal coverage (At least one net per every 2 individuals in the household) was found to be 69.7%. The most mentioned sources of LLINs in the householdswere free mass distribution 78.5% followed bySchool net program (SNP) 30%.**(Table 2).**

Table 2:Reported household ownership and source of LLIN in Butiama during the study period.

Variable	N	%
At least one LLIN in a household		
Yes	563	95.42
No	27	4.58
Total	**590**	**100**
No of LLINs in household		
Zero	27	4.58
One	63	10.68
Two	160	27.12
Three	161	27.29
Four	100	16.95
Five & more	79	13.39
Total	**590**	**100**
Households achieved UC		
Yes	384	65.08
No	206	34.92
Total	**590**	**100**
Sources of LLINs**		
UCC	463	78.47
SNP	177	30
Purchased	99	16.78
ANC	31	5.25
Other	2	0.34
Total	**-**	**130.84**

* UC –Universal coverage

** Multiple sources possible, total proportion more than 100%

4.3Reported household use of LLINs

Pupils who reported at least one member of the household slept under LLIN a night before survey was 563 (93.6%). In households with at least one net, 426 (75.7%) of school pupils reported that they usually sleep under a mosquito bed net and among them 421 (74.8%) slept under LLIN a night before survey. In households with at least one LLIN with the under-fives, 92.4% of the under-fives were reported to sleep under a mosquito bed net a night before survey. The proportion of mother/father, sister, brother and others who slept under nets a night before survey were 83.8%, 39.8%, 37.3% and 23.1% respectively (**Table 3).**

Table 3:Reported use of LLINs among members of the householdat Butiama District during the study period.

Variable	N	%
Pupil slept under ITN previous night		
YES	421	71.36
No	169	28.64
Pupil usually sleeping under LLIN		
YES	426	75.67
No	137	24.33
ITN users in the household*		
Father/mother	472	83.84
Sister	224	39.79
Brother	210	37.3
Other**	130	23.13
Under-five		
YES	305	92.42
No	25	7.58

*Multiple answers possible

** Grandmother/father, Uncle, Aunt, sister in-law

4.4 Malaria prevalence by mRDT

A total of 95 pupils tested positive for malaria using mRDT. The overall malaria parasite prevalence among primary school pupilsinButiama District was found to be 16.1%, 95% Confidence Interval (CI)[13.34, 19.30]. The prevalence among males (17.7%) was higher compared to females (14.7%). Male pupils were 1.25more likely to test positive for malaria than females95% CI [0.80-1.94] though this difference was not statisticallysignificant (P value 0.324) (**Table 4**).

Among pupils who slept under LLINs a night before survey, the prevalence of malaria was found to be 14.01% CI [11.00, 17.67] while the prevalence was 21.3%, CI [15.73, 28.20] among pupils who did not sleep under LLINs a night before survey.

Pupils who did not sleep under LLIN a night before survey were 1.67 significantly more likely to be malaria positive by mRDT, 95% CI [1.05-2.05] P= 0.029 (**Table 4)**

Table 4: Malaria prevalence by sex among pupils who slept under LLIN a night before survey

Variable	**mRDT test results**		
	Positive (%)	Negative (%)	**Total (%)**
Gender			
Male	49 (17.69)	228 (82.31)	277 (100)
Female	46 (14.69)	267 (85.30)	313(100)
Total	**95 (16.10)**	**495 (83.90)**	**590(100)**
Net use pre-night*			
Yes	59 (14.01)	362 (85.99)	421 (100)
No	36 (21.30)	133(78.70)	169 (100)
Total	**95 (16.10)**	**495 (83.90)**	**590 (100)**

*Net use previous night

4.5 Malaria prevalence by microscopy blood slide (BS)

The overall prevalence of Malaria infection by microscopy among school pupils in Butiama was 6.4%.

4.6 Reported other uses of LLINs

Other uses of nets apart from covering sleeping places to preventing mosquito bites reported were 80% did not know, 14.1% reported that LLINs were used for fencing chicken, 7%for fishing and 1.8% for fencing vegetable garden (Figure 3).

