Asian Journal of Research in Infectious Diseases

9(1): 24-42, 2022; Article no.AJRID.81708
ISSN: 2582-3221

Socio- demographic Factors Influencing the Ownership and Utilization of Long Lasting Insecticide Nets among Endemic Sub-counties in Kisii County, Kenya

Pacifica Chepchumba Bwogo [a*], Samuel Mong'are [b], Rael Masai [a], Josephat Nyabayo [c], Johnstone Ingonga [d≡], Francis Kimani [dφ], Luna Kamau [f#], Milkah Mwangi [d†], Josyline Cirindi [d‡] and Damaris Matoke [d¥]

[a] Department of Biological, Kisii University, School of Pure and Applied Sciences, , P.O Box 408-40200, Kisii, Kenya.
[b] Biomedical of Department, Kisii Univerity, School of Health Sciences, , P.O Box 408-40200, Kisii, Kenya.
[c] Department of Microbiology and Immunology, Faculty of Biomedical Sciences, Kampala International University, Western Campus, P.O Box 71 Bushenyi, Uganda.
[d] Department of Centre for Biotechnology Research Development, Kenya Medical Research Institute of Mbagathi Road Nairobi, Kenya.
[f] Department of Centre for Biotechnology Research Development, Kenya Medical Research Institute of Mbagathi Road Nairobi, Kenya Medical Research Institute, Kenya.

Authors' contributions

This work was carried out in collaboration among all authors. Author PCB, JN, JI, FK, LK, MM were involved in study design, data analysis, interpretation of results, drafting of the manuscript and manuscript review. Author PCB, RM, DM were involved in data collection and final manuscript writing. Author SM, DM were involved in supervision, interpretation of results and final revision of the manuscript. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/AJRID/2022/v9i130260

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://www.sdiarticle5.com/review-history/81708

Original Research Article

Received 15 November 2021
Accepted 19 January 2022
Published 20 January 2022

[≡] Leishmania Lab Technologist;
[φ] Malaria Lab Head;
[#] Senior Principal Scientist and Deputy Director, Head of Biotechnology Research and Development;
[†] Leishmania Lab Head;
[‡] Researcher Leishmania Lab;
[¥] Principal Research Scientist, Deputy director for Biotechnology Research Programmes, Entomology Lab head;
**Corresponding author: E-mail: passybwogo@gmail.com, pacificachepchumbabwogo2020@kisiiuniversity.ac.ke;*

ABSTRACT

Aim: To access the socio-demographic factors which are influencing the ownership and utilization of Long Lasting Insecticidal nets (LLINs) among endemic Sub-Counties in Kisii County, Kenya.
Study design: A descriptive cross-sectional study.
Place and Duration of Study: The study was carried out in Kisii County where study subjects were drawn from Bonchari, Kitutu Chache North and South Mugirango Sub-Counties between January to May 2021.
Methodology: Leading hospitals in the Sub-Counties with malaria cases without referrals were selected for the study. A total of 422 study participants who attended Kiaruta and Nyamagiri dispensaries, Eramba, Sieka, Moticho and Suguta health centers with signs of malaria were the targeted population. Structured and open ended questionnaires were used to collect data. Associations between variables were tested using Pearson's chi-square test through the Statistical Package for Social Sciences (SPSS) version 21.
Results: From the total study participants, 68.69% were having LLINs. From the total number with LLINs, 33.18% had torn LLINs. 61.61% study participants were sleeping under the LLINs. Of the participants who were sleeping under LLINs, 46.92% had torn LLINs. Positive association was seen between ownership of LLINs and age (P = 0.008), ownership of LLINs and level of education (P = 0.011), ownership of LLINs and household membership (P < 0.001) and ownership of LLINs and location (P < 0.001), also there was a statistical significance between use of LLINs and age (*P* < .001), use of LLINs and level of education (*P* < .001), use of LLINs and gender (*P* = .024), use of LLINs and location (*P* = .002), and use of LLINs and the last year when each participant received LLINs (*P* < .001),
Conclusion: Despite coverage of LLINs being high its usage was low and this means that socio-demographic factor has shown to be having a great influence on the ownership and utilization of LLINs. Therefore regular training must be done on LLINs and malaria transmissions with the urge to reduce malaria incidences.

Keywords: Plasmodium falciparum; LLINs; parasitemia; socio-demographic

1. INTRODUCTION

Globally, 229 million cases of malaria were estimated in 2019 [1] with 94% malaria cases, having been recorded in African region [2]. In 2019, 87 countries were marked as malaria endemic countries whereby 29 countries accounted for ninety five percent global malaria cases [1].

The most affected region in Africa by malaria in 2019 was Sub-Saharan Africa, having 19 countries accounting for 85% worldwide malaria burden [3] where Kenya is among the Sub-Saharan countries with relatively high malaria prevalences accounting for 30% of all hospital attendance [4]. Countries surrounding coastal and Lake Victoria regions, specifically the Western part of Kenya, show the highest rates of malaria transmissions [1]. The level of transmissions in these parts is enormous with yearly entomological inoculation rates (EIR) of 30 to 100 infectious bites per person [5].

Worldwide reduction of malaria cases from 2000 has been related to management of malaria cases which are improved and the use of Long Lasting Insecticides Nets (LLINs) [6]. LLINs is a bed net treated with insecticides which are safe with the aim of repelling and killing mosquitoes which carry malaria parasite or physically blocking them from transmitting malaria for a maximum of five years without retreatment. World Health Organization [7] reported that treated bed nets when used consistently and properly are effective in lowering malaria morbidity and mortality hence recommending free delivery of LLINs to endemic countries. Guyatt et al. [8] reported that in Kenyan Highlands sleeping under a treated bed net lowers malaria infection risks by 63%.

In the year 2004 to 2015, 49 million LLINs were distributed in Kenya whereby it followed routine system which started in 2004 October where 23.3 million bed nets were distributed [1]. The policy of distribution changed in 2011 with the aim of covering the whole population who are at risk of the disease irrespective of gender and age. However, in 2014 another LLINs mass distribution was effected with the aim of replacing the old ones and boosting coverage [9]. Targeted

areas for LLINs universal coverage were the endemic areas which are the Lake basin and coastal regions, also the highland epidemic areas. The free of charge bed nets distribution improved equality in coverage and decreases disparities in ownership when compared to clinical based distribution [10].

A great challenge has been observed in Sub-Saharan Africa in the maintenance, use and coverage of the LLINs. Despite that LLINs are effective in preventing malaria, there are sets of factors on which the effectiveness depends [11]. Education, vector density and seasonal patterns of precipitation in Highlands of Western Kenya were associated with the use of LLINs [12]. Gender, occupation of the head of the household, ownership of the net, age of the net, discomfort of heat inside the net, size of the household, transport accessibility, types of the houses and shapes of the nets are some of the other factors [13,14]. Four indictors to measure LLINs use and availability were recommended by World Health Organization Roll Back Malaria Monitoring and Evaluation Reference Group in 2013 [15], 2 being calculated at the population (individual) level (population proportion that used an LLIN the previous night and population proportion with an access to an LLIN within the household) while 2 others in the household level (household proportion owning at least one LLIN for two individuals and household proportion owning at least one LLIN) [16].

Given the main aim of LLINs is to provide individual protection against mosquito bites, there is a need to understand the use in the context of access indicators, ownership, availability and coverage. Therefore, this study aimed at assessing the socio-demographic factors influencing the ownership and utilization of LLINs among endemic Sub-Counties in Kisii County, Kenya.

