

The Acquisition And Proper Usage Of LLINs As A Primary Preventive Measure Against Malaria In The Batibo Health Area In North West Cameroon

Article Review by Bodzewan Emmanuel Fonyuy
Ph.D In Public Health, Texila American University
Email: ebodzewan@gmail.com

Abstract

Each year, there is an estimated 220 million deaths caused by malaria leading to approximately one million deaths mostly among children under five years of age. There is a growing international agreement to use prevention and treatments methods that are available against malaria. The most effective method include; the use of mosquito bed nets treated with long lasting insecticide (LLINs) to avoid mosquito and to kill mosquito and spraying the inside wall of the houses with similar to kill malaria carrying mosquitoes. In 2013 an estimated 136million LLINs were delivered in endemic countries, a major increase over the 70million bed nets were funded for delivery in 2014 and suggesting an even stronger pipeline for 2015. Population access to LLINs remain below the target universal coverage and has not appreciably improved.

Malaria being a fatal disease is becoming difficult to prevent and control because of the habit of increasing resistance to the insecticides of the female anopheles mosquito.

In Cameroon, malaria remains a public health problem and responsible for 31% of consultations and 44% of hospitalization in health facilities. It is responsible for 18% of deaths occurring in Cameroon. In children less than 5 years 31% of deaths are due to malaria.

The use of LLINs in Cameroon is still a problem, that is why in world malaria days from 2013-2015 the theme has been “invest in the future, defeat malaria to call attention to the effort to finish the job this 2015 calling for high level commitment to the vision of a world free of malaria”.

The general objective was to find out the factors affecting the acquisition and proper usage of LLINs as a primary preventive measure against malaria and to propose possible solutions to identified problems.

The specific objectives of the study were:

1. To assess the community's knowledge on malaria prevention.
2. To assess their practical measures used in preventing malaria through the use of LLINs.
3. To find out the proportion of the community with LLINs properly installed and utilized.
4. To ascertain the constraints encountered by the community in its proper usage and propose possible solution to any identified problems.

A descriptive cross-sectional study was employed in which data was collected on the acquisition and proper use of LLINs in the Batibo health area.

The study population constituted of the inhabitants of Batibo health area community.

A sample of 100 respondents were randomly selected using the systematic random sampling method to represent the entire population of Batibo Health Area). Results show that on the distribution of respondents relative to whether they have LLINs; it was observed that out of the 100 respondents 62% had LLINs while 38% did not have, 12 (19.35%) of the respondents said they have never had LLINs, 28(45.26%) said LLINs are not enough while 22(35.48%) said the one they had is bad. The reason why LLINs may not be enough maybe because of increase in household members as 46 % of the respondents have more than four members per household.

It was equally observed that out of the 38 respondents who had LLINs they were not properly used as only 10(26.5%) said they sleep under LLIN every night,8(21.0%) said when they feel cold and 20(52.6%)said they like.

Conversely, out of the 38 respondents who had LLINs 16(42.1%) said everybody in the household sleep under LLINs while 22(57.9%) said not everybody sleep under LLINs. It was observed that not everybody sleep under LLINs because 13(34.3%) of the respondents said they were old, 2(5.2%) said they do not know why and 2(5.2%) said it is because of negligence.

In conclusion, from the results obtained it was found out that; most people do not use nets because the nets are insufficient and may be because of increasing number of per household compared to the number of LLINs given per household. In the community the relationship between mosquito and malaria well known but many people are not aware of the night-biting female anopheles mosquito that transmit the malaria parasite may be contributing to the fact that many people still reluctant to use the net properly as a primary preventive measure against malaria.

The peripheral level has a great task in the implementation of the proper use of LLINs and to let the net users understand that heat production and not breathing well are minor effects to some people at the beginning of the use of LLIN but after sometime these effects will disappear.

Key words: Long lasting Insecticidal Bednets, Female anopheles mosquitoes, Malaria, Installation, Residual spraying, Prevention, Vulnerable, Under-fives

Introduction

According to World Vision, malaria though eliminated in some parts of the world years ago, remains a significant public health problem threatening half of the world's population (Atkinson JA, Bobagare, *et al*, 2009). Each year, there is an estimated two-hundred and fifty million deaths caused by malaria leading to approximately one million deaths mostly in children under five years of age.

There is a growing international agreement on how to use prevention and treatment methods that are available against malaria. The most effective preventive measures include the use of mosquito bed-nets treated with long lasting insecticides to avoid mosquito bites and to kill mosquito and spraying the inside wall of the houses with similar insecticides to kill malaria-carrying mosquitoes. The most effective treatment for malaria consists of using a combination of several anti-malaria drugs, one of which is the derivatives of artemisinin (WHO, 2005).