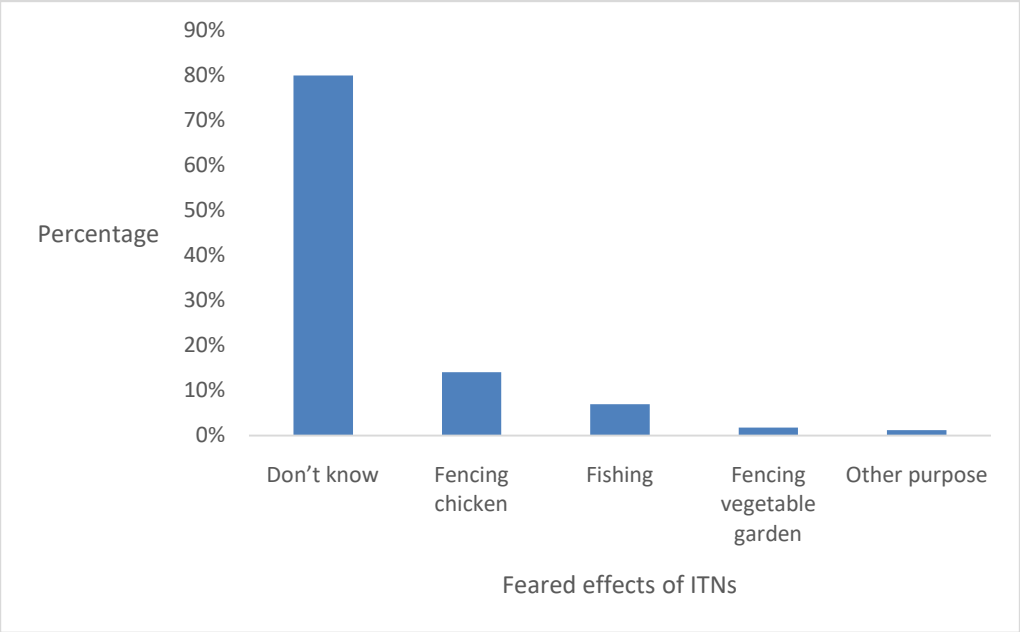


Figure 3: Reported other uses of LLINs by school pupils in Butiama during the study period

4.7 Safety perception of LLINs

Our study did not find significant safety issue hindering mosquito net use. Majority 536 (90.9%) reported don't know any danger of using LLINs. Fear of using LLINs were reported by 9.1% of the interviewed school pupils (**Figure 4**).

