Volume : 4 | Issue : 3 | March 2015 • ISSN No 2277 - 8179

Research Paper

Use and Misuse of Insecticide Treated bed Nets in Community Based Education and Service (COBES) Centres (2014) in Western Kenya.

Medical Science

KEYWORDS : ITNs; Use; Misuse; COBES; Centres

A.V.M. Kwena

Department of Medical Biochemistry, School of Medicine, College of Health Sciences, Moi University, P.O. Box 4606-30100, Eldoret, Kenya.

ABSTRACT

Use of permethrin Insecticide Treated Nets (ITNs) as well as curtains in control of malaria has been extensively reported. However, many cases of misuse of ITNs have also been documented. It is with this in mind that the community diagnosis process of the COBES programme of Moi University College of Health sciences provided an ideal framework to assess the proper use and misuse of ITNs. The objective of the study was to determine the proper and improper use of insecticide treated bed nets in COBES centres in Western Kenya. Cross-sectional surveys were carried out in 20 Health Centres in western part of Kenya. More than half of the Health centres had a mosquito prevalence of over 75% and a corresponding malaria prevalence. All the health centres reported use of mosquito nets in prevention against malaria. Almost all the Health centres showed evidence of misuse of Insecticide Treated mosquito nets. Misuse of ITNs should be discouraged in all the Health centres studied since it negates the mosquito control programmes.

INTRODUCTION

Insecticide-treated nets (ITNs) are the most prominent malaria preventive measure for large-scale deployment in highly endemic areas (Lengeler C, 2004). Between 2000 and 2013, access to insecticide-treated bed nets increased substantially. In 2013, almost half of all people at risk of malaria in sub-Saharan Africa had access to an insecticide-treated net, a marked increase from just 3 percent in 2004, according to WHO. Combining insecticide-treated bed nets with vaccines and other control measures may provide the best chance at eliminating malaria, which killed nearly 600,000 people worldwide in 2013, most of them African children (News Medical, 2015)

Use of permethrin Insecticide Treated Nets (ITNs) as well as curtains in control of malaria has also been extensively reported (Reyburn et al, 2000, Hawley et al, 2003). All mosquito nets act as a physical barrier, preventing access by vector mosquitoes and thus providing personal protection against malaria to the individual(s) using the nets. Pyrethroid insecticides, which are used to treat nets, have an excito-repellent effect that adds a chemical barrier to the physical one, further reducing human–vector contact and increasing the protective efficacy of the mosquito nets. Most commonly, the insecticide kills the malaria vectors that come into contact with the ITN. By reducing the vector population in this way, ITNs, when used by a majority of the target population, provide protection for all people in the community, including those who do not themselves sleep under nets (Binka et al, 1998, Hawley et al, 2003) The way in which full coverage should be achieved may vary with particular epidemiological and operational situations. However, many cases of misuse of ITNs have also been documented (WHO, 2014). WHO position on the use of Long Lasting Insecticide Nets (LLINs) for malaria prevention: The WHO Global Malaria Programme is calling on national malaria control programmes and their partners involved in insecticide-treated net interventions to: purchase only long-lasting insecticidal nets; distribute free or highly subsidized LLINs, either directly or through voucher/coupon schemes; achieve full LLIN coverage, including in high-transmission areas, by distributing LLINs through existing public health services; develop and implement locally appropriate communication and advocacy strategies to promote effective use of LLINs; and implement strategies to sustain high levels of LLIN coverage in parallel with strategies for achieving rapid scale-up. WHO Global Malaria Programme has also given its position statement on ITNs (Hawley et al, 2003)

Only pyrethroid insecticides are approved for use on ITNs (CDC, 2014). Pyrethroids do not rapidly break down unless washed or exposed to sunlight. Recent studies have suggested that the rise of pyrethroid resistance may undermine the effectiveness of nets. To help manage resistance, some net products incorporate piperonyl butoxide (PBO) along with a pyrethroid insecticide, but there is not yet evidence that this significantly improves ITN effectiveness in areas with high levels of pyrethroid resistance, and WHO currently does not consider nets that incorporate PBO to be tools for managing pyrethroid resistance.

These insecticides have been shown to pose very low health risks to humans and other mammals, but are toxic to insects and kill them, even at very low doses.

It is with this in mind that the community diagnosis process of the COBES programme of Moi University College of Health Sciences (Kwena et al, 2014) provided an ideal framework to assess the proper use and misuse of ITNs.