Several International Organizations have set up ambitious objectives for large scale malaria control. The target set by WHO in 2005 was to provide malaria prevention and treatment services by 2010 to at least 80% of the people who need them (WHO, 2009). By so doing it aims to reduce malaria by half the proportions of the people who become ill or died from malaria by 2010 and at least by three-quarter by 2015 compared to 2005. It is vital to monitor malaria trends to see if malaria control campaigns are being effective and to make improvements (WHO, 2008).

Malaria is one of the most severe public health problems worldwide. It is the leading cause of death and disease in many developing countries where young people and pregnant women are the groups mostly affected groups (WHO, 2010). Moreover because of the severity of this disease, malaria was included in the Millennium Development goals which were established by the UN in 2000 with the intention of tracking global poverty and health inequality. Goal six included the target to "halt and begin to reverse the incidence of malaria and other major diseases." Unfortunately, a report published in July 2008 in Plos Medicine states that this goal is unlikely to be met (UN, 2000).

More than 1700 people die every day from the effects of a simple mosquito bite. The provision of insecticides treated nets along with training on how to use them are proven ways of stopping the spread of this deadly disease (World Vision 2009).

Malaria is an entirely preventable and treatable mosquito borne illness. In 2013, 97 countries had an ongoing malaria transmission. An estimated 3.4billion people are at risk of malaria of whom 1.2billion

are at high risk. In high risk areas, more than one malaria case occurs per 1000 population. There were estimated 207 million cases of malaria in 2012 (WHO, 2012). Ninety percent of all malaria death occurs in sub-Saharan Africa. In 2012, malaria killed an estimated 482 000 children under five years of age, i.e. 1300 children die every day or one child almost every minute. Between 2000 and 2012, the scale up of interventions helped to reduce malaria incidence rate by 25% globally and 31% in the WHO African region (WHO, 2012).

About 52 countries are on track to reduce the malaria case incidence rate by 75% in line with WHO assembly and roll back malaria targets for 2015. These 52 countries only account for 4% (8million) of total estimated malaria cases. Fifty-two countries are on track to meet Millennium Development Goal targets of reversing the incidence of malaria between 2000 and 2015 (WHO, 2009).

In 2013, an estimated 136 million long last-lasting insecticides nets were delivered to endemic countries, a major increase over the 70million bed nets that were delivered in 2012. About 200million long-lasting insecticides nets (LLINs) were been funded for delivery in 2014, suggesting an even stronger pipe line for 2015. Population access to LLINs remains below the target of universal coverage and has not appreciably improved.

Malaria being a fatal disease is becoming difficult to prevent and control because of the habit of increasing resistance to the insecticides of the female anopheline species. It is highly endemic in nature and is characterized by severe illness episodes and complications. It is turning into a grown hazard in the developing countries. Being a common disease increasing morbidity and mortality, it is the focus of concern (UNICEF, 2014).

Internationally, malaria is a major health problem in Africa, Asia, Central America, and South America. About 40% of the world's population lives in areas where malaria is common. Three-hundred to five-hundred million of cases of malaria occur every year, and 1-2million deaths occur, most of which are young children (UNICEF, 2014).

Malaria affects males and females alike, children of all ages are susceptible to malaria. In counties where malaria is endemic, children less than five years have repeated, and often serious attacks. The survivors develop partial immunity thus older children and adults often have asymptomatic parasitemia, (i.e. presence of plasmodium in the blood-stream without clinical manifestations of malaria) most deaths resulting in children younger than five years (UNICEF, 2014).

In the African region, malaria death rates decreased by 49% across adult age groups and by 54% in children under five years of age. UNICEF is a funding partner with WHO, United Nations Development Program (UNDP) and World Bank's Roll Back Malaria (RBM) initiative a global partnership established in 1998 to catalyze support for malaria control and elimination, and to rally partners around a common plan of action to fight the disease. One of the key goals of 2011 revision of the Global Malaria Action Plan (GMAP) was to reduce global malaria deaths to near zero by the end of 2015 (UNICEF,2014).

From 2008-2012 UNICEF procured over 120 million nets and provided support to over thirty countries. Major recent efforts to scale-up the availability of Insecticide Treated Nets (ITN) in Africa are yielding impressive results. By 2011, seventy-eight countries worldwide had adopted the policy to provide nets to all persons at risk of malaria universal coverage of which eighty-nine countries have policy of distributing the nets free of charge to the end user.