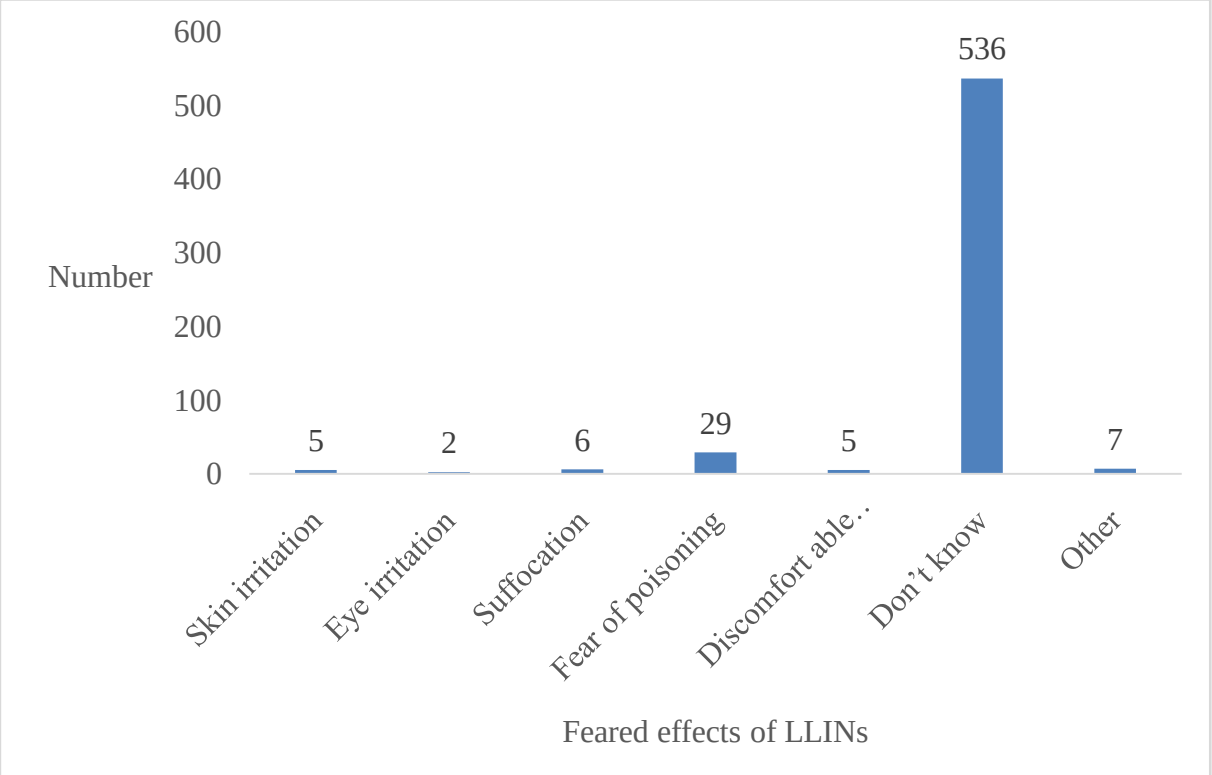


Figure 4: Reported feared effects of using LLINs among primary school pupils in Butiama district during the study period

4.8 Factors associated with net use among primary school pupils

During bivariate analysis three explanatory variables showed strong association with bed net use the previous night. Not received a net from school through SNP, increase number of nets in the household and history of receiving a net from UCC were significantly associated with net use during bivariate analysis.(OR=0.44,95%CI 0.29-0.67, P<0.OO1); (OR=2.24 95%CI 1.88-2.68, P<0.001); (OR=3.17 95%CI 2.08-4.84 P<0.001) respectively.

Gender, age, increase number of persons per bed, presence of under-five in the house hold, pupil's class and parent/guardian occupation were not significantly associated with net use in bivariate analysis.

At multivariable analysis, factors that were independently associated with net use were if a pupil did not receive a net from school and number of nets at home with (OR=0.45,95%CI: 0.28-0.72,P=0.001), (OR=2.37, 95%CI:1.96-2.86,P<0.001) respectively (**Table 5).**

Table 5: Factors associated with net use among school pupils

Variable	Previous night net use		CRUDE OR (95% CI)	P-Value	ADJUSTED OR (95% CI)	P-value
	Yes	No				
Age group						
14+	51(66.23)	26(33.77)	Ref			
10-13	225(69.88)	97(30.12)	1.18(0.70-2.01)	0.53		
6-9	145(75.92)	46(24.02)	1.61(0.9-2.86)	0.11		
Pupil received net viaSNP						
Yes	145(81.92)	32(18.08)	Ref			
No	276(66.83)	137(28.64)	0.44(0.29-0.67)	<0.001	0.45(0.28-0.72)	0.001
Presence of Under-five						
No	99(58.58)	70(41.42)	Ref			
Yes	240(57.01)	181(42.99)	0.94(0.65-1.35	0.73		
Gender						
Female	226(72.20)	87(27.80)	Ref			
Male	195(70.40)	82(29.60)	0.92(0.64-1.31)	0.63		
Free mass campaign						
No	107(63.31)	62(36.69)	Ref			
Yes	356(84.56)	65(15.44)	3.17(2.08-4.84)	<0.001		
Class level						
I-III	200(73.26)	73(26.74)	Ref			
IV-VII	221(69.72)	96(30.28)	0.84(0.59-1.20)	0.73		
Parent occupation						
Employed	34(80.95)	8(19.05)	Ref			
Pastoralist	21(87.50)	3(12.50)	1.65(0.39-7.02)	0.49		
Peasant	304(69.72)	132(30.28)	0.54(0.24-1.21)	1.13		
Other jobs	62(70.45)	26(29.55)	0.56(0.23-1.39)	0.2		
Past 12 moth IRS						
No	56(64.37)	31(35.63)	Ref			
Yes	365(72.56)	138(27.44)	1.15(0.91-2.37)	0.12		
# of nets	cont. var**	-	2.24*(1.88-2.68)	<0.001	2.37(1.96-2.86)	<0.001
# of persons per bed	cont. var**	-	1.25*(0.98-1.58)	0.07		

* Per unit increase

** Continuous variable

CHAPTER FIVE

5.0 DISCUSSION

The current study assessed prevalence of malaria infection, household coverage with long lasting insecticides treated nets (LLINs) and factors influencing bed net use among school children in Butiama District, Tanzania. The results of our study showed that malaria infection prevalence was high inButiama District among primary school pupils.