Community Based Education and Service (COBES) is the training of health professionals at the Moi University, School of Medicine in the community (Kwena et al 2014). It is a school-wide activity, not a department. All of School members (Staff and students) are involved (Baliddawa and Kwena, 2010, Kwena and Baliddawa 2012). It incorporates theory, Clinical and Field activities. In Second year of study, COBES incorporates community diagnosis where a number of Health problems in the community are diagnosed including prevalence of malaria and control methods used including use of insecticide treated bed nets using permethrin. A total of 20 Health centres were identified, namely: Amukura, Bokoli, Bukura, Burnt Forest, Chwele, Chulaimbo, Kabartonjo, Kabuchai, Kaptumo, Kilibwoni, Mautuma, Makunga, Matayos, Nambale, Mbale, Miteitei, Mosoriot, Nyahera, Sirisia, Turbo and Naitiri. Due to logistic reasons, not all of them were visited for data collection. It is with this in mind that the use and misuse of ITNs was determined in COBES centres in Western part of Kenya from April to May 2014.

Objectives

The broad objective of the study was to determine the use and misuse of ITNs in Health Centres where Moi University students go for COBES placement during their second year of study for community diagnosis fieldwork.

Materials and Methods:

Study area and population

The studies were carried out in selected COBES Centres namely Amukura, Bokoli, Bukura, Bumala 'B', Burnt Forest, Bushiri, Kabartonjo, Kabuchai, Makunga , Matayos, Mautuma, Mbale, Meteitei, Mosoriot, Nambale, Nyahera, Sirisia , Soy and Turbo, all in the larger Western part of Kenya , for the period April-May 2014. A total of 19 centres were sampled during the study.

Volume : 4 | Issue : 3 | March 2015 • ISSN No 2277 - 8179

Study design:
Cross-sectional surveys were carried out. Cluster sampling technique was used with each health centre as the sampling unit.

ITNs:
For proper and improper use of ITNs observations were made during the community diagnosis in the households visited. This was carried out in all the 19 health centres where the students were placed. Each household visited was assessed for presence or absence of ITN. Further assessment was carried out in each compound of the household visited for any improper use of ITNs. Health Centre records were also analysed for prevalence of malaria for the months preceding the COBES placement. This was carried out in all the 19 centres. Laboratory diagnosis of malaria in all the health centres had been carried out using the standard field stain method. This was additional to clinical diagnosis carried out at each of the Health Centres.

Consent
Consent was sought from the County Medical Officers of health prior to community diagnosis process.

Ethical considerations
Prior to commencement of community diagnosis programme of COBES 2 of Moi University, permission was sought from the Institutional Research and Ethics Committee of Moi University School of Medicine. Permission was also sought from District Medical Officers of Health from the counties under which the COBES Health Centres fall.

Results:
A total of 19 COBES Centres were sampled.

Table 1:
Summary of prevalence of Mosquitoes, Malaria and use or misuse of ITNs in the Health centres in 2014.

Health Centre	% Mosquito Prevalence	%Malaria Prevalence (Children)	%Malaria Prevalence (Adults)	Use of ITNs	Misuse of ITNs
Amukura	98	92	85	Yes	Yes
Bokoli	19.0	24	26	Yes	Yes
Bukura	87	85	75	Yes	-
Bumala 'B'	80	49	43	Yes	-
Burnt Forest	95	84	80	Yes	-
Bushiri	84	89	89	Yes	-
Kabartonjo	78	13	18	Yes	Yes
Kabuchai	75	22	29	86	Yes
Makunga	78	27	-	32.4	Yes
Matayos	91	88	78	16	Yes
Mautuma	17	13	-	Yes	Yes
Mbale	100	93	72	Yes	Yes
Meteitei	89	26	33	Yes	Yes
Mosoriot	66	80	75	66	Yes
Nambale	64	88	79	Yes	Yes
Nyahera	ND	90	83	93	Yes
Sirisia	100	67	-	Yes	Yes
Soy	54	95	90	Yes	Yes
Turbo	92.5	85	-	Yes	Yes

ND: Not Done.
: Data not available Amukura:
Situated in Busia county, Teso South District, Amukura Division, Amukura Location Western Kenya bordering Uganda.General population of the study area had 326 households and population of 1748 people.Vector control was practiced.

Bokoli:
Located in Bokoli location, Bungoma East district, Bungoma county. Study population comprised of 192 households and 1700 people. Malaria prevalence was high hence need for mosquito vector control.

Bukura:
Located in Emuhaya sub-Location,Butsotso South Location, Kakamega County. General area population was 5605 people. A total of 100 households were sampled. Mosquitoes occur at 87% in comparison to other pests and vectors. Chemical control was not assessed in this Health centre.

Bumala 'B':
Situated in Busia county in Western Kenya Butula sub county, Marachi East Location, Bumala B sub-Location. Population of about 8,000. Butula has an area of 247.1 sq. km. Study population comprised of 110 households and 110 respondents. Mosquito vector prevalence was 80% though this was lower than houseflies at 92%.

