THE UNIVERSITY OF ZAMBIA

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DEPARTMENT OF PUBLIC HEALTH

Determinants of Insecticide-Treated Nets utilisation in older children and young adults in Zambia from the Malaria Indicator Survey 2010

A Dissertation submitted

by

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in partial fulfilment of the requirements for the award of the Degree of Master of

Science in Epidemiology

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CERTIFICATE OF APPROVAL

The University of Zambia approves this dissertation of Mwamba Sichande in partial fulfilment for the requirements for the award of the degree in Master of Science in Epidemiology.

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CERTIFICATE OF COMPLETION OF DISSERTATION

I, **Mwamba Sichande**, do hereby certify that this dissertation is the product of my own work and in submitting it for my Master of Science in Epidemiology programme, further attest that it has not been submitted to another University in part or whole for the award of any programme.

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I, **Dr H. Halwindi**, having supervised and read this dissertation is satisfied that this is the original work of the author under whose name it is being presented. I confirm that the work has been completed satisfactorily and is ready for presentation to the examiners.

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DECLARATION

This dissertation is the original work of **MWAMBA SICHANDE**

It has been done in accordance with the guidelines for MSc. In Epidemiology dissertations for the University of Zambia. It has not been submitted elsewhere for a degree at this or another University.

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ABSTRACT

Background: The use of Insecticide-Treated Nets (ITNs) is recognised as an important method in the prevention of malaria. The universal access policy has led to high levels of ITN ownership across different socio-economic groups. Despite this, recent surveys show that the age group 5-19 year olds are the least likely to use ITNs in households with ITNs. Therefore, this study aims at identifying factors associated with low ITN utilisation in this age group.

Methods: Data stem from the Malaria Indicator Survey 2010 which covered the entire Zambia was used. Of the total number of 5-19 year olds (n=7 429), only 65% (n=4810) met the inclusion criteria for this study. Variables were derived from the questionnaire answered by household heads. Chi square was used to establish the association of each variable with sleeping under ITN a night before the survey. Those with p value<0.05 were retained and included in the multivariate logistic regression to come up with the final model.

Results: The ITN utilisation among the 5-19 year old individuals from households with the head having primary and secondary education were not statistically significant from those who came from households where the head had never been to school. However, those who came from households with the head having tertiary education attainment were more likely to sleep under an ITN a night before the survey than those from households headed by individuals who never attended school (OR=1.79; 95% CI, 1.19-2.41). The number of ITNs in households was also an important determinant of ITN utilisation. Those who came from households with two ITNs were more likely to use ITNs than those from households with only one ITN (OR=3.93; 95% CI 3.01-5.13) and those from households with three or more ITNs were more likely to use ITNs than those from households with one ITN (OR=5.10; 95% CI 3.61-7.19). Females were also more likely to use ITNs than males (OR=1.36; 95% CI 1.17-1.58).

Conclusion: The findings suggest that tertiary education of the head of the household and number of ITNs is important in determining ITN utilisation by 5-19 year olds. Therefore, reaching universal coverage on ITNs accompanied by health education especially targeting those with lower education levels could lead to equity of utilisation across all age groups.

DEDICATION

This dissertation is dedicated to my fiancée Margaret Lupiya for the understanding, love and being so supportive and my parents (Mr & Mrs Sichande) for the financial support and encouragements during my period of study.

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List of Acronyms

CSO   Central Statistical Office

HE   Health Education

IRS   Indoor Residual Spraying

ITNs   Insecticide Treated Nets

IVM   Integrated Vector Management

LLINs`   Long Lasting Insecticidal Nets

MDGs   Millennium Development Goals

MIS   Malaria Indicator Survey

MoH   Ministry of Health

NMCC   National Malaria Control Centre

NMSP   National Malaria Strategic Plan

RBM   Roll Back Malaria

U5   Under five

WHO   World Health Organisation

Definition of Key Operational Terms

- Accessibility – refers to the ability of the household to possess ITNs which were either acquired for free or bought.
- Children – any individual within the household aged 5-19 years.
- Household – a house or any other place of dwelling
- Older children – any individual aged 5-12 years
- Young adults – any individual aged 13-19 years
- Sleeping arrangement – this refers to sharing of a sleeping space by individuals within the household.

1.0 INTRODUCTION

Malaria is a parasitic infection which is transmitted by the female anopheles mosquito bite. Malaria affects people worldwide and it was estimated that in 2010 about 3.3 billion of the world population were at risk of malaria (WHO, 2011) and during the same year about 216 million cases of malaria were reported of which 81% was from the African region.

In Zambia, malaria still remains a major public health problem accounting for about 45% of all out patient attendances in hospitals and about 40% and 20% of overall infant and maternal mortality rates respectively (MoH, 2008). As a result of this, malaria has potential to derail the progress the country is making towards reaching the Millennium Development Goals by 2015. This is because malaria is a major cause of illness in both school age children and teachers which leads to absenteeism and also affects enrolment in schools. This has a direct impact in achieving Millennium Development Goal number two which aims at achieving universal primary education.

The high maternal mortality and infant mortality rates due to malaria may disrupt attainment of MDG number five which aims at reducing maternal mortality and MDG number four which aims at reducing child mortality. All these parameters give an insight of how important it is to fight this disease.

Realising the seriousness of the threat posed by malaria, the Zambian government through the Ministry of Health has put up various interventions for the control of malaria in order to achieve the government vision of having "a malaria free Zambia" as enshrined in the National Malaria Strategic Plan (NMSP, 2006-2011).

In order to achieve this, the government has implemented three primary interventions as recommended by WHO for effective control of malaria. These include accurate diagnosis of suspected malaria cases and treatment of diagnosed individuals with effective drugs, embarking on free or highly subsidised ITNs distribution more especially long lasting insecticidal nets to reach full coverage of all at risk of malaria and IRS (WHO, 2007). The use of ITNs, IRS and environmental management as vector control measures constitute what is called Integrated Vector Management and is a component of the three primary interventions (MoH, 2012).

The use of ITNs has been recognised as an important intervention in reducing the burden of malaria in areas where transmission is stable (Nahlen et al, 2003). ITNs apart from being

physical barriers also kills mosquitoes that come into contact with them and because of this they have also been shown to have community effect if the coverage is high such that even those who do not use them tend to benefit (Gimnig et al, 2003).

In order to ensure that significant impact of ITNs on the control of malaria is achieved, the MoH had set an objective to have 80% of all people in ITN eligible areas in all the districts sleep under ITNs by December 2008 and to sustain this through to 2011(NMSP 2006-2011). However, only 56.4% of household members slept under ITNs a night before the survey in 2010. When the ITN usage was stratified by age in five years interval, the age group 5-19 years had the lowest combined ITN utilisation of about 42% while almost all the other sub age groups had ITN utilisation above 60% (MoH, 2010).

This implies that individuals aged 5-19 years who make up about 40% of Zambian population had the lowest ITN utilisation and this had diluted a relatively high ITN utilisation observed in other sub age groups.

The universal coverage which aims at increasing ITN utilisation by all may not be attained if the ITN under-utilisation in children aged 5-19 years is not addressed. Therefore there is need to explore for factors that are associated with ITN utilisation in this age group from the dataset that is already existing. This will help in planning for future interventions that will mitigate this gap.

1.1 Statement of the problem

The MoH had set a target of reaching 80% ITN utilisation by all at risk of malaria by 2008 and to sustain this through to 2011.

Although the overall ITN utilisation of 56.4% in 2010 did not reach this target, ITN utilisation by age stratified by a 5 year interval showed that almost all sub age groups had reached above 60% ITN utilisation except individuals aged 5-19 years who had about 42% combined ITN utilisation (MoH, 2010).