5.1Prevalence of malaria in school children using mRDT

Our study found the prevalence of 16.1% malaria infection among school pupils in Butiama District. Malaria prevalence has declined compared to the previously reported. This could have been attributed by sleeping under LLINswhich significantly reduces malaria parasite prevalence(7,14). LLINs is one of the vector control method that reduces mosquito population that could have helped to reduce the burden of malaria(6).

Our findings disproves a hypothesis that there is an epidemiological shift in malaria burden from the under-fives to primary age group in Butiama. The results of TDHS-MIS 2015/2016 which examined Malaria infection prevalence in under-fives at regional level found 19.1% prevalence in Mara region where Butiama District is found(30).

Thereduced Malariaprevalence we observed from our study compared to the previous studies in Butiama could be due to effective malaria control measures that has been implemented in the District. These measures are extensive availability of mRDTs and ACTs which have been very effective in the rapid diagnosis and treatment of malaria cases, mass distribution of free LLINs and the recently introduced SNP which provides LLINs to primary school pupils yearly since 2016 in the District as one of the “keep-up” mechanism.

There was also geographical variabilityin malaria infection prevalence where by schools close to the proximity of Lake Victoria basin which provides good breeding sites for mosquitoes had higher malaria infection. Similar observation was seen in Kenya whereprevalence varied from no malaria in some schools to as high as 40% in other schools(18)

Differences in malaria prevalence among schools can be explained bygeographical location, amount of rain and temperature, education level, age, Socio-Economic Status (SES) and nature of sleeping places(44,45).Studies in Africa among school children had shown variations in malaria prevalence among school children, hopefully being influenced by the observed factors above(24,27,28).

Most of the malaria positive cases were asymptomatic. The impact of asymptomatic malaria cases is that,they are less likely to seek medical help due to absence of signs and symptoms. Some arepotential gametocyte carriers, who represents an important reservoir for malaria transmission.

5.2 Net ownership and use

We observed the overall high net ownership and use. The average number of nets per house hold was 3 (SD 1.72). The proportion of house hold with at least one net per two persons in the house hold (universal coverage) was found to be 69.66% which is below the National target of 80%.

The observed high net ownership we saw could be attributed to various “keep- up” mechanisms, including the recently introduced School Net Program (SNP) in 2016 in Lake Zone. SNP have shown to increase household ownership of LLINs in Southern regions of Mtwara, Lindi and Ruvuma as well as universal coverage of LLINs(46).

Mass distribution has shown to increase net ownership. For example a study that evaluated the impact of free mass distribution campaign in Lake zone showed that, the proportion of households with at least one ITN increased from 62.6% before the campaign to 90.8% post campaign(29). A similar pattern was seen in Congo,Ethiopia and Nigeria(16,38,43).A study in Uganda contrary to the above studies found a lower proportion of 35% ownership of at least one net post universal free distribution(20).

High LLIN coverage of 99.0% was seen by a studydone in Bhutan witha 0% prevalence of malaria in children below 12 years (47). Hence if LLINs are properly used in endemic areas, they can greatly reduce malaria prevalence.

5.3 Factors associated with net use

Among primary school pupils, factors that were independently associated with net use were if a pupil received a net through SNP and number of nets in the house holds. Pupils who received nets from school thought that these nets belongs to them and hence increased net use among them compared to those who did not receive the nets at school. Other studies in Africa found education level, significant number of nuisance mosquitoes, indoor low temperatures, place of resident, residing in households sprayed with IRS, fewer number of children and buying rather than receiving net for free being factors associated with net use (15–17).

High net use (92.4%) were reported among the under-fives. This high proportional of net use among the under-fives can be explained by the interventions directed to pregnant women and the under-fives where they get nets from antenatal clinic. Fathers benefit from the interventions because they usually share the sleeping place with mothers and the under-fives. A study in Kenya found ITN users in the household were 69.5%, 51.8%, 68.2% and 51.6% in mother, father, brother/sister and under-five respectively(45). This is in contrast to our findings that observed high net use among the under-fives. It could be due to differences in modes of ITN distribution.