2. METHODOLOGY

2.1 Study Site

The study was carried out in Kisii County, Kenya, where study subjects were drawn from Bonchari, Kitutu Chache North and South Mugirango sub-counties of Kisii County. The study took place in rural areas because urban areas are considered to be having low malaria risks compared to rural areas due to higher socio-economic status, fewer mosquito breeding sites and improved housing [17]. During the year 2018 the County registered a population of 1, 406, 043 (males 674, 901 and females 731, 142) with a growth rate of 2.2% yearly [18]. The County population density of 766/km^2 is high compared to Kenya average population density of 37 people per km^2 hence this overcrowding becomes an ideal environment for malaria rapid transmission [19].

2.2 Study Design

A cross-sectional study was used to assess the socio-demographic characteristics.

2.3 Study Population

Patients who attended the selected health centers and dispensaries with signs of malaria were the targeted members of the population. They included both gender and all age groups, excluding malaria positive cases from other hospitals within and outside the sub-counties.

2.4 Sample Size Determination

Required sample size was determined using the formula of Daniel et al*.,* [20] where the formula is:

$$n= \frac{z^2P(I-P)}{d^2}$$

n represents desired sample size in which the population > 10,000

z represents the standard normal deviate at the required confidence level.

P represents the proportion in the target population estimated to have adequate knowledge and practices on malaria control. From the fisher recommendation 50% will be used where there is no estimates available of the proportion in the target population assume to have characteristic of interest.

q=1-p =0.5
d= the level of statistics significance =0.05
$n= \frac{(1.96)^2 (0.50) (0.5)}{(0.05)^2}$ =384 malaria cases + 10% attrition rate =422 participants

2.5 Sampling Technique

Exponential non-discriminative snowball sampling technique was employed to select study participants whereby the search started from Kisii County Teaching and Referral Hospital. Using the Kenya Health Information System (KHIS) report, the researcher was

referred to malaria endemic Sub-County hospitals. From Sub-County hospitals, District Health Information System (DHIS) report was used to obtain the specific hospitals recording high cases of malaria where the researcher was referred to the specific hospitals. In the hospitals under study random sampling method was applied to collect 422 study participants.

2.6 Selection of Hospitals for the Study

In Bonchari Sub-County, 2019 DHIS report showed Nyamagiri, Kiaruta, Nyamagundo, Nyabioto and Oroche dispensaries recorded 1126, 1088, 997, 813, and 224 malaria patients, respectively. In Kitutu Chache North Sub-County, Eramba Health Centre, Sieka Health Centre, Kitutu Chache North referral hospital, Nyagesendo Dispensary, and Nyagoto Health Centre were the leading hospitals with malaria cases; 2679, 934, 749, 677 and 576 malaria patients, respectively, were recorded. In South Mugirango Sub-County Moticho Health Centre, Suguta Health Centre, Etago Sub-County hospital, Nduru Sub-county referral hospital and lastly Nyatike Health Centre were recorded as the leading hospitals with malaria cases; 1747, 830, 573, 331 and lastly 168 malaria patients, respectively, were recorded.

2.7 Questionnaires Administration

Structured and open-ended questionnaires (appendix i) were administered to the selected study participants in the selected hospitals (if under 18 a follow up to their household to get household head was done) to understand more on what they know and how they use vector control methods. Informed consent was obtained from the study participant before starting a face to face interview. Questionnaires in English version were translated to local language (Ekegusii) by the research assistance during interview sessions. Further, key informants made up of three public health officers from the selected sub-counties hospitals were interviewed using a semi-structured guide (appendix ii).

2.8 Data Analysis

Data was entered into excel where outcome variables were categorized accordingly and summarized as mean $\pm$ standard error (SE). Association between ownership of LLINs and demographic factor and use of LLINs and demographic factors with clinical characteristics was compared using chi-square (χ^2) test in SPSS version 21, where P-values $\leq$ 0.05 were considered statistically significant.

3. RESULTS

3.1 Response Rate

A total of 422 participants were recruited in this study. Therefore, a response rate of 100% (422 participants) was obtained.

3.2 Demographic and Clinical Characteristics of the Respondents

3.2.1 Gender distribution of the respondents

Out of the 422 participants, 263 (62%) were female while 159 (38% were male (Fig 1).

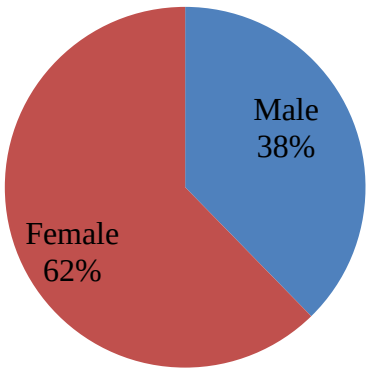

Fig. 1. Gender of participants

3.2 2 Age distribution of the participants

In this study, 24% participants were aged between 0-5 (3.08 ± 0.12) years, 47% participants were aged between 6-15 (9.82 ± 0.19) years, 19% participants were aged between 16 -30 (22.62 ± 0.45) years, 7% were aged between 31-50 (40.03 ± 0.10) years, while 3% were aged above 51 (67.36± 2.69) years (Fig 2).

3.2.3 Level of income

All of the study participants were unemployed with poor living standards with the majority involved in brick making; 56% participants had a monthly income of ksh 1000-3000 (2205.96 ± 34.53), followed by 15% participants who had a monthly income of less than ksh 1000 (740.48 ± 19.76). Further 14% had a monthly income of ksh 3000-5,000 (4028.95 ± 71.23), 12% had a monthly income of ksh 5000-10,000 (7547.06 ± 266.30) while 4% had a monthly income of more than ksh 10,000 (11812.50 ± 288.22) (Fig 3).

3.2.4 Level of Education

Regarding the level of education 73% (Eramba-13.27%, Sieka-13.27%, Kiaruta-12.32%, Nyamagiri-16.35% Moticho-7.82%, Suguta-9.95%) study participants had attained a primary level of education, 14% (Eramba-3.08%, Sieka-1.66%, Kiaruta-3.55%, Nyamagiri-3.08%, Moticho-0.71%, Suguta-2.13%) study participants had attained a secondary level of education, 1% (Eramba-0%, Sieka-0%, Kiaruta-0.95%, Nyamagiri-0%, Moticho-0%, Suguta-0.24%) had attained a tertiary level of education, while 12% (Eramba-2.13%, Sieka-1.66%, Kiaruta-1.66%, Nyamagiri-2.13%, Moticho-1.90%, Suguta-2.13%) had no formal education (Fig 4).