This low ITN utilisation by this age group which constitutes about 40% of the Zambian population (CSO, 2012) indicates that more people were not protected against malaria by ITNs despite 70% of households having reported owning at least one mosquito net (MoH,2010).

Table 1 Ownership of ITNs by Province in Zambia 2010

Province	Percentage of households that had at least one ITN	Percentage of households that had more than one ITN
Central	74.0	39.1
Copperbelt	62.3	31.2
Eastern	76.1	40.7
Luapula	50.1	17.0
Lusaka	49.9	22.4
Northern	61.2	32.2
North-Western	72.8	45.0
Southern	66.1	35.0
Western	74.7	36.1

Source: Malaria Indicator Survey 2010 report

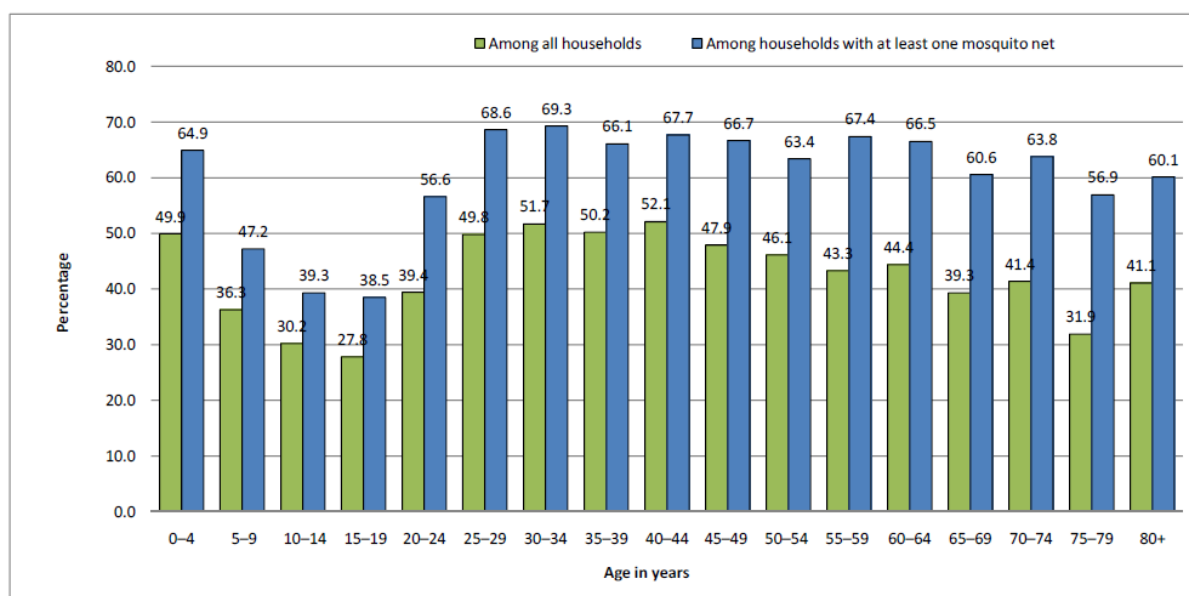ITN use among all household members by age category (Zambia 2010)

Figure 1   Source: Malaria Indicator Survey 2010 report

1.2 Justification

Malaria was the major cause of morbidity among individuals aged above five years in 2010 in Zambia. The incidence of malaria among those aged above five years decreased from 15.8% in 2008 to 15.3% in 2009 and then increased to 20.3% in 2010 (MoH, 2011).

The low ITN utilisation among 5-19 year olds was one of the contributory factors to the increase in the incidence of malaria in 2010 among those aged above five years. Low ITN utilisation in this case means that there was inequity of utilisation across age groups and since most sub age groups had reached more than 60% ITN utilisation, those that had below this were regarded as low utilisation relative to other sub age groups. Therefore, this study explored factors that were associated with under-utilisation of ITNs among 5-19 year olds and the findings would be useful for planning future ITN distribution programmes.
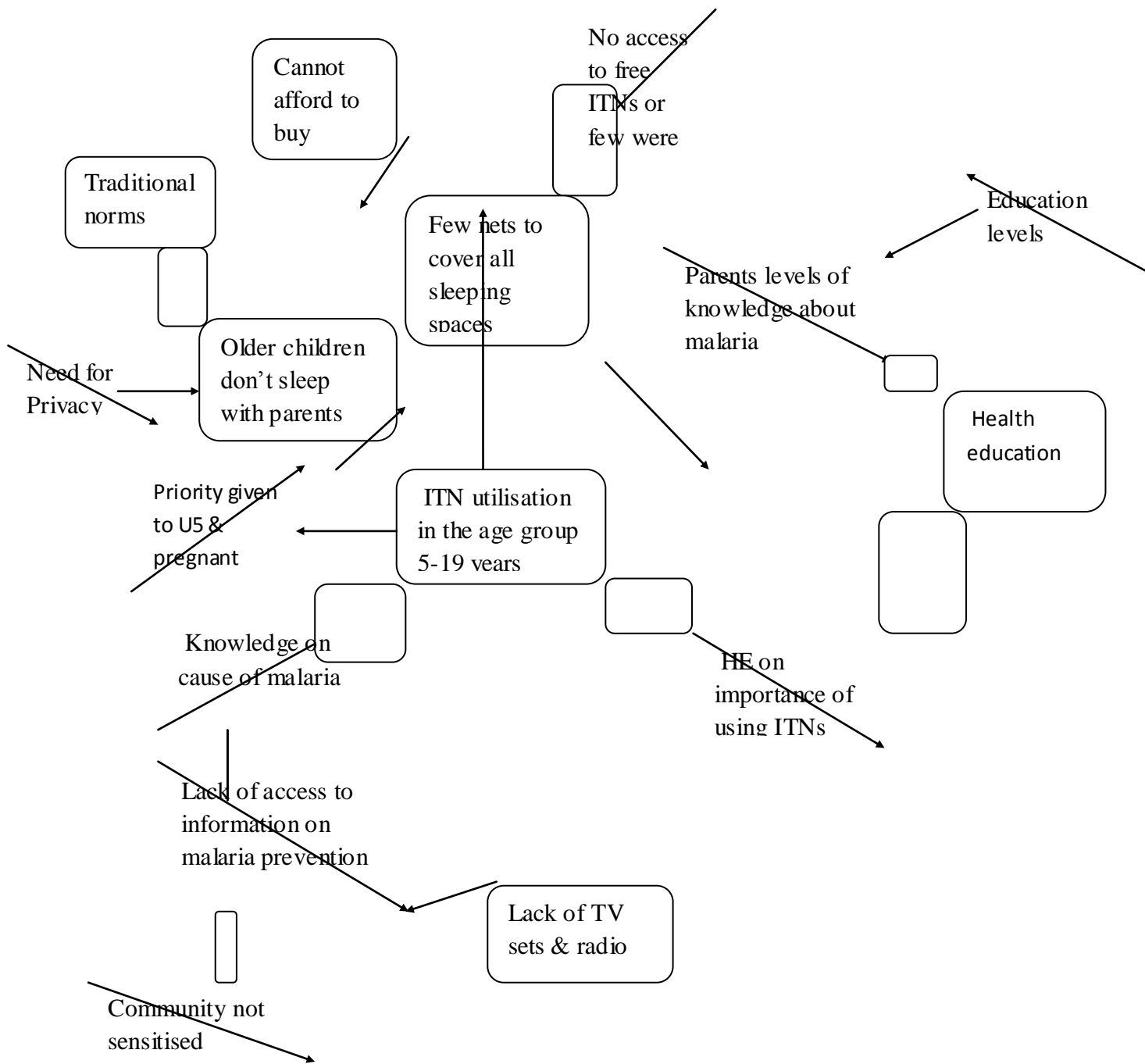
1.3 Study objectives

1.3.1 General objective

To determine the factors that are associated with ITN utilisation among children aged 5-19 years.