Majority of the school children in Butiamabelieve that LLINs are safe for use. Fear of using LLINs was reported by 9.1% of school pupils. This is in contrast to a study which was done in Southern Tanzania that found low net utilization due to safety concerns(39). A qualitative study in Nigeria showed that people were more concerned of potential hazard and safety of ITNs especially in children(48). These worries need to be well addressedsince studies have shown that ITNs are safe in human (42).

Some households were using LLINs for fencing chicken, fishing and for fencing vegetable garden. Education should be provided on the proper use of LLIs as these unintended uses may lead to reduced net use among members of the households.

Study limitation

School surveys are simple, quick and inexpensive way of assessing malaria burden in the community, so they should be used for assessing the success of control measures in the community.Our study was liable to information bias because the information provided by primary school pupils might not exactly give the detailed net ownership and use in their

households. However studies have shown that there is a correlation between information provided by school pupils and that was observed by household survey (20).

CHAPTER SIX

6.1CONCLUSION

Malaria prevalence has declined in Butiama District among school pupils from that was reported in 2015. However malaria prevalence is still far higher above the National target of having the prevalence of less than 5% by the year 2016. Universal coverage of LLINs have not yet been attained in Butiama. An overall household ownership of at least one LLIN was high (95.4%).Studies to verify if LLINs are being hanged and used at the sleeping places should be done in Butiama since malaria transmission rate is high despite of high net ownership.

6.2 RECOMMENDATION

Our study found a high net coverage of at least one LLIN in the households of 95% in Butiama District. This is enough to prevent malaria transmission even in neighboring households without ITNs. However malaria prevalence continues to be high in the District. Therefore further studies should be done in Butiama to look at what factors contributes to high malaria transmission in Butiama despite of highITN coverage and use.

Education should be provided and proper arrangement made to collect and dispose old and torn LLINs as some of the people use them for fishing, fencing gardens and fencing chickens. These torn LLINs if improperly disposed may be poisonous to other organisms in the surrounding environment.

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8.0 ANNEXES

8.1. Informed consent form, English version

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCIES, DIRECTORATE OF RESEARCH AND PUBLICATION

INFORMED CONSENT FORM

ID NO ☐☐☐

Consent to participate in a study

Greetings! My name is Baraka M Nyakuya, a Masters student at Muhimbili University of Health and Allied Sciences School of Public Health and Social Sciences, working on this research project to determine the prevalence of malaria in school children, net use and net occupancy in their households at ButiamaDistrict.

Purpose of the study

This study has the purpose of taking a malaria test to determine the presence of malaria infection among asymptomatic primary school children. We will also ask questions about mosquito net use at home.

Confidentiality

I assure you that all the information collected from your child will be kept confidential. Only people working in this research study will have access to the information. We will produce a report on the prevalence of malaria in school children, net ownership and use in households without any reference to individuals involved in the study.

Risk

There is no great risk from this study. Children will feel pain during a malaria test due to a finger prick to obtain blood for a test. We do not anticipate any harm to occur to your family as a result of participation in this study.

Rights to withdraw and alternatives

Taking part in this study is completely your choice. If you choose not to participate in the study or if you decide to stop participating in the study you will not get harm. You can stop participating in this study at any time, even if you have already given your consent.

Refusal to participate or withdraw from the study will not involve penalty or loss of any benefits to which you otherwise entitled.

Benefits

The information generated from this study will help to increase awareness on malaria prevalence in school children and net coverage and use which will help plan future malaria interventions. Again children who will be found to have malaria infection will get a full course of anti-malaria.

Who to contact

If you have questions about this study, you should contact the Principal investigator, **Dr Baraka Nyakuya,**Muhimbili University of Health and Allied Sciences, PO BOX 65001, Dar es Salaam. Phone number 0655270519. You may also contact **DrDonathTarimo** who is my supervisor to this study through 0754578528.

If you ever have questions about your rights as a participant, you may call **Dr. Joyce Rose Masalu,** Acting Chairman of the Senate Research and Publications Committee, P.O. Box 65001, Dar es Salaam. Tel: 2150302-6, 2152489.