Unfortunately, many children especially in Africa continue to die from malaria as they do not sleep under insecticide-treated nets. The proportion of the population sleeping under an ITN which represents the population directly protected was estimated to be 36% in 2013 (UNICEF, 2014).

In Cameroon, malaria remains a public health problem; the disease is responsible for 31% of consultations and 44% of hospitalization in health facilities. It is responsible for 18% of deaths occurring in the country. In children less than five years 41% of deaths are due to malaria (Science and Education, 2013).

The researchers carried out this study in the Batibo Health Area after having observed that the rate of malaria from the health centre record statistics was the most prevalent with 54.6 % of monthly consultations.

Research question

Why has malaria prevalence still remain considerably high even with the distribution of LLINs as a primary preventive measure?

Study objectives

General objective

To find out the factors affecting the acquisition and proper usage of long lasting insecticide nets (LLINs) as primary preventive measure against malaria and to propose possible solutions to any identified problems.

Specific objectives

- To assess the community's knowledge on malaria prevention in Batibo Health Area;
- To assess their practical measures used in preventing malaria through the use of LLINs in Batibo Health Area;
- To find out the proportion of the community with LLINs properly installed and utilized in Batibo Health Area;
- To ascertain the constraints encountered by the community in its proper usage and propose possible solutions to any identified problems.

Hypothesis

Households that are knowledgeable on the proper installation and daily use of LLINs as a primary preventive measure against malaria would have lesser or no cases of malaria incidence than those that are not.

Methodology

Study design

A descriptive cross-sectional design was used in which the investigator collected primary data from sample respondents, where people's knowledge and practical measures were assessed and the findings described as such.

The investigator collected data from a sample of respondents in the zones to assess the acquisition and effective use of LLINs as a primary preventive measure against malaria.

Sample size

The sample size was calculated using the formula below:

$$N = \frac{(z)^2 \times p(1 - p)}{(e)^2}$$

Where,

N=the required sample size

Z=confidence interval of 95% (z=1.96)

p=the population of households (15%)

e=random error of 5% (type 1 value of 0.05)

N=100 respondents.

The target population consisted all households in Batibo urban health area. A sample size of 100 respondents was selected to be a representative of the entire population of Batibo Health Area. Using a simple random sampling method, five selected zones were balloted via simple random sampling; the zones picked were selected for this study where houses were numbered in fours and every fifth house was selected for administration of questionnaires. Twenty houses were selected in each zone making a total of 100 households.

Instrument for primary data collection

A structured questionnaire of close and open ended questions was used in the collection of primary data.

Method used for data analysis

The data collected was analyzed using manual tallying and scientific calculator, presented using tables, bar charts, pie charts and histograms

Presentation and analysis of results

Sex distribution of respondents

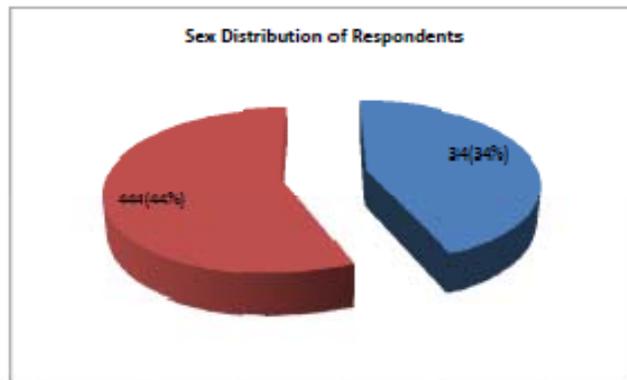


Figure 1. Distribution of respondents according to sex

From Figure 1, out of 100 people who were given questionnaires to answer, 34% were males, while 66 out of the 100 respondents were females.

Distribution of respondents' according to marital status.

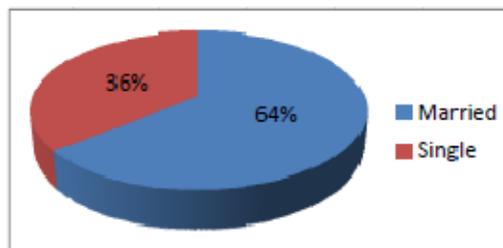


Figure 2. Distribution of respondents according to marital status.

From figure 2, out of 100 respondents, 64 were married while 36 were not married.

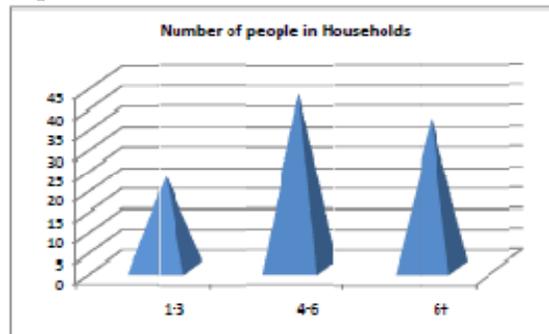


Figure 3: Distribution of respondents according to the number of persons per household.