1.3.2 Specific Objectives

1. To determine socio-demographic factors associated with ITN utilisation among children aged 5-19 years.
2. To determine the effect of levels of knowledge on malaria among the women of households on ITN utilisation in children aged 5-19 years.
3. To determine how accessibility to ITNs within households affects utilisation by children aged 5-19 years.
4. To determine how sleeping arrangements within households affect ITN utilisation in children aged 5-19 years.

Conceptual framework   figure 2

Cannot afford to buy

No access to free ITNs or few were

Traditional norms

Education levels

Few nets to cover all sleeping spaces

Parents levels of knowledge about malaria

Need for Privacy

Older children don't sleep with parents

Health education

Priority given to U5 & pregnant

ITN utilisation in the age group 5-19 years

Knowledge on cause of malaria

HE on importance of using ITNs

Lack of access to information on malaria prevention

Lack of TV sets & radio

Community not sensitised

2.0 LITERATURE REVIEW

Randomised control trials have demonstrated the effectiveness of ITNs in reducing all causes of mortality by about 16% in children under the age of five years (Phillips-Howard et al, 2003) leading to ITNs being recommended as an effective intervention in the prevention of malaria (WHO, 2010). However, in order to realise the full potential of ITNs WHO further recommended universal coverage for all individuals at risk of malaria in order to increase the coverage rates and as result the cumulative total of 254 million ITNs were delivered to sub-saharan Africa which were enough to carter for an estimated 66% of the 765 million people at risk of malaria between 2008 and 2010 (WHO, 2010).

The greatest challenge of ITN intervention as a preventive measure is to ensure that people do not only own ITNs but also use them if these targets are to be reached. Several studies that have been done on barriers to ITN utilisation have focussed more on pregnant women and children under five due to the earlier policy which prioritised these groups. With the advent of universal access policy on ITNs there is need to understand the barriers to ITN utilisation in all the age groups from the existing data.

Although WHO (2010) recognised that children aged 5-19 years were least likely to use ITNs which is also a reflection of the Zambian situation, there is paucity of data on factors that can be attributed to under-utilisation of ITNs in this age group in a local context. This study therefore is aimed at bridging this gap.

After noticing a similar trend in a study that was based on analysis of national household surveys from 18 malaria endemic African countries which also included Zambia, Noor and colleagues (2009) attributed the under-utilisation of ITNs in 5-19 years old individuals to sleeping arrangements within households and also the prioritisation of pregnant women and children under the age of five in the initial policy. The initial ITN distribution policy that was only done at the under five and anti natal clinics only empowered these two groups with ITNs and even the messages that were accompanied by this did not put emphasis on the importance of ITN utilisation by the age group 5-19 years.

Sleeping arrangement becomes an important factor in determining ITN utilisation when a particular individual within the household is more likely to use the available ITN than any other person in the household and therefore a person who shares the bed with that individual is also likely to use an ITN. As a result children who shared the bed with their parents were more likely to sleep under the mosquito net than those who did not (Mugisha and Arinaitwe,

2003). This has implications on ITN utilisation in the age group 5-19 years since this group is not expected to share the bed with their parents. Sleeping on the floor was also found to be a barrier to ITN utilisation by children as it was difficult to hang the nets (Baume et al, 2009). Therefore, there is need to determine how these intra household factors influences ITN utilisation in children aged 5-19 years in Zambia.

Socio-demographic factors are also important as these may influence both ITN ownership as well as utilisation. Factors such as education status of the head of household and also knowledge about Malaria have been found to influence ITN utilisation (Baume et al, 2009) in general although it remains to be seen if this can influence ITN utilisation by age group 5-19 years.

The age, locality and wealth status of the family were found to be significant in determining ITN utilisation in children under the age of five in Nigeria (Auta, 2012). Therefore, there is need to investigate whether these factors can also influence ITN usage in children aged 5-19 years in Zambia.

In addition factors attributable to parents may affect ITN usage in their children. The fact that parents oversee the affairs of the family may imply that their knowledge about the importance of ITNs in preventing malaria is crucial in determining whether their family members use ITNs or not. This was demonstrated in a cluster randomised control trial that was conducted in Ethiopia on the effect of skill based training of heads of households on long lasting ITN utilisation by household members. This led to an increase in utilisation by 17.7% in the intervention group across all ages after 6 months (Deribew et al, 2012).

This demonstrated that the ITN usage in a household to a large extent depends on knowledge of the head of the household on ITNs. Heads of the households on the other hand will only be compelled to encourage their family members to use ITNs when they understand that their household members are at risk of malaria as result of mosquito bites and that this could lead to death. Only after they understand this, will they be compelled to take action in ensuring that all their household members are protected against malaria. This approach is embedded in health promotion in a theory called health belief model (Barbara et al, 2005).

ITN availability is also an important factor in determining usage since no one can use an ITN if it does not exist in the first place. Although various factors that affect ITN accessibility such as distance to the health centres (Larson et al, 2012), the inequity that was created as a

result of socio-economic status has been bridged by distribution of free ITNs especially to vulnerable groups. This has resulted in more increase in ITN ownership in rural areas than urban areas (MoH, 2010) but this might not translate into a similar trend when it comes to utilisation.

While about 70% of households had at least one mosquito net in Zambia 2010, it is important to determine factors that influence ITN utilisation within the household which in turn will help us to understand why there has been under- utilisation of ITNs in this age group. This will help to come up with interventions that will ensure that equity is not only ensured at ownership level but also at the level of utilisation across all age groups in order to ensure equal protection against malaria for all.

3.0 METHODOLOGY

3.1 Malaria Indicator Survey 2010 dataset

This study was based on secondary data analysis using the Malaria Indicator Survey 2010. The study design was a cross sectional, national representative household survey in which information was simultaneously collected on both the outcome of interest and potential risk factors. In this case the outcome of interest was ITN utilisation among children aged 5-19 years and the risk factors were variables derived from the questionnaire.

The Malaria Indicator Survey has been carried out biennially since 2006 by the Ministry of Health through the National Malaria Control Centre in collaboration with cooperating partners. Its purpose is to monitor and evaluate the progress made in the malaria intervention programmes that are being implemented such as ownership and utilisation of ITNs and also coverage of indoor residue spraying (MoH, 2010).

The malaria indicator survey 2010 sample design used a two stage cluster design. (Sampling at census cluster level and at household level). Zambia has been divided into standard enumeration areas also called clusters which are 17000 in total (MoH, 2010). These clusters were stratified into rural and urban strata. The first stage involved selection of clusters using probability proportional to size and the second stage involved selection of households within selected clusters using systematic sampling method. Other parameters which were used in determining sample size include 10.2% of malaria parasite prevalence in children under the age of five (4.3% and 12.4% in urban and rural areas respectively), 80% power and a design effect of 2.00. Therefore, at 95% confidence interval with an adjustment of 20% for non response, a total of 4500 households as primary sampling units were determined which was representative for the entire country.

The tool that was used to collect data was a questionnaire. Two types of questionnaires namely household and women questionnaires were used. The household questionnaire was administered to the head of each of the selected households and it was used to list all the members of the household and valuable goods in the household. This helped in identifying women aged 15-49 years to answer the women questionnaire. It also collected information on the ITN ownership and usage among all household members within the household. The women questionnaire was used to collect information from women aged 15-49 years about general malaria knowledge and also information related to access to information about malaria.

3.2 Limitations of the MIS 2010 data set for this study

Children who were in boarding schools and colleges were left out of this survey which might have either overestimated or underestimated the ITN utilisation in this age group. However, this number was likely to be small since the majority of children in this age group were likely to be in day schools.

The study of this nature would have been more informative if the quantitative method was combined with qualitative method. Despite these limitations, the sample size is big enough to carry out this study.