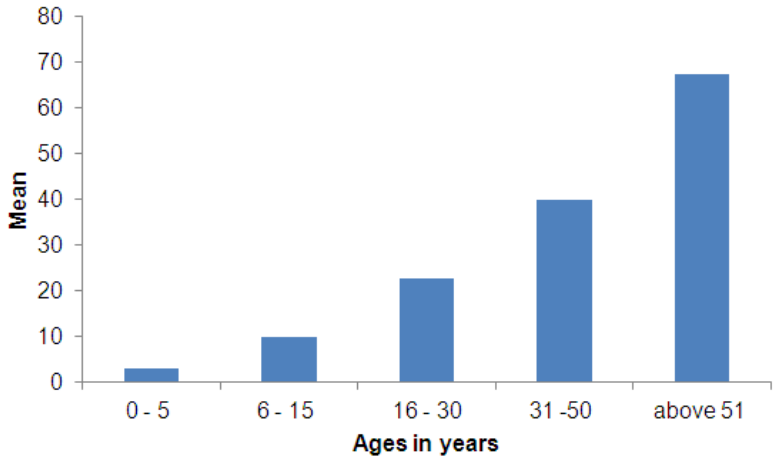

Fig. 2. Mean categories of participants' age

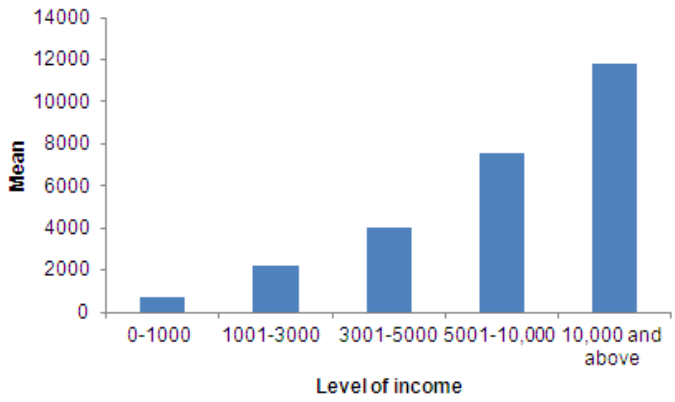

Fig. 3. Mean of the study participants' income

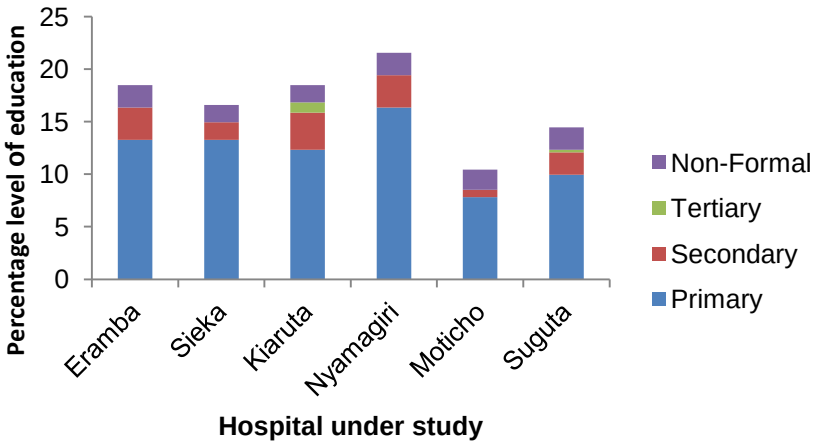

Fig. 4. Percentage of level of education of study participants

3.2.5 Household membership

Household membership in the selected sample showed that 54% study participants had a family size of more than 11 (13.89 ± 0.13) in a household, 37% study participants had a family size of between 6-10 (7.98 ± 0.11) in a household, 8% study participants had a family size of between 2-5 (3.78 ± 0.18) in a household while, 1% study participants were the only ones in the households (Fig 5).

3.2.6 Last year when the study participants each received LLIN

Study participants who had their LLINs issued before the year 2019 comprised 71% (Eramba-13.98%, Sieka-12.32%, Kiaruta-11.14%, Nyamagiri-14.22%, Moticho-7.82%, Suguta11.37%), the ones who received in 2019 comprised 12% (Eramba-1.90%, Sieka-2.60%, Kiaruta-1.90%, Nyamagiri-3.08%, Moticho-1.18%, Suguta1.42%), the ones who received in 2020 comprised 16% (Eramba-2.37%, Sieka-1.42%, Kiaruta-4.98%, Nyamagiri-4.27%, Moticho-1.42%, Suguta1.66%), and lastly those who received in 2021 comprised 1% (Eramba-0.24%, Sieka-0.24%, Kiaruta-0.47%, Nyamagiri-0%, Moticho-0%, Suguta-0%) (Fig 6).

3.2.7 Study participants with torn LLINs

The study participants with torn LLINs comprised 33% (Eramba-6.40%, Sieka-4.98%, Kiaruta-5.69%, Nyamagiri-9.24%, Moticho-2.37%, Suguta-4.50%), without torn LLINs comprised 36% (Eramba-6.40%, Sieka-5.69%, Kiaruta-8.53%, Nyamagiri-7.58%, Moticho-3.55%, Suguta-4.03%) while the ones without LLINs completely comprised 31% (Eramba-5.69%, Sieka-5.92%, Kiaruta-4.27%, Nyamagiri-4.74%, Moticho-4.50%, Suguta-5.92%) (Fig 7).