From figure 3, out of 100 respondents, 22% were having between 1-3 members in the house, and 42% were having between 4-6 members in the household, while 36% of the respondents were those who had at least six and above people in the house.

Community's knowledge on malaria prevention

Knowledge on malaria.

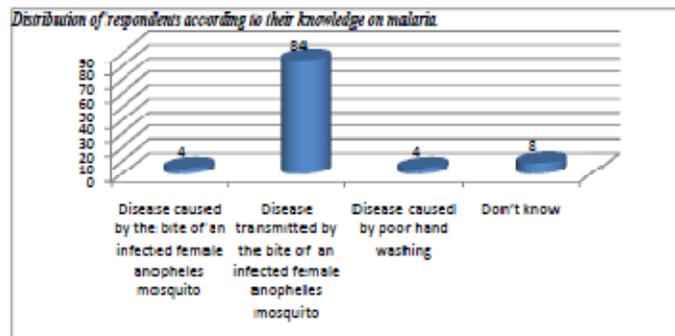


Figure 4: Distribution of respondents according to their knowledge on malaria.

From figure 4 above, it can be observed that 84% of the respondents said a disease transmitted by the bite of an infected female anopheles mosquito, 4% said a disease caused by the bite of an infected female anopheles mosquito, 4% said a disease caused by poor hand washing and 8% said they don't know.

Knowledge on malaria prevention

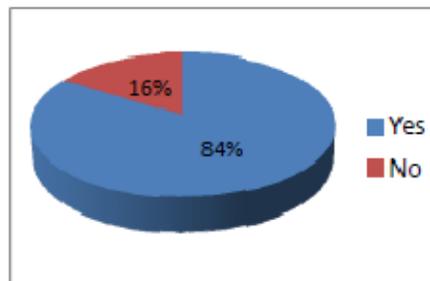


Figure 5. Distribution of respondents according to their knowledge on the prevention of malaria.

From figure 5 above, out of 100 respondents, 84 percent the respondents said malaria can be prevented while 16% of the respondents said malaria cannot be prevented.

Knowledge on the consequences of malaria

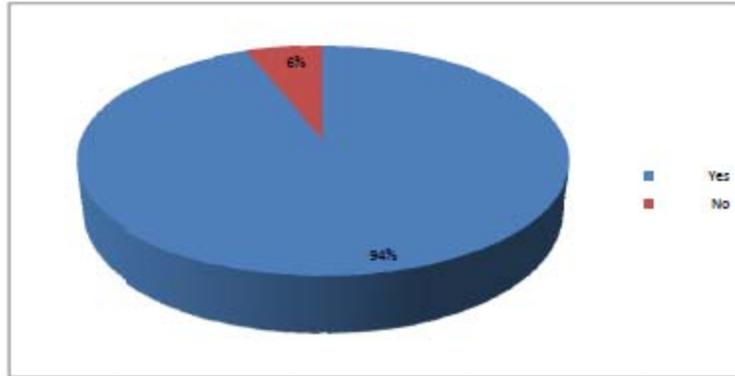


Figure 6. Distribution of respondents according to the consequences of malaria

From figure 6, 94% said malaria can kill following infection while 6% said malaria does not kill.

Malaria preventive measures used

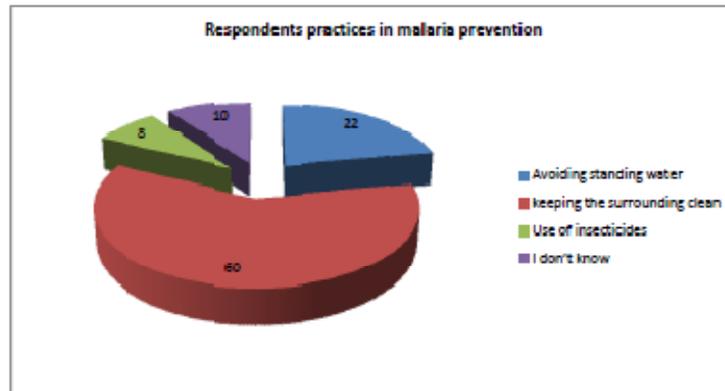


Figure 7: Distribution of respondents according to their practical measures on malaria prevention

From the result on figure 7, it can be observed that 60% of the respondents said by keeping the surrounding clean, 22% said by avoiding standing water, 10% said they did not know, and 8% said with the use of insecticide.