3.3 Study setting and study population

The 2010 MIS was conducted in all the nine provinces in Zambia. The target population for this study were children aged 5-19 years that were captured in the 2010 MIS. However, the study population were children aged 5-19 years who met the inclusion criteria.

3.4 Inclusion criteria

Any household with children aged 5-19 years and owned at least one mosquito net and had at least one woman interviewed.

3.5 Exclusion criteria

- ➤ Any household without children aged 5-19 years
- ➤ Any household with children aged 5-19 years but without any mosquito net
- ➤ Households which had no women were not included in the study.

3.6 Sample size determination

All the children aged 5-19 years that met the inclusion criteria were included in the study.

The purpose of sample size calculation therefore is just to show that the number of individuals aged 5-19 years that were captured in this survey was big enough to do this study. In the equation for sample size, P is the proportion of children aged 5-19 years who slept under an ITN a night before the survey and d is the precision at 95% confidence interval (z).

Formula for sample size calculation

$$n = (z_{1-\alpha/2})^2 \cdot p \cdot (1-p) \mathrm{Deff}/d^2$$

$z_{1-\alpha/2} = 1.96$

$P = 0.385$

$d = 0.05$

$\mathrm{Deff} = 2.00$

$n = (1.96)^2(0.385)(0.615)2.00/0.05$

$= 728$

The minimum number of children aged 5-19 years that were required in order to carry out this study was 728 and there were about 7400 children aged 5-19 years who were captured in the survey. This means that there was enough sample size to carry out this study. After applying the inclusion and exclusion criteria, the sample size came down to 4810 individuals aged 5-19 years.

3.7 Variables

TABLE 1

Type of variable	Variable	Indicator	Scale Measurement	Question number[1]
Dependant	ITN utilisation	proportion of children aged 5-19 years who slept under an ITN a night before survey	Yes No	25
Independent	Age of head of Household	Age at last birthday in years	continuous	1
	Gender of head of Household	Proportion of households headed by any Gender	Male Female	1
1	Gender of children aged 5-19	Proportion of a child gender who slept under an ITN a night before the survey	Male Female	1
	Family composition	Number of children aged 5-19 years within household.	discrete	1
	Residence	Locality of children aged 5-19 years who slept under an ITN a night before survey	Rural Urban	Front Page
2	Education of head household	Level of education attained by head of Household	Tertiary	9.11 & 9.12
			Secondary	
			Primary	
			Not at all	
	Cause of Malaria	Proportion of women who identified mosquito bites as cause of malaria	Yes Not	252
	Malaria prevention	Proportion of women who identified ITNs as a preventive measure for malaria	Yes No	253
	Health education	Proportions of households that received health education at home	Yes No	260
3	ITN availability	Proportion of sleeping spaces covered by Mosquito nets.	Yes No	14g & 17
	ITN ready for use	Proportion of sleeping spaces with hanged Mosquito nets.	Yes No	23g & 17
	Mode of acquirement	Proportion of nets acquired for free	free purchased	20a & 20b
	Net sharing	Number of children aged 5-19 sharing nets with U5	Numerical	25

[1] Refers to the question number corresponding to the MIS 2010 questionnaire where the variables were derived.

3.8 Data analysis

Data was analysed using Stata® Version 11 (Stata Corporation, College Station, Texas)

The first step involved using bivariate cross tabulation analysis where each of the independent variables was tested against the dependent variable to get p-values using Chi square test.

A core set of background variables that are known to influence public health outcomes such as residence (rural/urban), gender, age and household wealth were defined. Then the significance of other factors were tested by adding or removing them based on their significance to come up with the most parsimonious model using logistic regression. The variables with $p < 0.05$ were considered significant.

3.9 Ethical issues

Prior to the conducting of the MIS survey, the Research Ethics Committee of the University of Zambia reviewed and approved the protocol for MIS 2010. Permission was given by ministry of health to use the MIS 2010 dataset and ethical clearance was also granted by the Research Ethics Committee of the University of Zambia for this study to conduct secondary data analysis.

4.0 RESULTS

4.1 Socio-demographic characteristics

A total of 4810 individuals aged 5-19 years who met the inclusion criteria were included in the study out of 7429 who were captured in the survey. As depicted in table 2, 2332(48.5%) were males while 2478(51.5%) were females. The majority of these (68.2%) came from rural areas and only 31.8% were from urban areas. Copperbelt province had the highest number (18.8%) where as North Western had the least number (5.5%). The mean age was 10.9 years.

The majority of the study participants (79.6%) came from households headed by males while 20.6% were from female headed households. Three hundred and fifty nine (7.5%) of the participants came from households where the head had never attended school, 1987(41.3%) were from households with primary, 1894(39.4%) secondary and 570(11.8%) tertiary education attainment of the head of household. The mean age of the heads of households was 42.1 years and the mean number of ITNs per household was 2.2 nets.

Table 2.Distribution of households by socio-demographic characteristics in Zambia, 2010 Malaria Indicator Survey, n=4810

Characteristic	category	n(%)
Sex	Male	2 332(48.5)
	Female	2 478(51.5)
Residence	Urban	1 530(31.8)
	Rural	3 280(68.2)
Region	Luapula	325(6.8)
	Central	525(10.9)
	Copperbelt	906(18.8)
	Eastern	793(16.5)
	Lusaka	489(10.2)
	North Western	263(5.5)
	Northern	522(10.8)
	Southern	597(12.4)
	Western	390(8.1)
Age group (years)	5-9	1 129(23.5)
	10-14	1 669(34.7)
	15-19	2 012(41.8)
Gender of head of household	Male	3 831(79.6)
	Female	979(20.4)
Wealth quintile	Lowest	967(20.1)
	Second	600(12.5)
	Middle	938(19.5)
	Fourth	1 113(23.1)
	Highest	1 192(24.8)
Ratio of nets to sleeping spaces	Not all bed spaces covered	2 622(54.5)
	All bed spaces covered	2 188(45.5)
Education level of head of household	Never attended school	359(7.5)
	Primary	1 987(41.3)
	Secondary	1 894(39.4)
	Tertiary	570(11.8)
Age of head household (yrs)	<25	165(3.4)
	25-34	1 059(22.0)
	35-44	1 754(36.5)
	45-59	1 436(29.9)
	60+	396(8.2)
Number of ITNs owned by households	1	1 634(34.0)
	2	1 547(32.2)
	3 or more	1 629(33.8)

4.2 Presence of under-five children

As shown in table 3 below, 3643(53.7%) individuals aged 5-19 years came from households which had at least one child under the age of five and 1167(24.3%) were from households without any under-five child. Two thousand five hundred and eighty two (53.7%) came from households where at least one child under the age of five had slept under an ITN a night before the survey where as 2228(46.3%) came from households where no child under the age of five had slept under an ITN a night before the survey.

Table 3 Distribution of households by under five children in Zambia, 2010 Malaria Indicator Survey. n=4810

Characteristic		n(%)
Presence of <5 children in households	0	1 167(24.3)
	1	3 643(53.7)
Presence of <5 children who slept under an ITN a night before survey	0	2 228(46.3)
	1	2 582(53.7)

4.3 Women Knowledge about Malaria

As depicted in table 4 below, 4598(95.6%) individuals aged 5-19 years came from households that had received malaria information at home and 212(4.4%) were from households that had not received malaria information at home. Three thousand three hundred and sixty two (69.9%) were from households where the women who were interviewed knew that sleeping under an ITN prevents against malaria and 1448(30.1%) came from households where women did not know that sleeping under an ITN prevents against malaria. Four thousand two hundred and fifty nine (88.5%) came from households where women identified mosquito bites as the cause for malaria and 551(11.5%) came from households where women did not know that mosquito bites could cause malaria.