Signature:

Do you agree?

Participant agrees …… Participant does NOT agree ……..

I…….have read the contents in this form. My questions have been answered. I agree to participate in this study with my child.

Signature of participant _____

Signature of witness (if mother/caretaker cannot read) _____

Signature of research assistant _____

Date of signed consent _____

8.2: Informed consent, Swahili version

CHUO KIKUU CHA AFYA NA SAYANSI YA TIBA CHA MHIMBILI

KURUGENZI YA UTAFITI NA UCHAPISHAJI

FOMU YA RIDHAA

NAMBARI ……

Ridhaayakushiriki

Hujambo?Ninaitwa**Baraka M Nyakuya**, nimwanafunziwastashahadayaudhamilikatikachuokikuu cha afyanasayansiyatiba cha mhimbili, kitengochasayansiyaafyayajamii, nafanyautafitihuukuangaliahaliyaugonjwawa malaria kwawatotowashileyamsingi, uweponamatumiziyavyandaruamajumbanikatikawilayayaButiama.

Madhumuniyautafiti

Utafitihuuutahusishakuchikuakipimo cha malaria kwawatotowashuleyamsingihatakamahawanadaliliza malaria. Piatutamuulizamototokuhusiananamatumiziyavyandaruanyumbani.

Usiri

Ninakuhakikishiakuwataarifazitakazokusanywakutokakwakokupitiadodosohilizitakuasirina hamnamtuyeyotembalinawahusikawautafitihuuatakayeambiwaulichikisema. Tutatoataarifakuhusuutafitiwetuhatahivyohatutatajajinawalautambulishowowotekuhusuwas hirikiwautafiti.

Hatari

Hakunahatariyeyoteitakayotokeakwakokutokananaushirikiwakokatikautafitihuu. Watotowatapatamaumivukidogowakatiwakuchukuliwadamuyakipimo cha malaria.

Hatutegemeihatariyeyotekutokeakatikafamiliayakokutokanakushirikikwakokatikautafitihuu.

Hakiyakujitoa au vinginevyo

Ushirikikatikautafitihuunihiari. Kutoshiriki au kujitoakutokakwenyeutafitihakutakuanaadhabuyeyotenahakutopotezastahilizakokamautaonanivemakufanyahivyo.
Unawezakujitoawakatiwowotehatakamamwanzoniuliridhiakushiriki.

Faida

Taarifaatakazotoamwanaozitasaidiakutoauelewajuuyahaliyaugonjwawa Malaria namatumiziyavyandaruahivyobasikuboreshautoajiwahudumaza malaria katikawilayayako. Lakinipiawatotowatakaokutwana malaria watapewadawaza malaria kamainavyostahili.

Naniwakuwasiliananayeukiwanashida

Kama utakuanaswalikuhusuutafitihuu, itakubidikuwasiliananamtafitimkuuDr Baraka Nyakuya, wachuokikuu cha afyanasayansiyatiba cha mhimbili, kitengochasayansiyaafyayajamiiSLP 65001, Dar es Salaam, simu0655270519. UnawezapiakuwasiliananaDrTarimoambayenimsimamiziwangukatikautafitikwasimu 0754578528.

Kama unamaswalizaidikuhusiananautafitihuu, unawezakuwasilianana Prof. Said Aboud, Mkurugenziwakamatiyautafitinauchapishajichuokikuu cha afyanasayansiyatibaMuhimbili SLP 65001 DSM, simunambari 0754301692.

Je, umekubali?

Nimekubali …… Sikubali ……..

Mimi ……..nimesomamaelezojuuyautafitihuunanimeridhika.

Sahihiyamshiriki……..

Sahihiyashahidikamamshirikihawezikusomanakuandika…….

Tareheyakutiasahihi……

8.3: Questionnaire English version

Introduction

Thank you for participating in our study.We are researchers from Muhimbili University of Health and Allied Sciences. We are conducting a studyonprevalence of malaria among school children and household coverage with long lasting insecticides treated nets using school children reports as a proxy at Butiama district in Mara Region. The information generated from this study will inform the NMCP and the Implementing partners on the magnitude of malaria among school children, net use among school children and overall estimation of household net coverage in Butiama District which is useful for planning infrastructure in the District to deliver malaria interventions in schools and in the community at large. I will read each question loud and wait for your response. Please take as long as you need to remember or think about your answer. If you need more clarification please say, so that I can repeat or explain it.