Practical measures on the proper use of LLINs

Community's practical measures via the proper use of LLINs.

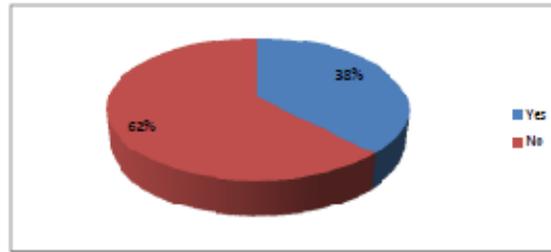


Figure 8. Distribution of respondents according to whether they have LLINs.

From figure 8 above 38 % of the respondents had LLINs while 62 % of the respondents did not have LLINs.

Knowledge on proper use of LLINs

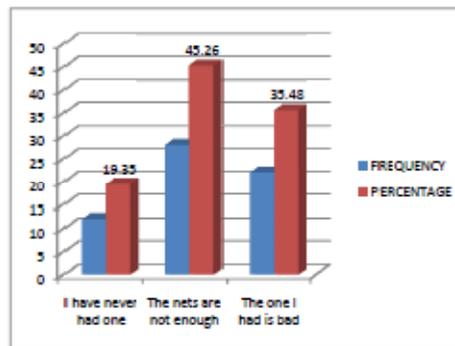


Figure 9. Distribution of respondents according to the reasons why they don't have a mosquito net

From figure 9, 12 (19.35%) of the respondents have never had nets, 28(45.26%) of the respondents said the nets were not enough, and 22 (35.48%) said the one they had was bad.

Practical use of LLINs

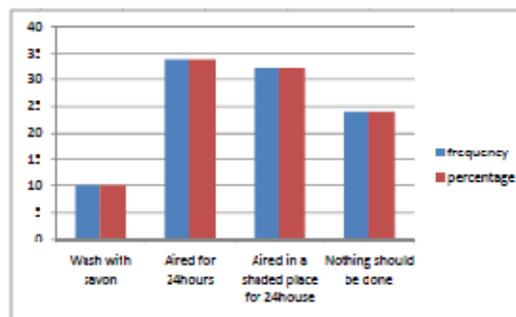


Figure 10. Distribution of respondent according to what is to be done to a new net before using it.

From figure 10, out of 100 responses on what is to be done before using new LLINs, 34% of the respondents enunciated the fact that the LLINs should be aired for 24 hours, 10% of the respondents said it should be washed with a detergent, 24% said nothing should be done and 32% of the respondents said it should be aired in a shaded place for 24hours.

Frequency in the utilization of LLINs.

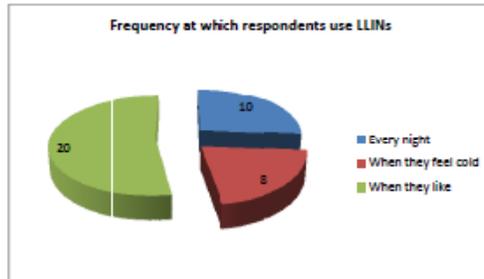


Figure 11. Distribution of respondents according to how often they use LLINs.

From figure 11 above 26.5% of the respondents said they slept under LLINs every night, 21% said they used LLINs when they feel cold and 52.6% said they sleep under LLINs only when they like.

Minor side effects encountered during the use of LLINS.

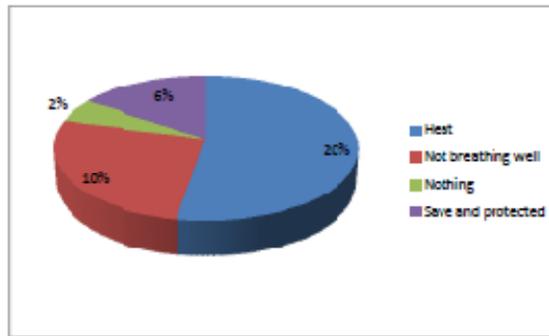


Figure 12. Distribution of respondents according to how they feel sleeping under a mosquito net.

From figure 12 above it can observe that out of the 38% had nets, 52.63 percent said they feel heat when they sleep under the net, 26.32% of the respondents said they feel as if they are not breathing well, 5.26 percent of the respondents said they don't feel anything and 15.59 percent said they feel save and protected.