Table 4 Distribution of households by Knowledge of women about Malaria in Zambia, 2010
Malaria Indicator Survey. n=4810.

Characteristic		n(%)
Children 5-19 year olds who came from households that received malaria information at home	No	4 598(95.6)
	Yes	212(4.4)
Children 5-19 year olds who came from households where women knew ITN protects against malaria	No	1 448(30.1)
	Yes	3 362(69.9)
Children 5-19 year olds who came from households where women knew mosquito bites causes malaria	No	551(11.5)
	Yes	4 259(88.5)

4.4 Logistic regression

All the independent variables were analysed separately against the dependent variable using pearson chi square to obtain p-values. This helped to identify factors that were associated with sleeping under an ITN the night before the survey by 5-19 year old individuals. Factors that were significant at P<0.05 were retained in the multivariate logistic regression model as shown in the table 5 below. The estimates took into account the effect of the survey design when coming up with point estimates.

Table 5. P-values from chi square tabulation of sleeping under an ITN by 5-19 year old against each of the valuables.

Variable	P-value	Valuable	P-value
Sex	0.001*	Education level of house head	0.039
Residence	0.005*	Wealth quintile	0.465
Region	0.000*	Malaria information at home	0.167
Age group of children	0.000*	Knowing ITN prevents malaria	0.158
Gender of head of household	0.934	Knowing bites causes malaria	0.800
Number of ITNs	0.000*	ITN to sleeping space ratio	0.000*
Age of head of household	0.002*	Presence of under five child	0.233
		Under five slept under ITNs	0.000*

*Significant at p<0.05

Out of the 4810 eligible participants captured in the survey, only 2023(42.1%) slept under ITNs a night before the survey. The factors associated with sleeping under ITNs by individuals aged 5-19 were identified. Univariate analysis of the factors associated with sleeping under the ITNs in households with at least one ITN was done. As shown in table six below, being female, residing in an urban area, living in Central, Eastern, Northern, North Western and Western provinces, being in the age group 5-9 years, coming from a household with two, three or more ITNs, coming from a household with the head in the age group less than twenty five or 25-34 years, coming from a household which had at least one under-five child who slept under an ITN and being in the household which had enough ITNs to cover all the sleeping spaces were all associated with sleeping under ITNs by 5-19 years old individuals.

After controlling for potential confounders, being female, living in Central, Eastern, North Western and Western provinces, being in the age group 5-9 years, coming from a household with two, three or more ITNs, coming from a household with the head in the age group less than twenty five or 25-34 years, coming from a household which had at least one under-five child who slept under an ITN and being in the household which had enough ITNs to cover all the sleeping spaces retained their significance while coming from a household with the head having tertiary education attainment became significant.

The findings in table six means that among the 5-19 year old individuals, females were 1.36 times (95% CI 1.17-1.58) more likely to have slept under ITNs than males. Luapula Province had the lowest rate of ITN utilisation. Only 28% had slept under the ITNs and hence it was taken as a comparison province. Participants in Central were 1.53 times (95% CI 1.01-2.33), Eastern were 2.60 times (95% CI 1.69-4.00), North Western were 1.85 times (95% CI 1.18-2.91) and Western were 1.69 times (95% CI 1.09-2.61) more likely to have slept under the ITN than those from Luapula province. The three categorised age groups for 5-19 year olds in relation to ITN utilisation revealed that those in the age group 5-9 years were 1.29 times (95% CI 1.03-1.60) more likely to use ITNs than those aged 15-19 years. There was no statistical significance in ITN utilisation between those in the age group 15-19 and 10-14 years. The number of ITNs owned by the household was an important determinant of ITN utilisation by 5-19 year olds. Participants in households that owned two ITNs were almost four times more likely to sleep under the ITN than those coming from households which only had one ITN. AOR=3.93(95% CI 3.01-5.13) and those from households with three or more ITNs were five times AOR=5.10(95% CI 3.61-7.19) more likely to have slept under the ITN than those from households with one ITN. Similarly, those who came from households which had enough ITNs to cover all the sleeping spaces were 2.78 times (95% CI 2.17-3.58) more likely to have used the ITNs than those from households which had fewer number of ITNs than the sleeping spaces available. The effect of education level of the head of household on ITN utilisation was investigated. Participants coming from households where the head never attended school were the comparison group. There was no significant difference in ITN utilisation in both those who came from households where the heads had attained primary or secondary level and those who came from households where the heads had never been to school. However, those who came from households with the head having tertiary education level were 1.79 times (95% CI 1.05-3.57) more likely to have used the ITN than those whose heads had never been to school.

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The age group 35-44 years of heads households was a comparison group. Those who came from households where the heads were less than twenty five years old were 3.17 times (95% CI 1.77-5.68) more likely to have used the ITNs than those from heads aged 35-44 years. Those from 25-34 years old heads were 1.37 times (95% CI 1.03-1.83) more likely to have used the ITNs than those from heads of households aged 35-44 years. The participants who came from households which had at least one under-five child who had used the ITN a night before the survey were 2.62 times more (95% CI 2.00-3.42) likely to have slept under the ITNs than those who came from households where no under-five child used the ITN a night before the survey.

Table 6.Logistic regression of predictors of 5-19 year old sleeping under an ITN a night before the survey in households with at least one ITN in Zambia 2010 MIS

Variables		Slept under an ITN a night before the survey		OR(95%CI)	Adjusted OR(95%CI)
		Yes n(%)	No n(%)		
Sex	Male	928(39.8)	1 404(60.2)	1.00	1.00
	Female	1 095(44.2)	1 383(55.8)	1.22(1.08-1.38)	1.36(1.17-1.58)
Residence	Rural	552(36.1)	978(63.9)	1.00	1.00
	Urban	1 471(44.8)	1 809(55.2)	1.49(1.13-1.98)	1.20(0.85-1.68)
Region	Luapula	91(28.0)	234(72.0)	1.00	1.00
	Central	236(44.9)	289(55.1)	2.22(1.42-1.47)	1.53(1.01-2.33)
	Copperbelt	336(37.1)	570(62.9)	1.49(0.94-2.31)	1.21(0.76-1.93)
	Eastern	429(54.1)	364(45.9)	3.15(2.06-4.84)	2.60(1.69-4.00)
	Lusaka	151(30.9)	338(69.1)	1.16(0.74-1.83)	1.18(0.68-2.07)
	North Western	136(51.7)	127(48.3)	2.86(1.81-4.51)	1.85(1.18-2.91)
	Northern	252(48.3)	270(51.7)	2.40(1.50-3.85)	1.47(0.90-2.39)
	Southern	207(34.7)	390(65.3)	1.35(0.82-2.23)	0.82(0.48-1.38)
	Western	185(47.4)	205(52.6)	2.56(1.60-4.75)	1.69(1.09-2.61)
Age category (in years)	5-9	932(46.3)	1 080(53.7)	1.36(1.13-1.64)	1.29(1.03-1.60)
	10-14	647(38.8)	1 022(61.2)	0.98(0.84-1.15)	0.92(0.76-1.13)
	14-19	444(39.3)	685(60.7)	1.00	1.00
Number of ITNs	1	268(16.4)	1 366(83.6)	1.00	1.00
	2	773(50.0)	774(50.0)	5.32(4.13-6.84)	3.93(3.01-5.13)
	3 or more	982(60.3)	647(39.7)	7.75(5.69-10.55)	5.10(3.61-7.19)
Age head	<25	95(57.6)	70(42.4)	1.79(1.14-2.82)	3.17(1.77-5.68)
	25-34	508(48.0)	551(52.0)	1.41(1.09-1.82)	3.17(1.77-5.68)
	35-44	734(41.8)	1 020(58.2)	1.00	1.00
	45-59	514(35.8)	922(64.2)	0.86(0.67-1.11)	1.04(0.78-1.40)
	60 and above	172(43.4)	224(56.6)	1.13(0.75-1.72)	1.35(0.83-2.20)
Education of head	Never	150(41.8)	209(58.2)	1.00	1.00
	Primary	819(41.2)	1 168(58.8)	0.99(0.62-1.57)	1.07(0.69-1.66)
	Secondary	764(40.3)	1 130(59.7)	0.93(0.59-1.47)	1.22(0.77-1.93)
	Tertiary	290(50.9)	280(49.1)	1.56(0.92-2.65)	1.79(1.05-3.07)
ITN coverage	Not full	653(24.9)	1 969(75.1)	1.00	1.00
	Full coverage	1 370(62.6)	818(37.4)	4.72(3.64-6.12)	2.79(2.17-3.58)
Under5 slept under ITN	No	634(28.5)	1 594(71.5)	1.00	1.00
	Yes	1 389(53.8)	1 193(46.2)	2.86(2.27-3.61)	2.62(2.00-3.42)