Burnt Forest:
Situated in Uasin Gishu County and quite close to Eldoret town in Rift Valley province and EldoretEast District, Division:Ainapkoi, Location:Olare, A total of 140 households were studied. Mosquites occur at a prevalence of 80%. ITNs are used as a major control method in addition to spraying with insecticides. Percentage chemical control not assessed.

Bushiri:
North Butsotso location, Ingotse Sub location, Kakamega county.General population in the area was 15892 people.There were 130 respondents. Mosquitoes are the highest form of vectors at 84% while malaria prevalence occurs at 89%.

Kabartonjo:
Located in Kabartonjo Division Baringo North Sub- county, Baringo county. Study population comprised of 220 households and a population of 3740 people. Mosquito vector control was high due to high prevalence of malaria both in children and adults.

Kabuchai:
This is in Bungoma county in Western province. It is one of the six rural areas of Bungoma District.The study population consisted of 338 households and a population of 2,782 people. There is high incidence of malaria especially during the rainy season. Mosquitoes as vectors constitute 75% of all the vectors and pests. Use of chemical control of pests and vectors constitutes 42%.

Mautuma:
Located in Mautuma Location, Lugari Division, Kakamega county. Study population comprised of 161 households with a population of 601 people. Prevalence of malaria was higher than other health problems hence need for mosquito vector control.

Makunga:
Located in Butere/Mumias District and also in Kakamega County. A total of 170 households were sampled. General population was 8763 people. A total of 170 questionnaires were administred. The major cash crop in the area is sugarcane that is milled by the nearby Mumias Sugar Company. The presence of sugarcane has also been linked to increase in mosquitoes that are vectors of malaria. Prevalence of mosquitoes occurs at 19.6 % of all vectors and pests in the area. Chemical control of Vectors constitute 32.4%

Matayos:
Found in Busia county. Has a population of about 56,186. The main economic activity is trade with the neighbouring Uganda

with Busia town. The sample size of 210 respondents and 210 people were sampled. Prevalence of mosquitoes was 91%. The area does not have any outstanding vector control method although mosquito control occurs at 16% which is almost similar to control of other vectors.

Mbale:
Found in Vihiga county in Western Province. The area is also hilly with hot and wet climate. The average rainfall is 250 mm per month. There are two rainy seasons in the study areas: the long rains occur from March to May and the short rains from October to December. Mosquito prevalence is very high hence control using ITNs justified. The most common health problem being Malaria. Study area had 287 households and 1,505 people.

Meteitei:
Found in Nandi county in Tinderet Division. It lies on the outskirts of the famous Tinderet forest well known for tea growing. It lies at an altitude of 9,000 feet above sea level in Rift valley area of Western Kenya. It also borders Lake Victotia as well as Kakamega and Kisumu Counties .

The topography is dominated by the Nandi Hills. Population of Tinderet is 58,925.The study population consisted of 130 households and population of 779 people. ITNs are used to control mosquitoes. Malaria is the most prevalent health problem.

Mosoriot:
Situated in Nandi North sub county Nandi county and close to Eldoret. The study population comprised of 299 households and population of 1674 people. Mosquito prevalence is very high due to bushy vegetation and swampy area at Toret Moi Village. Mosquito vector control mainly carried out by chemical control.

Nambale:
Situated in Busia County Western Kenya has a population of 174,752. Constituency Area In Sq. Km (Approx.): 237.90. A total of 234 households in the study are with total sub-county population of 27448 people but 150 respondents were assessed. Malaria is the most prevalent health problem favored by the hot and wet climate that favors the breeding of mosquitoes. Despite being provided with free ITNs, many people use them for other purposes such as protection of poultry.

Nyahera:
Located in Bar A sub location, North Kisumu Location approximately 24,5 Sq. Km with a population of 5985 people. One hundred and forty households were studied comprising of 344 people. Malaria is the highest health problem at 83%, Mosquito control occurs at 93%.

Sirisia:
Located in Bungoma West sub-county, Bungoma county, Western Kenya.Bisunu sublocation has a population of about 28,000 people and area of 26 sq Km. A total of 150 households were sampled. Malaria is highest at 67% prevalence compared to other health problems, Chemicals used to control vectors included Insecticides especially for mosquito control.

Soy:
Situated in Uasin Gishu county, Soy Location, Soy sub-location. Covers an area of 152.3 sq. Km Soy sub location has 11978 inhabitants. Three hundred and ninety households were sampled. High number plasmodium falciparum malaria mosquitoes due to the climate. Other Insects and vectors are also found in the area. Mosquito control is by treated nets.