Preliminary information

Questionnaire code number……

Name of interviewer……

Name of village/street……

Name of ward……

Name of school……

Date of interview……/……/…….

PART ONE: Social demographic information

1. What class are you in……

2. How old are you……years
3. Respondent gender (tic in appropriate box)

   Male ☐ Female ☐
4. How many people live in your household…….
5. How many are under five in your house hold……
6. What is your parent/guardian current job(circle where applies)
   a) Employed
   b) Pastoralist
   c) Peasant
   d) Others (specify)……

PART TWO: Net occupancy, use and history of IRS

7. How many long lasting insecticidal nets does your household have (Fill 99 if don't know)……..
8. Did you sleep under LLIN last night? (Circle the correct response)
   a. Yes b. No
9. How many were you in a bed last night? .....
10. Do you usually sleep under mosquito treated nets?(Circle the correct response)
    a. Yes b. No
11. Did the under-fives slept under a mosquito net last night? (Fill 99 if no under-five)……

    a. Yes b. No
12. Who else slept under the net last night? (Circle all that apply)
    a. Father/mother b. My sister c. My brother
    b. Others (specify)…….
13. Have you or any child in your family given a mosquito net from school to take home?(Circle the correct response)
    a. Yes b. No
14. Where did your household get LLINs?(circle all that apply)
    a. Government free mass campaign
    b. Antenatal clinic
    c. School net campaign

d. Buy from the shop/market

e. Others (specify)…….

15. How many mosquito nets did your house hold get from the last free net distribution campaign? (Fill 99 if doesn't know)……

16. How many times in the past 12 months did your house get sprayed to kill insects by the government ((Fill 99 if doesn't know)…….

PART THREE: History of recent malaria infection and its management

17. Did you have fever in the past two weeks? If "No" go to Qn 21

a. Yes b. No

18. What was the result of the test……..

a. Malaria positive b. No malaria c. Others……..

19. Were you given some medicines (Tick in the appropriate box)

Yes ☐ No ☐

20. Day of visit malaria mRDT test results……

a. Positive b. Negative

PART FOUR: Household safety perceptions of LLINs for malaria control

21. Why do you think people sleep under mosquito nets (Circle all the mentioned response)

a. Avoid mosquito bite

b. To prevent malaria

c. Avoid other insect bite

d. To keep warm

e. To get sound sleep

f. Don't know

g. Others (specify)……..……..

22. What are the other uses of nets in your family/place of resident apart from avoiding insect bite (circle all that apply)
    a) For fishing
    b) For fencing vegetable garden
    c) For fencing chicken
    d) Don't know
    e) Other specify…….
23. What are the reasons why some other people do not use mosquito bed nets (circle all that apply)
    a) No mosquitoes
    b) No malaria now
    c) Don't like smell
    d) Too hot
    e) Net not available
    f) Net no longer kill mosquitoes
    g) Net too small
    h) Net too old
    i) Feel closed in
    j) Afraid to use nets
    k) Don't know
    l) Other, specify……
24. Mention one feared effects LLINs that you know
    a) Skin irritation
    b) Eye irritation

c) Suffocation

d) Fear of poisoning

e) Discomfort able warmness

f) I don’t know

g) Other specify…….

Thank you for your participation. Do you have any question for me?

8.4: Questionnaire Swahili version

Dodoso

Utambulisho
Sisiniwatafitikutokachuokikuu cha sayansinatiba cha Muhimbili. Tunafanyautafitikuangaliahaliyamaambukiziyaugonjwawa malaria kwawatotowashulezamsinginaumilikiwavyandaruavyenyedawayamudamrefukatikafamilia zaokatikawilayayaButiamaMkoani Mara. Utafitihuuutasaidiakujuaukubwawatatizo la malaria miongonimwawatotowanaosomashulezamsingi, matumiziyavyandaruakatikakundihilinakupatatathminiyavyandaruakatikafamiliazaotaarifai takayosaidiaMpangowaTaifawakudhibiti malaria nawadauwenginekuwekamikakatiyakutoahudumastahiliza malaria katikawilayayaButiama.