Key OR-odds ratio, AOR-Adjusted Odds Ratio, CI-Confidence Interval

5 DISCUSSION

This study explored factors associated with low ITN utilisation observed in 2010 Malaria Indicator Survey among 5-19 year old individuals from households with at least one ITN. Although the advent of mass distribution of ITNs has significantly reduced the inequity in the ownership and use of ITNs between the poor and the rich as shown by Ye et al (2012) in a study that was done in Northern Nigeria after mass distribution of ITNs, there has been a growing trend in the inequity of ITN use across different age groups. Both WHO (2010) and Noor et al (2009) found that 5-19 year old individuals were least likely to use ITNs in households and therefore were least protected by ITNs. This trend was also seen in the 2010 Malaria Indicator Survey data set which this study is based on.

Among the factors investigated, education level of the head of the household was found to be associated with ITN utilisation among 5-19 year olds in Zambia. When compared with households headed by those who had never attended school, more participants who came from households with the head having tertiary education attainment slept under the ITNs than those from the comparison group. This could be because the head of the households with tertiary education are more knowledgeable about malaria than those with low education. This though contradicts slightly with the finding by Atiele et al (2011) that primary or secondary level of education by the head of households was an important determinant of ITN use by household members.

The number of ITNs owned by households was also an important determinant of utilisation among 5-19 year old individuals. The participants who came from households which owned two ITNs and three or more ITNs used the ITN more than those from households which had only one ITN. This may suggest that if there is only one ITN present in the household, priority may still be given to pregnant women and under five children although the full coverage concept promotes ITN usage by all age groups. Therefore there is need to increase access to ITNs in order to encourage utilisation by school age children. Those from households which had attained full coverage also showed similar trends of higher utilisation compared to those from households which did not attain full coverage. The distribution of ITNs by provinces also affected utilisation. Luapula province had the lowest overall ITN utilisation and hence it was chosen as a reference province in the analysis. Provinces such as Central, Eastern, North-Western and Western which had more than 70 per cent of households with at least one ITN had higher utilisation rates compared to Luapula. This was due to distribution strategies that targeted these provinces towards the end of 2009. The presence of more ITNs in households therefore, seems to encourage usage by other age groups other than the traditional pregnant women and under five children. Therefore, more ITNs are required per household to encourage high utilisation among 5-19 year olds and this should be accompanied by health education to emphasise that everyone is at risk of malaria and not just pregnant women and under five children. This however, contradicts with the finding by Baume and Franca-Koh (2011) that the likelihood of a net being used was more in households with fewer mosquito nets than those with more nets.

These findings call for the need to reach universal ITN coverage in order to increase ITN utilisation. Once this is attained, there is need for keep up strategy that will help maintain the

coverage by replacing worn out ITNs. Several distribution strategies have been suggested but a combination of a distribution strategy that targets pregnant women and infants and also school based distribution in primary and secondary schools have been found to be more cost effective and have the ability to reach out to more than 85 percent of the population (Koenker et al, 2013).

The effect of the earlier campaign that only targeted pregnant women and under-five children are still being seen despite the change of policy to universal ITN coverage. Children under the age of five and those aged 20 years and above had the highest ITN utilisation in the 2010 Zambia Malaria Indicator Survey. About 44% of females had slept under the ITNs the night before the survey compared to 40% males (MoH, 2010). In this sub population study of 5-19 year olds, more females also slept under an ITN than males. One possible explanation for this could be due to the presence of pregnant young women in the age group 15-19 years. This is consistent with the findings by Garley et al (2013) in a study that was done in Nigeria to determine gender differences in the use of ITNs three months after mass distribution of free ITNs. In this study, it was found that more females slept under ITNs than males although this was not specific to 5-19 year old individuals. The age of household head also affected ITN utilisation. More individuals from households where the head was below forty five years slept under the ITNs than those whose heads were above forty five.

This study had some limitations worth mentioning. Some questions which would have been helpful in identifying more determinants of ITN utilisation were not asked in the questionnaire. For instance in a study done in Ethiopia, it was found that children who were sleeping on the floor were less likely to use ITNs due to difficulties in hanging ITNs (Baume et al, 2009). There was no question to capture such kind of information in the 2010 MIS. There was also a possibility of under reporting or over reporting ITN usage by the head of the household who answered questions on behalf household members.

CONCLUSION

The study finds that the numbers of ITNs owned by the household and education level of the head of household were important determinants of ITN utilisation among 5-19 year olds. The free distribution of ITNs is an effective strategy in reducing inequity in ownership of ITNs across different socio-economic groups though it may not ensure equality of utilisation across different subpopulations. However, this study provide enough evidence to advocate for strategies that will ensure that equity of utilisation in different age groups is attained through attainment of universal coverage of ITNs and health education especially targeting those with low education.

RECOMMENDATIONS

- There is need to do a school based survey using mixed methods. The qualitative part will help to understand more on the barriers associated with ITN utilisation among 5-19 year olds. This will also reduce on under or over reporting by head of households.
- There is need to ensure that universal coverage of ITNs is attained and a keep up strategy should be put in place to replace worn out ITNs.
- The strategy of distributing ITNs should include a combination of one that target pregnant women and infants and school based delivery targeting primary and secondary school pupils as it has been found to be cost effective with the ability to reach to more people (Koenkar et al, 2013). This will help in reaching universal coverage and also maintaining the ownership levels of ITNs.
- The Malaria Indicator Survey should include questions in the questionnaire that will help identify those who sleep on the floor and those who fail to hang the ITNs because of houses not being suitable especially traditional houses.

6.0 REFERENCES

Atieli H.E, Zhou G, Afrane Y, et al (2011). Insecticide-treated net (ITN) ownership, usage and malaria transmission in the highlands of western Kenya. Parasites and vectors, 4:113 doi:10.1186/1756-3305-4-113.

Auta A (2012). Demographic factors associated with Insecticide Treated Bed Net use among Nigerian Women and Children. N Am J Med Sci 4 (1):40-44.

Baume C.A and Franca-Koh A.C (2011). Predictors of mosquito net use in Ghana. Malar J 10:265.

Baume C.A, Reithinger R and Woldehanna S (2009). Factors associated with use or non use of mosquito nets owned in Oromia and Amhara Regional States, Ethiopia. Malar J 8:264.

Central Statistical Office (2012). Zambia 2010 census of population and housing population summary report. Pp 84

Deribew A, Birhanu Z, Sena L, et al (2012). The effect of household heads training on long-lasting insecticide-treated bed nets utilisation: A cluster randomised control trial in Ethiopia. Malaria Journal 11:99.

Garley A.E, Ivanovich E, Eckert E, et al (2013). Gender differences in the use of insecticide-treated nets after a universal free distribution campaign in Kano State, Nigeria: post-campaign survey results. Malaria Journal, 12:119.