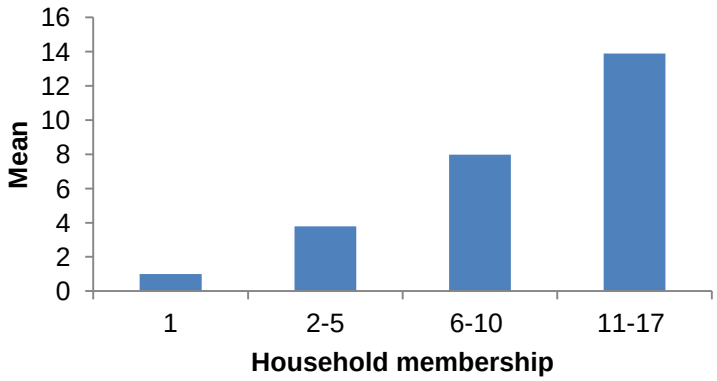

Fig. 5. Mean of the study participants' household membership

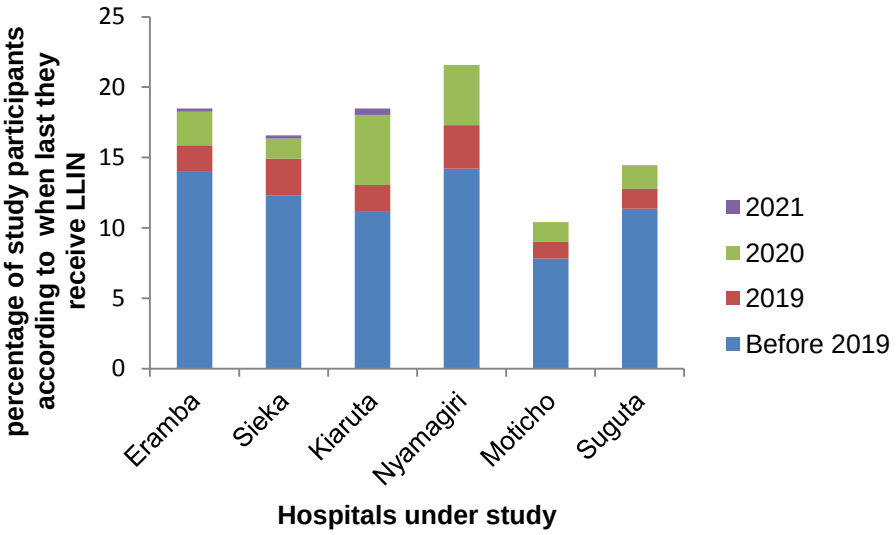

Fig. 6. Percentage of year of issue LLINs

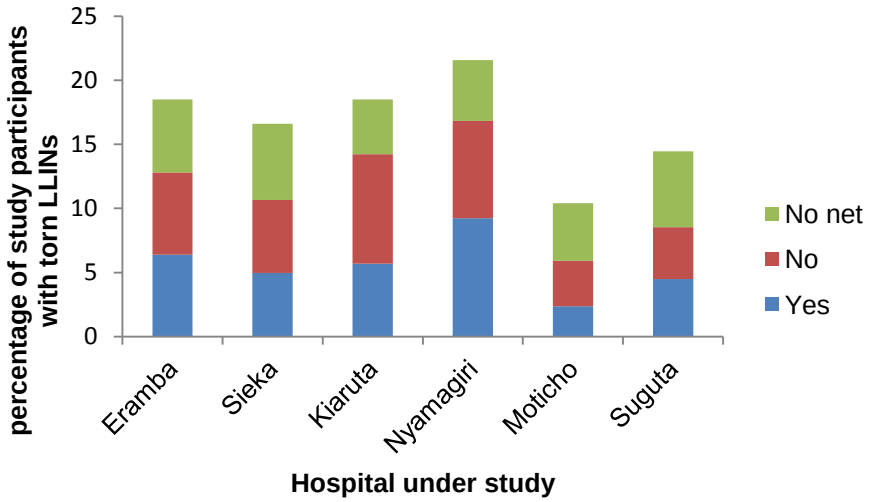

Fig. 7. Percentage of study participants with torn LLINs

Out of study participants, 62% (Eramba-12.32%, Sieka-9.00%, Kiaruta-12.32%, Nyamagiri-16.11%, Moticho-4.74%, Suguta-7.11%) were sleeping under LLINs. Of these 122 study participants possessed torn LLINs while 138 possessed un-torn LLINs. Out of 38% (Eramba-6.16%, Sieka-7.58%, Kiaruta-6.16%, Nyamagiri-5.45%, Moticho-5.69%, Suguta-7.35%) study participants who were not sleeping under LLINs, 18 possessed torn LLINs while 13 possessed un-torn LLINs (Table 1).

Table 1. Study participants sleeping under torn LLINs

		Torn LLINs			X^2	P-value (95%)
		Yes (%)	**No (%)**	**No net (%)**		
Sleep under LLINs	Yes	122(28.91)	138(32.70)	0	305.45	<.001
	No	18(7.23)	13(5.22)	131(52.61)		

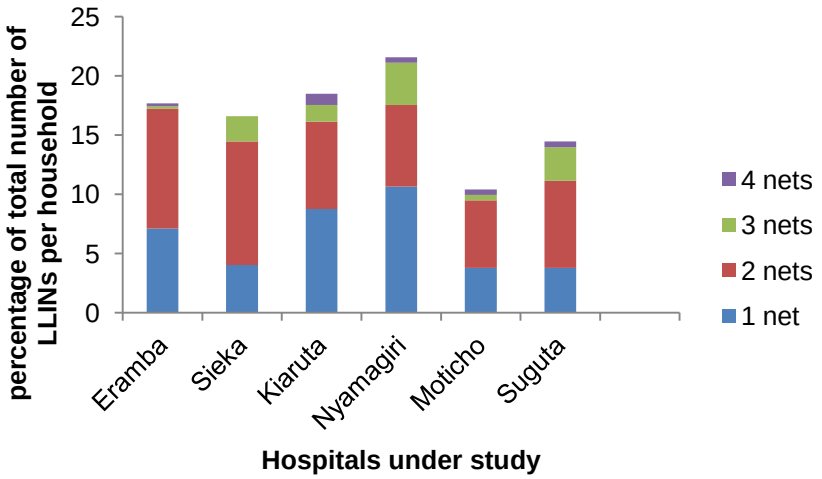

Fig. 8. Total number of nets available per household

Table 2. Association between ownership of LLINs per household and socio-demographic characteristics

Variable	Ownership of LLINs per household				Total	X^2 (d.f.*)	*P*- value
Age (Years)	**1 net**	**2 nets**	**3 nets**	**4 nets**			
0-5	45	44	9	2	100	26.777(12)	0.008
6-15	73	103	17	6	199		
16-30	30	40	10	2	82		
31-50	10	16	3	1	30		
51 above	3	2	6	0	11		
Education status							
Primary	118	156	25	9	308	21.430 (9)	0.011
Secondary	22	29	0	20	60		
Tertiary	2	0	2	1	5		
Non-formal	19	20	10	0	49		
Monthly income							
<1000	30	27	5	1	63	9.295 (12)	0.678
1001 -3000	88	117	22	8	235		
3001-5000	20	30	7	0	57		
5001-10,000	17	24	9	1	51		
>10,000	6	7	2	1	16		
Household membership							
0	5	0	0	0	5	90.423(9)	0.001
1-5	23	7	2	0	32		
6-10	91	59	6	2	158		
7-11	42	139	37	9	227		
Gender							
Male	55	88	12	2	193	5.585 (3)	0.134
Female	106	117	33	7	263		
Location							
Eramba Health Centre	30	46	1	1	78	43.717 (15)	0.001
Sieka Health Centre	17	44	9	0	70		
Kiaruta Dispensary	37	31	6	4	78		
Nyamagiri Dispensary	45	29	15	2	91		
Moticho Health Centre	16	24	2	2	44		
Suguta Health Centre	16	31	12	2	61		

Table 3. Association between the use of LLINs and socio-demographic characteristics

Variable	Use of LLINs		Total	X^2 (d.f.*)	P- value
Age (Years)	**Yes**	**No**			
0 - 5	84	16	100	43.68 (4)	0.001
6-15	100	99	199		
16-30	42	40	82		
31-50	25	5	30		
51 above	9	2	11		
Gender					
Male	87	72	159	5.127 (1)	0.024
Female	173	90	263		
Level of Education					
Primary	169	139	308	22.825 (3)	0.001
Secondary	47	13	60		
Tertiary	5	0	5		
Non-formal	39	10	49		
Location					
Eramba Health Centre	52	26	78	18.732 (5)	0.002
Sieka Health Centre	38	32	70		
Kiaruta Dispensary	52	26	78		
Nyamagiri Dispensary	68	23	91		
Moticho Health Centre	20	24	44		
Suguta Health Centre	30	31	61		
Household income					
<1000	39	24	63	7.400 (4)	0.116
1001 -3000	137	98	235		
3001-5000	33	24	57		
5001-10,000	39	12	51		
>10,000	12	4	16		
Year of net issued					
Before 2019	141	158	299	90.646 (3)	0.001
2019	49	2	51		
2020	66	2	68		
2021	4	0	4		
Household membership					
0	4	1	5	2.296 (3)	0.513
1-5	20	12	32		
6-10	91	67	158		
7-11	145	82	227		

3.2.8 Total number of nets available in the study participants' households

38.15% (Eramba-7.11%, Sieka-4.03%, Kiaruta-8.77%, Nyamagiri-10.66, Motich-3.79%, Suguta-3.79%) of study participants had only one net per household, 48.58% (Eramba-10.09%, Sieka-10.43%, Kiaruta-7.35%, Nyamagiri-6.88, Motich-5.69%, Suguta-7.35%) of study participants had 2 nets per household, 10.66% (Eramba-0.24%, Sieka-2.13%, Kiaruta-1.42%, Nyamagiri-3.55, Motich-0.47%, Suguta-2.84%) of study participants had 3 nets per household while 2.61% (Eramba-0.24%, Sieka-0%, Kiaruta-0.95%, Nyamagiri-0.47, Motich-0.47%, Suguta-0.47%) of study participants had 4 nets per household (Fig 8).

3.3 Association between Ownership of LLINs per Household and Socio-demographic Characteristics

There was an association between ownership of LLINs and household membership, age, level of education, and location of the study participants, while monthly income and gender were not significantly associated with the parameter (Table 2).

3.4 Association between the use of LLINs and socio-demographic Characteristics

There was an association between the use of LLINs and age, level of education, gender, location and the last year when the study participants received LLINs, while household income and household membership were not significantly associated with the use of LLINs (Table 3).