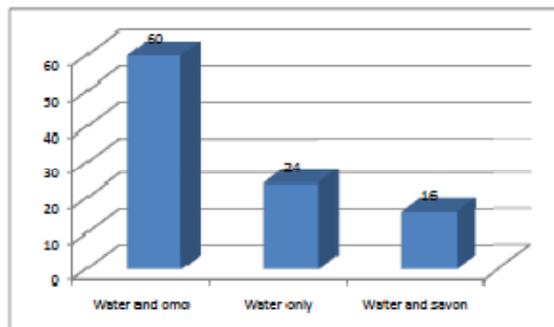


Figure 13. Distribution of respondents according to what can be used to wash the net.

From figure 13, 60% of the respondents said water and powdered detergent can be used to wash the net, 24% of the respondents said only water should be used and 16% said water and detergent soap can be used.

Constraints encountered by the community in the proper use of LLINs.

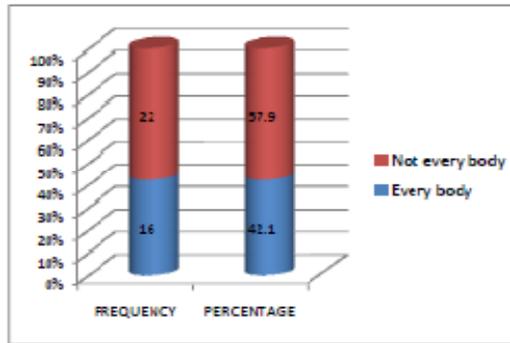


Figure 14. Distribution of respondents according to the actual number of people that sleep under mosquito nets

From figure 14 above, out of the 38% of the respondents who have nets 57.9% of the respondents do not sleep under LLINs and 42.1% of the respondents said everybody sleep under the net.

Reasons LLINs are not used

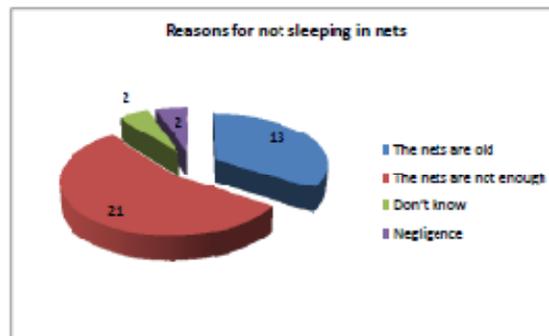


Figure 15. Distribution of respondents according to reasons why everybody do not sleep under the mosquito net.

From figure 15 above, out of the 38% of respondents who have LLINs, 34.3% of the respondents said not everybody sleep under LLINs because the nets are old, 55.3% said the nets are not enough; 2% said it's because of negligence.

Obstacles encountered in the use of nets

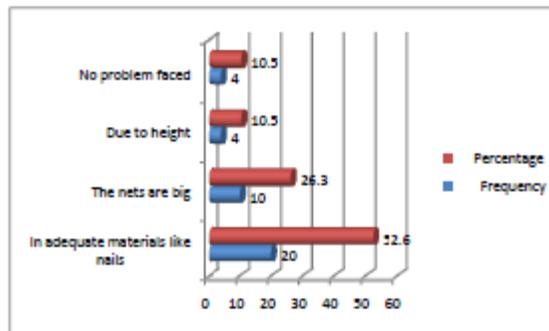


Figure 16. Distribution of respondents according to the difficulties faced in hanging the nets.

From figure 16 , out of the 38 respondents who had nets 52.6% of the respondents faced problems of inadequate materials like nails, pins, 26.3% of the respondent said the nets are too big, 10.5% said the height of their ceiling was a problem and 10.5% said there had no problems.

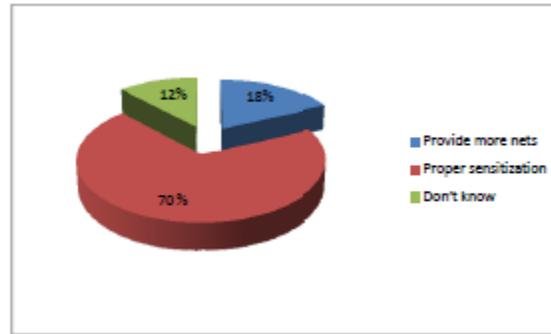


Figure 17. Distribution of respondents according to what the health unit can do in order to convince the community on the proper use of mosquito net.

From figure 17, 18% of the respondents said the health units should provide more nets, 70% said proper consistent sensitization and 12% said they don't know.