Gimnig J.E, Kolczak M.S, Hightower A.W, et al (2003). Effect of perimethrin-treated bed nets on the spatial distribution of malaria vectors in Western Kenya. Am. J. Trop. Med Hyg., 68 (suppl 4):pp115-120

Koenkar H.M, Yukich Y.O, Mkindi A, et al (2013). Analysis and recommendation options for maintaining universal coverage with Long lasting Insecticidal Nets: The case of Tanzania 2011. Malaria Journal, 12:150

Larson P.S, Mathanga D.P, Campbell C.H, et al (2012). Distance to health services influences insecticide-treated net possession and use among six to 59 month-old children in Malawi. Malaria Journal 2012, 11:18.

Ministry of Health. Zambia National Malaria Indicator Survey 2010. Lusaka. Available at http://nmcc.org.zm/ (Accessed January 12, 2012).

Ministry of Health (2012). National Malaria Control action plan 2012

Ministry of Health (2011). Annual Health Statistical Bulletin 2010

Ministry of Health (2008). National Malaria Control Plan: Actions for scale-up for impact of malaria in Zambia in support of the National Strategic Plan 2006-2010.

Ministry of Heath, National Malaria Control Centre. National Malaria Strategic Plan 2006-2010. Lusaka. Available at http://www.nmcc.org.zm/publications.htm (Accessed November, 20, 2011).

Mugisha F and Arinaitwe J (2003). Sleeping arrangements and mosquito net use among under-fives: Results from the Uganda Demographic Health Survey. Malaria Journal, 2:40

Nahlen B.L, Clark J.P and Alnwick D (2003). Insecticide treated bed nets. Am J Trop Med Hyg, 68 (suppl 4):pp 1-2.

Noor A.M, Kirui V.C, Brooker S.J, et al (2009). The use of insecticide treated nets by age: implications for universal coverage in Africa. BMC Public Health, 9:369.

Phillips-Howard P.A, Nahlen B.L, Kolczak M.S, et tal (2003). Efficacy of permethrin-treated bed nets in the prevention of mortality in young children in an area of high perennial malaria transmission in Western Kenya. Am J Trop Med Hyg, 68 (suppl 4):pp 23-29.

Barbara K, Rimer B.K and Glanz K (2005). Theory at a Glance: A Guide for Health promotion Practice. 2nd ed. U.S Department of Health and Human Services, National Institutes of Health. PP 12-14

WHO (2011) World Malaria Report 2011 fact sheet. Geneva

WHO (2010). World Malaria Report 2010. Geneva.World Health Organisation.

WHO (2007). WHO Global Malaria programmes: Position statement on ITNs. Geneva. Available at www.who.int/malaria/publications/atoz/itnpospaperfinal.pdf (Accessed November 20, 2011)

Ye Y, Patton E, Kilian A, et al (2012). Can universal insecticide-treated net campaigns achieve equity in coverage and use? The case of Northern Nigeria. Malaria Journal, 11:32.

Questionnaires

EXTRACTED FROM ZAMBIA MALARIA INDICATOR SURVEY 2010

Household questionnaire

<table>
<tr><td colspan="2">IDENTIFICATION[1]</td></tr>
<tr><td>

PLACE NAME

NAME OF HOUSEHOLD HEAD..

CLUSTER NUMBER...

HOUSEHOLD NUMBER...

REGION..

URBAN/RURAL (URBAN=1, RURAL=2).......................................

LARGE CITY/SMALL CITY/COUNTRY SIDE[2]...

(LARGE CITY=1, SMALL CITY=2, TOWN=3, COUNTRYSIDE=4)

</td><td></td></tr>
</table>

INTERVIEWER VISITS				
	1	2	3	FINAL VISIT
DATE INTERVIEWER'S NAME RESULT	....	....	....	DAY ☐☐ MONTH ☐☐ YEAR ☐☐☐☐ NAME ☐☐ RESULT ☐
NEXT VISIT: DATE TIME	....	....		TOTAL NO OF VISITS ☐
RESULTS CODE 1 COMPLETED 2 NO HOUSEHOLD MEMBER AT HOME OR NO COMPETENT RESPONDENT AT HOME AT TIME OF VISIT 3 ENTIRE HOUSEHOLD ABSENT FOR EXTENDED PERIOD OF TIME 4 POSTPONED 5 REFUSED 6 DWELLING VACANT OR ADRESS NOT A DWELLING 7 DWELLING DESTROYED				TOTAL PERSONS IN HOUSEHOLD ☐☐ TOTAL ELIGIBLE WOMEN ☐☐ LINE NUMBER OF

8 DWELLING NOT FOUND 9 OTHER .... (SPECIFY)	RESPONDENT TO HOUSEHOLD QUESTIONNAIRE	

SUPERVISOR NAME: .... DATE:	OFFICE EDITOR	KEYED BY

[1] This section should be adapted for country-specific survey design

[2] The following guidelines should be used to categorise urban sample points: "Large cities" are national capitals and places with over 1 million populations; "small cities"

Household Listing

Now we would like some information about the people who usually live in your household or who are staying with you now.

LINE NO	USUAL RESIDENTS AND VISITORS	RELATIONSHIP TO HEAD OF HOUSEHOLD	SEX	RESIDENCE		AGE	ELIGIBLE WOMEN
	Please give the names of the persons who usually live in your household and guests of the household who stayed here last night, starting with the head of the household	What is the relationship of (NAME) to the head of household?	Is (NAME) male or female?	Does (NAME) usually live here?	Did (NAME) stay here last night	How old is (NAME)?	CIRCLE LINE NUMBER OF ALL WOMEN AGED 15-49
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
01			M 1 F 2	YES 1 NO 2	YES 1 NO 2	IN YEARS	01
02			1 2	1 2	1 2		02
03			1 2	1 2	1 2		03
04			1 2	1 2	1 2		04
05			1 2	1 2	1 2		05

CODES FOR Q.3 RELATIONSHIP TO HEAD OF HOUSEHOLD

01=HEAD   03=SON OR DAUGHTER   05=GRANDCHILD   07=PARENT-IN-LAW   09=OTHER RELATIVE   11=NOT RELATED

02=WIFE/HUSBAND   04=SON-IN-LAW OR DAUGHTER-IN-LAW   06=PARENT   08=BROTHER OR SISTER 10=ADOPTED/FOSTER/STEPCHILD
98=DON'T   KNO

NO	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
9.11	For the head of the household, did he/she attend school?	Yes...1 No..2	-<10
9.12	For the head of the household, what is the highest level of school attended: primary, secondary or higher?	Primary...1 Secondary...2 Higher...3	
14f	How many rooms in this household are used for sleeping? INCLUDE ONLY ROOMS WHICH ARE USUALLY USED FOR SLEEPING	NUMBER OF SLEEPING ROOMS	
14g	How many separate sleeping spaces are there in your household? INCLUDE ALL SLEEPING SPACES, INCLUDING IF THERE IS MORE THAN ONE SLEEPING SPACE IN EACH ROOM USED FOR SLEEPING.	NUMBER OF SLEEPING SPACES	
16	Does your household have any mosquito nets that can be used while sleeping?	Yes...1 No..2	
17	How many mosquito nets does your household have? IF 7 OR MORE NETS, RECORD '7'.	NUMBER OF NETS	