4. DISCUSSION

In this study, the average number of nets per household was 1.8 with minimum of one household owning one net and a maximum of one household owning four nets (Fig 5). This means that, all the study participants' households had at least one LLIN and this showed 100% ownership of LLINs per households. From the study participants, 68.96% had LLINs, of these 61.61% of these study participants were sleeping under it. This means that LLINs usage among those who owned the nets was high. This study was consistent with the study of Githinji et al*.,* [21] at Western Kenya which reported that 95% ownership and 59% usage, while the study of Atieli et al*.,* [12] at highlands also of Western Kenya reported a little lower ownership of LLINs of 71% and almost similar percentage of usage of 56.3%. Again similar study of Ng'ang'a et al*.,* [1] at Western Kenya reported high rates of ownership of 96.9% almost like this study, but a little higher percentage of usage of 98.1% just like the study of Liu et al*.,* [22] at northeastern Myanmar which reported 99.7% ownership and 97.3% usage. The variation of LLINs ownership of the above studies is due to the additional affirmative information which was part of the effort to attain the 2015 target as per the national malaria guideline [23]. From the guideline training, education and sensitization at community level was accepted as the main strategy to attain higher LLIN ownership and utilization.

Kenya Ministry of Health, roll back malaria partnership has reported at least 60% household LLINs coverage, and from this study, Githinji et al*.,* [21], Atieli et al*.,* [12], and Ng'ang'a et al*.,* [1] studies, Kenya have met the required target [5]. The major method used in Kenya to increase ownership is through free mass campaigns, free distribution of LLINs to parents with children less than five years of age during post-natal and pre-natal clinics and free distribution to mothers who are expectant [24]. The 100 % ownership of nets in this study could be due to free mass campaign distribution which happened in 2017 just like the study of Ng'ang'a et al*.,* [1] which reported that the three quarter of the LLINs acquisition was from a mass distribution which was free from the Ministry of Health, Kenyan government. These programs for LLINs distribution rapidly increases ownership and strengthens its usage within households [1] just like Sierra Leone where mass distribution campaigns bolster usage within households within a period of six months by 137% [25].

This study showed a statistical high significant association between LLINs ownership and household membership. This means that study participants' households with more than 11 members had more number of LLINs compared to study participants' households with less members. This shows that there was unequal distribution of LLINs among households of different study participants in the different study areas. This clearly explains the reason why LLINs coverage for every two household members in this study was too low (38.15%) compared to WHO recommended level (80%) which is accepted for protection [26]. The main determinants of the household ownership of LLINs were number of children, household membership and number of rooms for sleeping. This study was in conformity with the study of Alawode et al*.,* [27]. The average size of a family per household was 7 with a minimum of one member per family and a maximum of 17 members per household (Fig 6).

This study also showed an association between LLINs ownership of the study participants and their level of education. This implies that study participants who had attended school; primary, secondary or tertiary own LLINs while non-formal study participants do not own LLINs. This study is in agreement with the study of Tassew et al*.,* [28] and Woyessa et al*.,* [29] which took place in Ethiopia. The knowledge of education influences the link between malaria prevention and sleeping under the LLIN hence this predict LLIN ownership [30]. By this factor, behavioural change can be upgraded through communication to improve further ownership of LLINs [31].

Further this study showed a positive association between LLINs ownership and age. This means that there was an increasing trend of ownership of LLINs in this study with increasing age of the

study participants. This study was in agreement with the study of Tassew et al., [28] and Antony et al., [32] of Ethiopia and Uganda. This is because as an individual grows the likelihood of getting information about Malaria transmissions, signs, symptoms and control are high compared to a young individual. Age goes hand in hand with knowledge.

Strong association also was seen between LLINs ownership and location. This means that ownership if LLINs in this study depended on the home location of the study participants. Study participants having their homestead near to the road owned LLINs while study participants living far away from the road had no LLINs. This suggests that study participants living in poor homesteads might find it difficult to access information related to malaria. Poverty does not only mean individuals with low income, but it includes lack of enough resources like poor roads, information and a lot of vulnerability [33]. Like the study of Sixpence et al., [34] which took place in Malawi, there was lack of access to health information to the poorest households' especially in rural areas due to distance to nearest health facilities and poor road network to reach the facilities.

The use of LLINs in this study showed a strong association with the level of education. This means study participants who had gone to school; primary, secondary and tertiary are using LLINs to protect themselves against mosquito bites unlike the non-formal study participants. Explanation has been made in the study of Eteng et al., [35] in the Cross River State of Nigeria that parents who are educated appreciates and understands the importance of treated bed nets in Malaria protection and have enough information about public awareness campaigns which will eventually influence bed nets usage. This study corroborates with the study of Habimana et al., [36], Wekere et al., [37], Aluko & Oluwatosin, [38] and Ugwu et al., [39] in Southern Rwanda, Rivers State University Teaching Hospital, Nigeria, Ibadan, Nigeria and Enugu, South Eastern Nigeria respectively. The study was not in agreement with the study of Okeyo & Isara, [40] and Musa et al., [41] due to the variations in the study designs across all the studies. There was a statistical significance association between use of LLINs and gender in this study, meaning households head by males are more likely to use LLINs compared to female heads. This was in agreement with Fokam et al., [42].

Age also showed an association with the use of LLINs in this study. This means that study participants with the age of 31 and above or mothers with children below 5 years and sleep with them were likely to use LLINs compared with study participants between the ages of 6-30. This study was in conformity with the study of Wekere et al., [37], Omonijo & Omonijo, [43] and Habimana et al., [36] but contrary to the study of Musa et al., [41], Okeyo & Isara, [40], and Yitayew et al., [44]. This difference might be attributed to the difference in the study sample whereby these studies were using pregnant women who might have more knowledge about malaria due to their frequent visits to antenatal clinics and exposed to a lot of education on malaria compared to the study participants of this study.

This study also showed an association between use of LLINs and location of the study participants. This means that study participants whose households are near to the road used LLINs unlike the study participants who live far away from the road. This study was in corroborates with the study of Ng'ang'a et al., [1]. This might be due to lack of information about public awareness campaigns about sensitization on malaria prevention, poverty or poor education.

Just like the study of Hill et al., [45] this study showed that household income has no statistical significance with the use of LLINs, unlike the study of Habimana et al., [36]. This means study participants earning a monthly income of 10,000 Ksh and above had no difference in the usage of LLINs compared to the study participants earning less than 1000 Ksh monthly. This might be due to the environmental factors like heat, use of sprays or personal interests like tiredness and forgetfulness of the study participants.

This study showed also that there was no impact on utilization of LLINs and household membership. This means that despite study participants' households having many family members or few family members, that does not affect the use of LLINs. This study was in agreement with the study of Fokam et al., [42] but contrary to Diabaté et al., [46] and Sena et al., [47] which took place in Burkina Faso and South West Ethiopia respectively where their studies revealed that the use of nets was significantly higher in smaller households than in larger ones. These results can be explained by poor parental control, sleeping arrangements and bed net density.