Discussion of findings

Respondent's knowledge on the use of LLINs

It was observed that 66% of the respondents were females and 34% were males ; this is probably because many women were met at home than the men and probably because when the women go for their ANC the nets are given to them even when they are married or not. Also, 64% compared to 36% of the respondents were married as seen on figure 1 page-, it implies that those that are married and have children have a greater probability of having more than one net than those that are not . It was also observed that 78% of the respondents had household members of 4 and above as seen on table 2 page- which implies that nets are limited to an extent due to overcrowding in some homes. The issue of insufficient nets goes in line with a study that was conducted in Banadi where each household received one or two nets depending on the composition of the household (Wardi Distribution Report 2013) .It was observed that the proportion of 1:38 persons in a room will be 95% bed net use, implying that overcrowding will reduce the average net per household. According to Adjei *et al*, 2011, each addition of bed nets in the house increase its use by 58%.

It was observed that even though malaria is endemic in Cameroon 16% of the respondents as seen on table 3 page- did not really know what malaria was all about which implies that they cannot be preventing what they do not know. So, some effort should be put in this area so as to educate the population on basic knowledge about malaria so that adequate measures can be taken to prevent it. It was also observed that 84% of the respondents know that malaria can be prevented while 16% still said malaria cannot be prevented as seen on figure 3 page-, this may be due to the fact that most of the respondents are ignorant of the fact that female anopheles mosquito bite mostly at night, so the use of LLINs can adequately prevent malaria if properly used at night to prevent the bite of this mosquito thereby preventing malaria. Even though 16% of the respondents did not know if malaria can be prevented, they were aware of the fact that malaria kills as seen on figure 4 page- that 94% of the respondents had the knowledge that malaria kills, 6% are still ignorant of malaria outcome which is a problem because malaria is an endemic disease though can be treated the population has to be sensitized on every detailed about it.

Practical measures on the use of mosquito nets

The use of LLINs is just one of the methods of preventing malaria; a good number of the respondents were aware of other methods of preventing malaria as seen on figure 5 page- that 90% of the respondents said by keeping the environment clean, avoid standing water and the use of insecticide while 8% of the

respondents did know other preventive method other than the use of LLINs which is still positive for the health area to prevent malaria if adequately used.

During this study it was observed that 62% of the respondents did not have LLINs while 38% had as seen on figure 7 pages- that out of the 38 respondents that had nets, 19.35% have never had nets, 45.26% said the nets are not enough may be because of increased number of persons per household while 35.48% of the respondents said the one they had is bad and have been discarded probably because of limited knowledge on the fact that the nets can be washed and use again. Also 68% of the respondents what can be used to wash the net; this may be because they did not even have the nets and secondly it might be because in the past the nets were always taken to the health units where they were washed and treated but today the nets used are long lasting insecticide nets so many people might still be having limited knowledge on its management. The nets can be washed with water and savon or omo that has little or no detergent.

Sixty-eight percent of the respondents said the nets can be washed but did not know what can be used may be because they did not have nets. Still from the 38% that have LLINs it was observed that only 10% of the respondents sleep under at night while 28% sleep under the LLIN only when there is cold or when they like as seen on figure 9 page-. Although 38% of the respondents had nets it was not a an assurance that 38% of the respondents were protected because 28% of the 38% were not using the nets properly thereby still increasing the chances of malaria prevalence.

Proportion of respondents with properly installed nets

It was again observed that out of the 38% respondents who have nets, 57.3% do not sleep under as seen on figure 12 page-probably because the nets have been discarded saying they are old 43.3%, some said the nets were not enough, 55.3% and 4% said it was because of negligence all these responses might be indicating that there is limited knowledge on the management of LLINs. Emphasis should be really be laid on the proper use of these nets so that we can reduce while not eradicate malaria in our country Cameroon.

Constraints encountered and possible solutions

Despite the minor side effects like feeling heat and not breathing well as seen on table 4 page- the respondents before receiving the nets should be made to understand that these are minor side effects that they may experience but will disappear over a very short time. As seen on table 7 page-52.6 % of the 38% respondents who had nets said they had inadequate materials like nails for hanging up nets compared to their ceiling, 26.3% said the nets were too big compared to the size of their beds making them to see the nets as a burden to them and 10.5% of the respondents complained of the height and the nature of their houses and 10.5% said they had no problems. This implies that many people have limited knowledge on other methods like the frame and tent methods in the Batibo health area.

Finally, the health units have to put more efforts to ensure that the nets distributed are properly used and if possible provide more nets and sensitize the community on the importance of these nets and also add that in all areas of consultation if malaria is diagnosed the clients should be educated on the importance of its prevention and if possible a net should be provided so that we can invest in the future while defeating malaria as the theme of the world malaria day theme set by the Roll Back Malaria partnership 2015.