Nambariyadodoso……

Jina la mtafiti……

Jina la kijiji/mtaa……

Jina la kata……

Jina la shule……

Tareheyausahili……/……./……..

SEHEMU YA KWANZA: Taarifamuhimu

1. Unasomadarasa la ngapi……
2. Unaumrigani……miaka
3. Jinsi …… ME ☐ ☐
4. Kwenye kaya yenumnaishi/mkowatuwangapi…….
5. Kwenye kaya yenukunawatotowangapiwenyeumrichiniyamiakamitano…….
6. Mzazi/Mleziwakoanafanyakazigani(Zungushiainayohusika)
    a. Ameajiliwa
    b. Ni mfugaji
    c. Ni mkulima

d. Nyingine (taja)……

SEHEMU YA PILI: Umilikinamatumiziyavyandarua

7. Nyumbanikwenukunavyandaruavenyedawayamudamrefuvingapi? ……..
8. Je? Weweulilalandaniyachandaruachenyedawausikuwakuamkialeo?
    a. Ndio b) Hapana
9. Je? Mlilalawangapikwenyekitanda? .....
10. Ukiachiliambaliusikuwaleo, sikunyinginehuaunalalandaniyachandarua?
    a. Ndio b)Hapana
11. Je? Mtotowaumrichiniyamiaka 5 alilalandaniyachandarua a) ndio b) hapana

12. Naniwenginenyumbaniwanalalandaniyachandarua?
    a. Baba/mama b. Dada yangu c. Kaka yangu
    b. Wengine (wataje)…….
13. Umeshawahikupewachandaruashulenikupelekanyumbani?
    a. Ndio
    b. Hapana
14. Vyandaruavyenyedawamlivyonavyonyumbanimlivitoawapi?
    a. Tuligawiwabure
    b. Mama alitokanavyo clinic
    c. Tulipewashuleni
    d. Tulinunuadukani/sokoni
    e. Nyinginezi (taja)…….
15. Wakativyandaruaviagawiwabure, nyiemlipatavyandaruavingapi? …….
16. Katikakipindi cha miezi 12 iliyopita,upuliziajiwadawayaukokoukutanikuuambuilifanyikamarangapikatikafamiliayenu? .....

SEHEMU YA TATU: Uwepowahomannanamnailivyotibiwa

17. Je? Ulipatwanahomakatikakipini cha wiki mbilizilizopitanakwendahospitalinadamuyakokupimwa malaria

NdioHapa☐ ☐

18. Majibuyakipimo cha malaria ……..

a. Nilikuana malaria b) Sikuwana malaria c) Sikuyajua

19. Je, ulipewadawaza malaria……NdioHapan☐ ☐

20. Matokeoyakipimo cha malaria kwasikuyausailikwakipimo cha mRDT……

a. Ana malaria b) Hana malaria

SEHEMU YA NNE: Uelewajuuyamatumizinaatharizavyandarua

21. Unadhanikwaniniwatuwanatumiavyandarua?

h. Kuzuiaking'atwanambu

i. Kuzuia malaria

j. Kuzuiakung'atwanawaduduwengine

k. Kupatajoto

l. Kupatausingizimzuri

m. sielewi

n. sababunyingine (zitaje)…….

22. Tajamatumizimengineyavyandaruambalinakutumiakwaajiliyakujikingakuumwana wadudu

f) Kuvuliasakaki

g) Kuzungushiabustaniyamboga

h) Kuzungushiavifaranga/kuku wasizurure

i) Ningine (zitaje)…….

23. Kwaniniwatuwenginehawalalindaniyavyandarua?

a. Sikuhizihakunambu
b. Hamna malaria
c. Hawapendiharufu
d. Zinaletajoto
e. Hawanavyandarua
f. Vyandaruahaviuimbu
g. Vyanaruanividogo
h. Vyandaruavimechakaasana
i. Anakosahewa
j. Wanaogopakutumiavyandarua

24. Ni madharaganiwatuwanayohofiakulalandaniyavyandaruavyenyedawa?

h) Kuwashwangozi
i) Kuwashwa macho
j) Kukosahewa
k) Hofuyasumu
l) joto
m) Sielewi
n) Mengineyo (taja)…….

Aksantekwakushiriki. Je unaswalilolotekwangu?