On the conditions of the LLINs in this study 33.18% of the study participants were having nets with holes and 31.04% did not have nets completely while 35.78% were having nets in good conditions. This might be due to the fact that the study was done four years later after the last free mass distribution of the nets whereby 70.85% received their nets before 2019 (Fig 8). Another major contributing factor to those holes was study participants using poorly made wooden beds and the use of sticks to support the nets within the sleeping areas just like the study of Ng'ang'a et al*.,* [1]. For those who were having bed nets with good conditions most of them had given birth to their young ones a maximum of one year before the study was conducted so they had just receive their LLINs. This study was in agreement with the study of Githinji et al*.,* [21] and Maxwell et al., [48] who reported 40% and 44.9%of the nets with poor physical conditions respectively. However, our study was not in concordance with the study of Ng'ang'a et al*.,* [1] who reported 74.9% of nets with good conditions and 7.8% with holes. For a community to sustain the use of nets it is good to identify the motivator behind the use of nets and what discourages them from using it. The best motivator of using bed nets is to avoid nuisance biting mosquitoes than to prevent malaria as it has been reported in Beer et al*.,* [49]. The disadvantage part of this motivation is that family members might end up using the nets when there is high density of mosquitoes. Also it can be taken as a luxury and not to control malaria [50] like the study done in Ghana [51]. Nevertheless, another study in the highlands of western Kenya showed that education with seasonal patterns of vector density was linked with the use of ITNs [12]. Other factors associated with not sleeping under the treated bed nets are household characteristics [52], gender, age, access, education, demographic characteristics [53], social status [11], conditions of the nets [13] and others.

5. CONCLUSION

This study has shown that the coverage of LLINs in the endemic sub - counties of Kisii County, Kenya was high irrespective of equitability but its usage was low. This means that socio-demographic factor has a great influence on the ownership and utilization of LLINs. This is because this study has shown that there was statistical association between ownership and usage of LLINs and education, age and location. To attain equitable ownership of LLINs in households free of charge mass distribution of LLINs bed nets should be an adopted method. In addition to that mass education should be done on exposure to the mosquito and the importance of prompt and effective treatment to reduce incidences of malaria transmissions. When one has knowledge about malaria transmission and protection, this increases the urge of LLINs usage and ownership within the community.

CONSENT

All authors declared that written informed consent was obtained from each study participant. Consent was obtained during questionnaire interviews in the specific hospitals under study and they all declared the report of the study to be published. A copy of the written consent is available for review by the Editorial office/Chief Editor/Editorial Board members of this journal.

ETHICAL APPROVAL

Ethical approval was sought from the University of Eastern Africa, Baraton, while research permit was obtained from National Commission for Science, Technology and Innovation (NACOSTI). Kisii County Government County Health Services department of training and research, County Director of Education Kisii County, County Commissioner Kisii County, Medical Officers for malaria endemic Sub-Counties hospitals and head of the selected hospitals under study were informed and also sought for approval. Voluntary informed consent was sought from the respondents before participation to the study where memorandum of understanding between the selected participants and the researcher was established hence revealing the study aim.

ACKNOWLEDGEMENTS

Much appreciation to Kisii County at large for allowing this study to take place, especially Eramba, Moticho, Suguta and Sieka Health Centres, Kiaruta and Nyamagiri Dispensaries where the study participants of this study were drawn. Appreciation also goes to all the clinical staffs of the above hospitals for their technical assistance in their laboratories.

The study had no source of funding but the authors funded the study.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Ng'ang'a PN, Aduogo P, Mutero CM. Long lasting insecticidal mosquito nets (LLINs) ownership, use and coverage following mass distribution campaign in Lake Victoria basin, Western Kenya. BMC Public Health. 2021;21(1):1-13.
2. World Health Organization. World Malaria Report. Geneva: World Health Orgnization; 2020.
3. World Health Organization. World Malaria Report. *Geneva*: World Health Orgnization; 2019.
4. National Malaria Control Programme [NMCP]. Ministry of Health. The epidemiology and control profile of malaria in Kenya: reviewing the evidence to guide the future vector control. Nairobi: National Malaria Control Programme, Ministry of Health; 2016.
5. Division of Malaria Control (DOMC). Towards a malaria-free Kenya. National Malaria Strategy 2009–2017. Division of malaria control. Nairobi: 2019 Ministry of Public Health and Sanitation; 2009.
6. Bhatt S, Weiss DJ, Cameron E, Bisanzio D, Mappin B, Dalrymple U, Gething PW. The effect of malaria control on Plasmodium falciparum in Africa between 2000 and 2015. Nature. 2015;526(7572):207-211.
7. World Health Organization. Malaria Microscopy Standard Operating Procedures; 2016.
8. Guyatt HL, Corlett SK, Robinson TP, Ochola SA, Snow RW. Malaria prevention in highland Kenya: indoor residual house-spraying vs. insecticide-treated bednets. Tropical Medicine & International Health. 2002;7(4):298-303.
9. Zhou G, Lee MC, Githeko AK, Atieli HE, Yan G. Insecticide-treated net campaign and malaria transmission in western Kenya: 2003–2015. Frontiers in Public Health. 2016;4:153.
10. Wanzira H, Yeka A, Kigozi R, Rubahika D, Nasr S, Sserwanga A, Steinhardt L. Long-lasting insecticide-treated bed net ownership and use among children under five years of age following a targeted distribution in central Uganda. Malaria Journal. 2014;13(1):1-8.
11. Ernst KC, Hayden MH, Olsen H, Cavanaugh JL, Ruberto I, Agawo M, Munga S. Comparing ownership and use of bed nets at two sites with differential malaria transmission in western Kenya. Malaria Journal. 2016;*15*(1):1-16.
12. Atieli HE, Zhou G, Afrane Y, Lee MC, Mwanzo I, Githeko AK, Yan G. Insecticide-treated net (ITN) ownership, usage, and malaria transmission in the highlands of western Kenya. Parasites & Vectors. 2011;4(1):1-10.
13. Storey JD, Babalola SO, Ricotta EE, Fox KA, Toso M, Lewicky N, Koenker H. Associations between ideational variables and bed net use in Madagascar, Mali, and Nigeria. BMC public Health. 2018;18(1):1-15.
14. Fokam EB, Kindzeka GF, Ngimuh L, Dzi KT, Wanji S. Determination of the predictive factors of long-lasting insecticide-treated net ownership and utilisation in the Bamenda Health District of Cameroon. BMC Public Health. 2017;17(1):1-10.
15. Monitoring RBM. Evaluation Reference Group Survey and Indicator Task Force. Household survey indicators for malaria control. Chapel Hill: MEASURE Evaluation; 2013.
16. Koenker H, Arnold F, Ba F, Cisse M, Diouf L, Eckert E, Kilian A. Assessing whether universal coverage with insecticide-treated nets has been achieved: is the right indicator being used?. Malaria Journal. 2018;17(1):1-11.
17. Mathanga DP, Tembo AK, Mzilahowa T, Bauleni A, Mtimaukenena K, Taylor TE, Wilson ML. (). Patterns and determinants of malaria risk in urban and peri-urban areas of Blantyre, Malawi. Malaria Journal. 2016;15(1):590.
18. NACC, National Aids Control, Report; 2018.
19. Onkoba EN. Influence of Microfinance Institutions on the Growth of Women Entrepreneurial Ventures in Mombasa County, Kenya (Doctoral dissertation, University of Nairobi); 2017.
20. Daniel WW, Cross CL. Biostatistics: a foundation for analysis in the health sciences. Wiley; 2018.
21. Githinji S, Herbst S, Kistemann T, Noor AM. Mosquito nets in a rural area of