Conclusion

Most people do not use nets because the nets are insufficient and may be because of increasing number of people per household compared to the number of LLINs given per household. In the community the relationship between mosquito and malaria well known but many people are not aware of the fact that the female anopheles mosquito that transmit the malaria parasite frequently bite at night time when people are

asleep. Equally, many people are still reluctant to hang the nets properly, tuck them appropriately under the mattress at night and tie and hang them at dawn as a primary preventive measure against malaria.

The peripheral level of the health care system has a great task in the implementation of the proper use of LLINs and to let the net users understand that heat sensation and not breathing well are minor effects to some people at the beginning of the use of LLIN but after sometime these effects will disappear; this therefore ties with the study hypothesis.

Recommendations

To the ministry of public health

To encourage more research in order to assess many more factors why LLINs are not properly used in many other areas where malaria prevalence is only increasing instead of rolling back.

To supply more nets and develop strategies of making the nets properly used by the communities.

To the staff of batibo health center

To continuously educate the community on the Importance of using LLINs, the effects of not using LLINs and also how to care for the LLINs.

References

- [1] Adjei K, Calman PK (2011): *Targeting of malaria for control and elimination.*
- [2] Alexander B K ,Paul Lewsein (1996): *Creating a world without mosquito nature.*
- [3] Atkinson JA Babagare (2009): *Guidance and evidence for malaria elimination.*
- [4] Bardaji HJ (2012): *Intermittent preventive treatment of malaria in pregnant women.*
- [5] Barik TY (2011): *Malaria vector control from past to future.*
- [6] BBC news (2011): *Scientists has created sperm less in an effort to curb the spread of malaria.*
- [7] Breman M R (1995): *The standard of malaria prevention advice in UK primary care.*
- [8] Canyon DV Hii (1997): *Environmental friendly biological agent for mosquito control medical and vertinary entomology.*
- [9] Center for Disease control (2012): <http://www.cdc.gov/malaria>.
- [10] Curtis et al (2000): *Development and field evaluation of synthetic mosquito lure that is more attractive than humans.*
- [11] Enayati OZ, Peter KL (2010): *The impact of pyrenoid resistance on the efficacy of insecticide treated nets against African Anopheles mosquitoes.*
- [12] Esther Tallah (2012): *Cameroon coalition against malaria prevention: scaling up for impact in Cameron.*
- [13] Health Records (2014): *Statistic on malaria prevalence.*
- [14] Iratana ST (1999): *Comparism of house spraying and insecticide treated nets for malaria control.*
- [15] J.A.A Le Prince (2005): *Control of mosquito oiling as an anti-mosquito measure Public Health report.*
- [16] Jennifer Carpenter (2011): *Sperm-less mosquito hold promise to stop malaria.*
- [17] Kayfast DF, Gilbert GH (2009): *Changing perspectives on malaria.*
- [18] Kenneth Mackay (1995): *Mosquito control through vector source reduction part iii interaction 31: A comparative study of the ability of fish to catch mosquito lava.*
- [19] Kijchalao YJ, Lawrence TH (1988): *The use of mosquito nets as blankets.*
- [20] Lallow NB, Franck DH (2000): *Guidelines for malaria prevention in travellers Public Health England.*
- [21] Lengeler (2003): *Insecticide treated nets and curtains for preventing malaria the Cochrane data base.*
- [22] Mehlhorn (2008): *Preventing malaria in travellers from malaria endemic zones.*
- [23] Nassena (2012): *Global malaria mortality.*
- [24] Science and Education (2014): *Education and Leadership Development/defeating malaria.*
- [25] UN (2000): *United Nation Millennium Development Goals.*

- [26] UNICEF (2014): Global partnership for malaria prevention.
- [27] Wardi report (2013): mass distribution of long lasting insecticide nets.
- [28] WHO (1999): World malaria report strategies endorsed in Amsterdam on the fight of malaria using long lasting insecticide treated.
- [29] WHO (2005): Combination of chemotherapy for the treatment of malaria.
- [30] WHO (2006): Guideline for testing mosquito adulticide for indoor residual spraying and treatment of nets.
- [31] WHO (2008): *World malaria Report: Global malaria control and eradication.*
- [32] WHO (2009): Control to eradicate malaria.
- [33] WHO (2010): Annual Funding for malaria control.
- [34] WHO (2012): National malaria control program report.
- [35] WHO (2013): residual spraying an operational manual indoor residua; spraying for transmission control and elimination of malaria.
- [36] WHO (2014): World malaria report on things you need to know about malaria.
- [37] Wikipedia (1999): Malaria mosquito-theory.
- [38] World Vision (2009): Vision of malaria prevention and treatment programs.
- [38] Zimick (1992): Motivations to acquire and use long lasting insecticide nets in a stable malaria zone in Burundi.