Turbo:
Found in Uasin Gishu County close to Eldoret town. The constituency population is 208,583 whereas the area in sq. km is approximately 365.60. Total households sampled were 463 with a total population of 2,294 people. Total number of questionnaires administered were 120. The prevalence of mosquitoes was high at 92,5%. Chemical control of vectors was at 45.3 for all the vectors

Fig. 1.
Proper use and misuse of ITNs in COBES centres: Kitchen gardens, fishing nets, swings for children:
a: Proper use:



B. Misuse: in Turbo Area.



Discussion:
All COBES Centres assessed for proper or improper use of ITNs showed the two factors present in most of the Health centres. All centres showed malaria to be the major Health problem (Kwena et al, 2014) except for Turbo and Mbale where respiratory tract infections were most prevalent, hence the need for use of ITNs. The high prevalence of malaria could be due to misuse of insecticide treated bed nets usually supplied free of charge to children below 5 years and expectant mothers as assessed from some of the Health centres. Many people used them for protection of their kitchen gardens against pests and also as fishing gears amongst other forms of misuse. Given the highly toxic nature of pyrethroids against other insects other than mosquitoes, the communities under study may indirectly have discovered a simple and improper way of using the mosquito nets in their kitchen gardens to control other pests in their gardens, especially if the nets were old and torn. What may not be justified is the use of mosquito nets for fishing purposes. This later case may be due to the texture of materials as well as pore sizes used to make the ITNs that resemble the fishing nets.

ITNs are highly effective in reducing childhood mortality and morbidity from malaria. Widespread access to ITNs is currently

Volume : 4 | Issue : 3 | March 2015 • ISSN No 2277 - 8179

being advocated by Roll Back Malaria (Lengeler, 2004), Their misuse therefore negates the Roll Back Malaria initiative.

Conclusion:

Proper use and misuse of ITNs was rampant in COBES centres in Western Kenya. The Government should intensify Public Health education to sensitize the Community on proper use of ITNs which would otherwise negate the malaria control programme in the country.

ACKNOWLEDGEMENT:

We are grateful to the students who participated in data collection from the Centres mentioned and the Tutors who supervised them. We thank the staff of the Health centres where data was collected. We would also like to thank the COBES committee, Dean school of Medicine, The Principal College of Health Sciences and the University for facilitating data collection.

REFERENCE

1. Binka F, Indome F, Smith T.(1998). Impact of spatial distribution of permethrin- | impregnated bed nets on child mortality in rural northern Ghana. American Journal of Tropical Medicine and Hygiene, 59:80–85. | 2. Baliddawa JB & Kwena A (2010). The role of community based education and services | (COBES) in peace and reconciliation. 2nd International Moi University symposium on peace. 'Youth empowerment for peace, reconciliation and development'. May, 2010; Abstract 1:19: 30. | 3. Baliddawa JB & Kwena A. (2010). The Role of Community Based Education and | Services (COBES) in promoting interdisciplinary of sustainable integral development. Cross cutting symposium of the 6th Annual Moi University Conference, 7th-11th Sept, 2010; Abstract 4.5-21: 202. | | 4. Centre for Disease and Control (CDC) 2014, Atlanta, USA. | | 5. Hawley WA, Phillips-Howard PA, ter Kuile FO, Terlouw DJ, Vulule JM, Ombok M, | Nahlen BL, Gimnig JE, Kariuki SK, Kolczak MS, Hightower AW (2003). Community-wide effects of permethrin-treated bed nets on child mortality and malaria morbidity in western Kenya. Am J Trop Med Hyg , 68: 121-127. | 6. Kwena, A.& Baliddawa J. (2012). Nutritional status of children aged 6 to 59 months in | community based education and service (COBES) programme at selected health centres in Western Kenya. African Journal of Food, Agriculture, Nutrition and Development (AJFAND).(3):6229-6244 | 7. Kwena A, Baliddawa J.B.,Taylor K., Mcdowell M., Mining S, (2014). Comparison of | Protein Energy Malnutrition and P. Falciparum malaria levels in AMPATH and non AMPATH COBES centres in Western Kenya. gjra –Global Journal for Research Analysis: 159-162, Volume : 3 | Issue : 2 | Feb 2014 | 8. Lengeler C (2004). Insecticide-treated bed nets and curtains for preventing malaria. | Cochrane Database Syst Rev. (2):CD000363. | | 9. University of Michigan, Medical Research News, January, 2015 | | 10. Reyburn H et al.(2000). A randomized controlled trial of insecticide-treated bednets and | chaddars or top sheets, and residual spraying of interior rooms for the prevention of cutaneous leishmaniasis in Kabul, Afghanistan Transactions of the Royal Society of Tropical Medicine and Hygiene, 94:361–366. | 11. WHO Global Malaria Programme (WHO/GMP), 2014