Western Kenya: ownership, use and quality. *Malaria Journal*. 2010;*9*(1):1-6.
22. Liu H, Xu JW, Guo XR, Havumaki J, Lin YX, Yu GC, Zhou DL. Coverage, use and maintenance of bed nets and related influence factors in Kachin Special Region II, northeastern Myanmar. Malaria Journal. 2015;14(1):1-12.
23. FMoH. National Malaria Guidelines. 3rd ed. Addis Ababa: Federal Ministry of Health; 2012.
24. Division of Malaria Control, Kenya National Bureau of Statistics (KNMS), ICF Macro. 2010 Kenya Malaria Indicator Survey; 2011.
25. Bennett A, Smith SJ, Yambasu S, Jambai A, Alemu W, Kabano A, Eisele TP. Household possession and use of insecticide-treated mosquito nets in Sierra Leone 6 months after a national mass-distribution campaign. PloS one, 2012;7(5):e37927.
26. World Health Organization. Achieving and maintaining universal coverage with long-lasting insecticidal nets for malaria control (No. WHO/HTM/GMP/2017.20). World Health Organization; 2017.
27. Alawode OA, Chima V, Awoleye AF. Household characteristics as determinants of ownership of mosquito nets in urban households in Nigeria. Scientific African. 2019;6:e00156.
28. Tassew A, Hopkins R, Deressa W. Factors influencing the ownership and utilization of long-lasting insecticidal nets for malaria prevention in Ethiopia. Malaria Journal. 2017;16(1):1-9.
29. Woyessa A, Deressa W, Ali A, Lindtjørn B. Ownership and use of long-lasting insecticidal nets for malaria prevention in Butajira area, south-central Ethiopia: complex samples data analysis. BMC Public Health. 2014;14(1):1-10.
30. Musoke D, Karani G, Ssempebwa JC, Etajak S, Guwatudde D, Musoke MB. Knowledge and practices on malaria prevention in two rural communities in Wakiso District, Uganda. African Health Sciences. 2015;15(2):401-412.
31. Forero R, Nahidi S, De Costa J, Mohsin M, Fitzgerald G, Gibson N, Aboagye-Sarfo P. Application of four-dimension criteria to assess rigour of qualitative research in emergency medicine. BMC Health Services Research. 2018;18(1):1-11.
32. Antony I, Andinda M, Robert K, Tony M, John R, Semana AR. Factors associated with utilization of insecticide treated nets among residents of Kamwenge Town Council-Kamwenge District-Uganda. International Journal of Infectious Diseases and Therapy. 2019;4(1):1.
33. Worrall E, Basu S, Hanson K. Is malaria a disease of poverty? A review of the literature. Tropical Medicine & International Health. 2005;10(10):1047-1059.
34. Sixpence A, Nkoka O, Chirwa GC, Milanzi EB, Mangani C, Mathanga DP, Ntenda PA. Levels of knowledge regarding malaria causes, symptoms, and prevention measures among Malawian women of reproductive age. Malaria Journal. 2020;19(1):1-13.
35. Eteng M, Mitchell S, Garba L, Ana O, Liman M, Cockcroft A, Andersson N. Socio-economic determinants of ownership and use of treated bed nets in Nigeria: results from a cross-sectional study in Cross River and Bauchi States in 2011. Malaria Journal. 2014;13(1):1-8.
36. Habimana A, Gikunju J, Magu D, Tuyizere M. Assessing knowledge and factors associated to long lasting insecticide nets use among pregnant women in Southern Rwanda. Rwanda Journal of Medicine and Health Sciences. 2020;3(1):60-70.
37. Wekere FCC, Kalio DG, Kua PL, Iwo-Amah RS. Evaluating the Relationship between Socio-Demographic Factors, Knowledge, Ownership and Usage of Long-Lasting Insecticide-Treated Bed Nets among Pregnant Mothers in Rivers State University Teaching Hospital. International Journal of Research and Reports in Gynaecology. 2020:1-12.
38. Aluko JO, Oluwatosin AO. Utilization of insecticide treated nets during pregnancy among postpartum women in Ibadan, Nigeria: a cross-sectional study. *BMC pregnancy and childbirth*, 2012;*12*(1):1-7.
39. Ugwu EO, Ezechukwu PC, Obi SN, Ugwu AO, Okeke TC. Utilization of insecticide treated nets among pregnant women in Enugu, South Eastern Nigeria. Nigerian Journal of Clinical Practice. 2013;16(3):292-296.
40. Okoye CA, Isara AR. Awareness on the use of insecticide-treated nets among women attending antenatal clinic in a tertiary health facility in South-South Nigeria. Nigerian Medical Journal. 2011;52(2).
41. Musa OI, Salaudeen GA, Jimoh RO. Awareness and use of insecticide treated

nets among women attending ante-natal clinic in a northern state of Nigeria. Marketing. 2009;59(354).

42. Fokam EB, Kindzeka GF, Ngimuh L, Dzi KT, Wanji S. (). Determination of the predictive factors of long-lasting insecticide-treated net ownership and utilisation in the Bamenda Health District of Cameroon. BMC Public Health. 2017;17(1):1-10.
43. Omonijo A, Omonijo AO. Assessment of the status of awareness, ownership, and usage of long-lasting insecticide treated nets after mass distribution in Ekiti State, Nigeria. Journal of Parasitology Research; 2019.
44. Yitayew AE, Enyew HD, Goshu YA. Utilization and associated factors of insecticide treated bed net among pregnant women attending antenatal clinic of Addis Zemen hospital, North-western Ethiopia: An institutional based study. Malaria Research and Treatment; 2018.
45. Hill J, Hoyt J, van Eijk AM, D'Mello-Guyett L, Ter Kuile FO, Steketee R, Webster J. Factors affecting the delivery, access, and use of interventions to prevent malaria in pregnancy in sub-Saharan Africa: a systematic review and meta-analysis. PLoS Medicine. 2013;10(7): e1001488.
46. Diabaté S, Druetz T, Bonnet E, Kouanda S, Ridde V, Haddad S. Insecticide-treated nets ownership and utilization among under-five children following the 2010 mass distribution in Burkina Faso. Malaria Journal. 2014;13(1):1-8.
47. Sena LD, Deressa WA, Ali AA. Predictors of long-lasting insecticide-treated bed net ownership and utilization: evidence from community-based cross-sectional comparative study, Southwest Ethiopia. Malaria Journal. 2013;12(1):1-9.
48. Maxwell CA, Rwegoshora RT, Magesa SM, Curtis CF. Comparison of coverage with insecticide-treated nets in a Tanzanian town and villages where nets and insecticide are either marketed or provided free of charge. Malaria Journal. 2006;5(1):1-6.
49. Beer N, Ali AS, Eskilsson H, Jansson A, Abdul-Kadir FM, Rotllant-Estelrich G, Källander K. A qualitative study on caretakers' perceived need of bed-nets after reduced malaria transmission in Zanzibar, Tanzania. BMC Public Health. 2012;12(1): 1-10.
50. Kroeger A, Mancheno M, Alarcon J, Pesse K. Insecticide-impregnated bed nets for malaria control: varying experiences from Ecuador, Colombia, and Peru concerning acceptability and effectiveness. *The* American Journal of Tropical Medicine and Hygiene. 1995; *53*(4):313-323.
51. Adongo P, Kirkwood B, Kendall C How local community knowledge about malaria affects insecticide treated net use in northern Ghana [MIM-PA-38950]. In *Acta Tropica*. PO BOX 211, 1000 Ae Amsterdam, Netherlands: Elsevier Science BV. 2005;95: S49-S50
52. Plucinski MM, Chicuecue S, Macete E, Chambe GA, Muguande O, Matsinhe G, Morgan J. Sleeping arrangements and mass distribution of bed nets in six districts in central and northern Mozambique. Tropical Medicine & International Health. 2015;20(12): 1685-1695.
53. Malede A, Aemero M, Gari SR, Kloos H, Alemu K. (). Barriers of persistent long-lasting insecticidal nets utilization in villages around Lake Tana, Northwest Ethiopia: a qualitative study. BMC Public Health. 2019;19(1):1-11.