18	ASK RESPONDENT TO SHOW YOU THE NET(S) IN THE HOUSEHOLD. IF MORE THAN THREE NETS, USE ADDITIONAL QUESTIONNAIRE(S)	NET #1	NET #2	NET #3
		OBSERVED......1 NOT OBSERSERVED..2	OBSERVED......1 NOT OBSERSERVED..2	OBSERVED......1 NOT OBSERSERVED..2
20a	Where did you obtain the net?	GOVERNMENT CLINIC/HOSPITAL NEIGHBOURHOOD HEALTH COMMITTEE (NHC) COMMUNITY HEALTH WORKER (CHW)/AGENT RETAIL SHOP PHARMACY OTHER (SPECIFY) DON'T KNOW	GOVERNMENT CLINIC/HOSPITAL NEIGHBOURHOOD HEALTH COMMITTEE (NHC) COMMUNITY HEALTH WORKER (CHW)/AGENT RETAIL SHOP PHARMACY OTHER (SPECIFY) DON'T KNOW	GOVERNMENT CLINIC/HOSPITAL NEIGHBOURHOOD HEALTH COMMITTEE (NHC) COMMUNITY HEALTH WORKER (CHW)/AGENT RETAIL SHOP PHARMACY OTHER (SPECIFY) DON'T KNOW
20b	Did you purchase the net?	YES................1 NO.................2 NOT SURE......8	YES................1 NO.................2 NOT SURE......8	YES................1 NO.................2 NOT SURE......8
23g	Is the net hanging for sleeping? PLEASE OBSERVE OR ASK IF THE NET IS HANGING	YES................1 NO.................2	YES................1 NO.................2	YES................1 NO.................2
25	Who slept under this mosquito net last night?	NAME.................. LINE NO NAME................... LINE NO NAME.................... LINE NO NAME.................... LINE NO NAME.................. LINE NO	NAME.................. LINE NO NAME................... LINE NO NAME.................... LINE NO NAME.................... LINE NO NAME.................. LINE NO	NAME.................. LINE NO NAME................... LINE NO NAME.................... LINE NO NAME.................... LINE NO NAME.................. LINE NO
26		GO BACK TO18 FOR NEXT NET OR IF NO MORE NETS, GO TO 27	GO BACK TO18 FOR NEXT NET OR IF NO MORE NETS, GO TO 27	GO BACK TO 18 IN FIRST COLUMN OF NEW QUESTIONNAIRE OR IF NO MORE GO

QUESTIONNAIRES

ZAMBIA MALARIA INDICATOR SURVEY 2010

Women's questionnaire

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┌─────────────────────────────────────────────────────────────────────────────┐
│                    IDENTIFICATION¹                          │                 │
│                                                            │                 │
│  PLACE NAME...............................................................  │                 │
│                                                            │                 │
│  NAME OF HOUSEHOLD HEAD................................................  │                 │
│                                                            │                 │
│  CLUSTER NUMBER.........................................................  │                 │
│                                                            │                 │
│  HOUSEHOLD NUMBER......................................................  │                 │
│                                                            │                 │
│  REGION..................................................................  │                 │
│                                                            │                 │
│  URBAN/RURAL (URBAN=1, RURAL=2)...................................  │                 │
│                                                            │                 │
│  LARGE CITY/SMALL CITY/COUNTRY SIDE²............................  │                 │
│                                                            │                 │
│  (LARGE CITY=1, SMALL CITY=2, TOWN=3, COUNTRYSIDE=4)       │                 │
└─────────────────────────────────────────────────────────────────────────────┘
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INTERVIEWER VISITS				
	1	2	3	FINAL VISIT
DATE	....	....	....	
INTERVIEWER'S NAME	....	....	....	DAY [ ][ ]
	....	....	....	MONTH [ ][ ]
RESULT				YEAR [ ][ ][ ][ ]
				NAME [ ][ ]
				RESULT [ ]
NEXT VISIT: DATE	....	....		TOTAL NO OF
TIME	....	....		VISITS [ ]

RESULTS CODE

1 COMPLETED	4 REFUSED	7 OTHER......................(SPECIFY)
2 NOT AT HOME	5 PARTLY COMPLETED	
3 POSTPONED	6 INCAPACITATED	

COUNTRY SPECIFIC INFORMATION: LANGUAGE OF QUESTIONNAIRE, LANGUAGE OF INTERVIEW, NATIVE LANGUAGE OF RESPONDENT AND WHETHER TRANSLATOR USED

SUPERVISOR NAME: .... DATE:	OFFICE EDITOR [ ][ ]	KEYED BY [ ][ ]

[1] This section should be adapted for country-specific survey design

² The following guidelines should be used to categorise urban sample points: "Large cities" are national capitals and places with over 1 million populations; "small cities"

NO	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
103	How old were you at your last birthday?	AGE IN COMPLETED YEARS	
104	Have you ever attended school?	YES..1 NO...2	-<108
105	What is the highest level of school you attended: Primary, Secondary or higher?	PRIMARY..1 SECONDARY...................................2 HIGHER..3	

GENERAL MALARIA KNOWLEDGE

NO	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
252	IN YOUR OPINION, WHAT CAUSES MALARIA? MULTIPLE RESPONSES POSSIBLE PROBE ONCE (ANYTHING ELSE?)	MOSQUITO BITES…………………………1 EATING IMMATURE SUGARGANE………2 EATING COLD NSHIMA……………………3 EATING OTHER DIRTY FOOD……………4 DRINKING DIRTY WATER…………………5 GETTING SOAKED WITH RAIN……………6 COLD OR CHANGING WEATHER…………7 WITCHCRAFT……………………………………8 OTHER (SPECIFY)……………………………9 DON'T KNOW……………………………………10	
253	HOW CAN SOMEONE PROTECT THEMSELVES AGAINST MALARIA? MULTIPLE RESPONSES POSSIBLE PROBE ONCE (ANYTHING ELSE?)	SLEEP UNDER A MOSQUITO NET………1 SLEEP UNDER AN INSECTICIDE TREATED MOSQUITO NET………………2 USE MOSQUITO REPELLANT……………3 AVOID MOSQUITO BITES…………………4 TAKE PREVENTIVE MEDICATION………5 SPRAY HOUSE WITH INSECTICIDE…….6 USE MOSQUITO COILS……………………7 CUT THE GRASS AROUND THE HOUSE……………………………………8 FILL IN PUDDLES (STAGNANT WATER)…………………………9 KEEP HOUSE SURROUNDINGS CLEAN…………………………………………10 BURN LEAVES……………………………………11 DON'T DRINK DIRTY WATER……………12 DON'T EAT BAD FOOD (IMMATURE SUGARCANE/LEFTOVER FOOD………..13 PUT MOSQUITO SREENS ON THE WINDOW……………………………………14 DON'T GET SOACKED WITH RAIN…….15 OTHER (SPECIFY)……………………………16 DON'T KNOW……………………………………17	
260	HAS ANYONE EVER PROVIDED YOU WITH EDUCATION AT HOME?	YES…………………………………………………1 NO……………………………………………………2	IF 2 SKIP TO 267
262	WHAT TYPE OF INFORMATION/EDUCATION ABOUT MALARIA DID YOU RECEIVE AT YOUR HOME? PROBE BUT DO NOT PROVIDE ANSWERS. MULTIPLE ANSWERS POSSIBLE. POSSIBLE ANSWERS INCLUDE:	MALARIA IS DANGEROUS………………….1 MALARIA CAN KILL…………………………2 MOSQUITOES SPREAD MALARIA………3 SLEEPING UNDER MOSQUITO NET IMPORTANT……………………………………4 WHO SHOULD SLEEP UNDER MOSQUITO NET…………………………………5 SEEK TREATMENT FOR FEVER…………6 SEEK TREATMENT FOR FEVER WITHIN 24 HOURS/PROMPTLY………..7 IMPORTANCE OF HOUSE	

		SPRAYING....8 NOT PLASTERING WALLS AFTER SPRAYING…………………………………9 ENVIRONMENTAL SANITATION ACTIVITIES…………………………………10 OTHER (SPECIFY)……………………………11 DON'T KNOW……………………………12	