APPENDIX I: QUESTIONNAIRE

Questionnaire used in the study to assess socio- demographic factors influencing the effectiveness of LLINs among endemic Sub-Counties in Kisii County

PART 1: RESPONDENTS APPROVAL COVENANT

I (number……) hereby agree to be part of this study by giving the right and comprehensive information for the benefit of all residents of Kisii County, and generally Kenyan hospitals at large.

Signature …… Date ……... /……./2021

PART 2: RESPONDENTS DETAILS

Age……..in Years

Level of education

Primary ……. [Yes/No]
Secondary……. [Yes/No]
Tertiary/college…… [Yes/No]
Non-formal…… [Yes/No]

Approximate income per month

<Ksh. 10,000……. [Yes/No]
>Ksh. 10,000…….. [Yes/No]
Ksh.10.000 – 20,000……. [Yes/No]

Size of the family(Household membership)

(1 member)……..… [Yes/No]
(Between 2-5) …… [Yes/No]
(Between 6-10) …… [Yes/No]

(<11) ……..….. [Yes/No]

PART 3: INTERVENTION PRACTICES

Have you ever used intervention practices before…….[Yes/No] if yes answer the following;
Use of insecticides treated nets (LLINs) …….[Yes/No]
The previous night sleep under LLINs……[Yes/No]
Is the LLINs slept the previous night torn…….[Yes/No]
Number of LLINs in the whole household……

Use of intermittent preventive treatment in pregnancy (IPTP) with Sulfadoxine-pyrimetamine [Yes/No]
If Yes what are the;

i. Response after three days: Good…….Fair..…….. Poor …..……
ii. Response after completion of the drug: Good……Fair..…… Poor …..……..
iii. Complications accompanied by the drug……
Use of Insecticides (coils or sprays) …… [Yes/No]
Use of insects repellant……. [Yes/No]
Domestic hygiene practice (cutting the grass [Yes/No], sweeping the backyard [Yes/No], pruning the trees [Yes/No])

Use of indoor residual spraying (IRS) [Yes/No] if Yes

i. When did you start to use ……..…
……..……...
ii. How often do you spray ……...
……
iii. What was the effect
    a. Immediately……
    b. After three days……..
    c. After one week……..
    d. After a month……..

What else do you do to prevent malaria in your area
……..……
When was the last year you received LLINs a. [Before 2019]
b. [2019]
c. [2020]
d. [2021]

PART 4:

DECLARATION FROM THE RESEARCHER

1. Malpractices or intimidation from the respondents with an aim of getting information will not be there
2. Informed consent of the study will be signed for confidence and further elaboration will be done where not understood by the respondents before the study
3. Provided information by the respondents will not be tampered or edited and will be kept private and confidential
4. Translation will be done in case language barrier arise
5. Collected data from pregnant women under the study will be used for the described purpose of the study but not to disclose information.

Researcher's name: Pacifica C. Bwogo

Signature.....
Date……

APPENDIX II: SEMI-STRUCTURED GUIDE USE TO INTERVIEW KEY INFORMANTS

PART 1: Consent form

I (number……) hereby agree to be part of this study by giving the right and comprehensive information for the benefit of all individuals residing in Kisii County, and generally Kenyan hospitals at large.

Signature …… Date …..... /…….. /2021

PART 2: RESPONDENTS DETAILS

What percentage of patient is usually referred due to malaria from health centers or dispensaries weekly……

a. How many are female……above 5……..below 5……
b. How many are male……above 5……below 5……

What are the protective measures of malaria used in South mugirango/Kitutu chache north/Bonchari……..
When was mass spraying of insecticides house to house done in South mugirango/Kitutu chache north/Bonchari…….
When was the LLINs free mass distribution done in South mugirango/Kitutu chache north/Bonchari……..
After how long is the free mass distribution done in South mugirango/Kitutu chache north/Bonchari……..
Which criteria is usually used in South mugirango/Kitutu chache north/Bonchari to distribute LLINs since last free mass distribution……
When were the last month specific hospitals in South mugirango/Kitutu chache north/Bonchari received the LLINs for distribution to parents having children under 5/Pregnant……
What of a parent with more than two children under 5, how many nets are given to that patient……and which procedure is being followed……..
When was the last mass education done in South mugirango/Kitutu chache north/Bonchari about malaria……

APPENDIX III: INFORMED CONSENT

TITLE OF STUDY

Socio- demographic factors influencing the ownership and utilization of long lasting insecticide nets among endemic sub-counties in Kisii County

PRINCIPAL INVESTIGATOR

Name: XXXX
University: XXXXX
School: XXXXX
Department: XXXX
Address: XXXXXX
Phone number: XXXXX

PURPOSE OF THE STUDY

(You are being asked to take part in a research study. Before you decide to participate in this study, it is important that you understand why the research is being done and what it will involve. Please read the following information carefully. If there is anything that is not clear kindly feels free to ask for clarification.)

The purpose of this study is to understand the socio- demographic factors influencing the effectiveness of LLINs as malaria transmission reduction interventions among endemic sub-counties in Kisii County. Malaria continues to strike hardest among pregnant women and children especially in Africa. Malaria compromises the health of children and pregnant mothers and puts them at a higher risk of death. It leads to low birth weight, anemia in the mother, neonatal and infant mortality. LLINs are the key malaria vector control measure, but socio- demographic factors has been seen to be influencing its effectiveness to control malaria.

STUDY PROCEDURES

The study procedures include: blood samples collection, questionnaires interview for soci-demographic data collection and malaria parasite light microscopy testing. After that association between socio- demographic factors and the effectiveness of LLINs will be analyzed.

RISKS

Pain while collecting blood samples might be observed but with the presence of hospital health workers it will be controlled.

BENEFITS

This study will benefit everybody residing in Kisii County and Kenya at large since the socio-demographic factors influencing the effectiveness of LLINs as malaria transmission reduction interventions among endemic sub-counties in Kisii County will be evaluated and published online for every individual within Kenya and outside for future referrals.

CONFIDENTIALITY

Your participation to this study will be anonymous. Please any identifying information will not be indicated on your samples. Every effort will be made by the researcher to preserve your confidentiality. Participant data will be kept confidential except in cases where the researcher is legally obligated to report specific incidents. These incidents include, but may not be limited to, incidents of abuse and suicide risk.

CONTACT INFORMATION

If you have questions at any time about this study, or you experience adverse effects as the result of participating in this study, you may contact the researcher whose contact information is provided on the first page. If you have questions regarding your rights as a research participant, or if problems arise which you do not feel you can discuss with the Primary Investigator, please contact the Institution of study of the researcher as provided on the first page again.

VOLUNTARY PARTICIPATION

Your participation in this study is voluntary. It is up to you to decide whether or not to take part in this study. If you decide to take part in this study, you will be asked to sign a consent form. After you sign the consent form, you are still free to withdraw at any time and without giving a reason. Withdrawing from this study will not affect the relationship you have, if any, with the researcher. If you withdraw from the study before data collection is completed, your data will be returned to you or destroyed.

SIGNATURE

I have read and I understand the provided information and have had the opportunity to ask questions. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason and without cost. I understand that I will be given a copy of this consent form. I voluntarily agree to take part in this study.

Participant's signature _____ Date _____

Investigator's signature _____ Date _____

Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle5.com/review-history/81708