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Effect of Health Education through Community Leaders on Increase Utilization of Households Regarding LLINs in Intervention and Control Villages of New Halfa Locality-Kassala State (2017-2020)

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Abstract

The long-lasting insecticidal nets (LLIN) are effective against prevention of malaria and its utilization has been proven to save lives. Despite the mass distribution of LLIN, Nigeria remains the country with the highest malaria burden in Africa. The current study aimed to assess the effect of Health Education through Community leaders on increased knowledge of Households Regarding malaria control, treatment and prevention in intervention and control villages of New Halfa Locality-Kassala State (2017-2020). Randomized community trials (Controlled intervention study) in New Halfa locality among two communities were randomly assigned to intervention group which receive health education messages regarding the use of LLINs and control group where there is no health education. Standard Questionnaire was use to collect data from the head of household at each village. The information collected should include the owner and using LLINs, distributed to household. The observation the conditions of LLINs. This Questionnaire was done with committee for integrated vector management - Federal Ministry of Health and WHO. The major source of information was TV in control (23.2%) and intervention villages (22.8%) with no significant difference, p> 0.05. There was no significant difference between intervention and control regarding sleeping under net last night (p=.87). The proportion of households slept under nets was not significantly slightly increased in intervention villages (51.9%) compared to control villages (48.1%). The most reasons for not sleeping under nets in control and intervention villages was significantly were no mosquito, no need, hot weather, bad feeling, owner absence and other reasons not mentioned. The frequency distribution of number of bed nets per household. The number of bed nets per household in control villages was found to be 3.7(1.9%) during survey I , 3.1 (1.5%) during survey II and 3.2 (1.6%) during the survey III with mean of 3.2 (1.6%). However, the number of bed nets in intervention villages during surveyI , survey II, survey were found 3.7 (1.9%), 3.2 (1.4%) and 2.9 (1.4%) respectively with mean of 3.3 (1.7%). The number of households in control group during survey I was 2541 (44.8%), survey II 1838 (32.4%) and during survey III 1300 (22.9%). While the number of households in intervention villages during survey I 2526 (41.8%), survey II 1997 (33.1%) and during survey III was 1514 (25.1%). The ownership of bed nets was 100% in control

village during surveyI, survey II and survey III, but the ownership was slightly decreased in intervention villages during survey I (99.4%) and during survey III (99.6%). Regarding use of nets, the use of bed nets during survey I in control villages was found high 70.8% compared to intervention villages (64.1%) while remarkable increased in bed nets use during survey II (82%) and survey III (55.8%) in intervention villages compared to control villages (74.8%), (47%) respectively. This may be due to health education packages. It can be concluded that the overall knowledge was fair in the present study. This could be attributed to the media campaign sessions during net distribution and to the role of community leaders in these campaigns. Also, in other words this study has demonstrated the effectiveness of health education as vital tool for improving the knowledge of malaria and utilization of LLINs.

Keywords

Health education, LLINs, New Halfa, Kassala State.

INTRODUCTION

Malaria continues to be endemic in most parts of Africa causing millions of lives to be lost across age categories (Allain *et al.*, 2016). Some barriers to LLIN use have been documented to include distribution challenges where there is inadequate number of nets per household, limited Social and Behavior Change Communication (SBCC) activities as well as lack of continuous malaria education. (Worrall *et al.*, 2020). At the community level, there is knowledge gap on malaria prevention, inability to hang LLINs in many households due to housing type and sleeping places. There is also misuse and repurposing of LLINs (Opoku *e al*., 2021). Health-worker challenges have also been reported to include lack of adequate training on community mobilization skills, minimal number of staff and lack of follow-up, community engagement, and supervision (Assan *et al*., 2018). Thus, ability to achieve desired outcomes from LLIN campaigns may require adoption of social innovative approaches which support behavior change within communities (Wakefield *et al*., 2010). Social Innovation is described as a collective process enabling the generation of ideas by people who participate collaboratively to improve delivery strategies in the community or health facility (Dako-gyeke *et al*., 2020).

Synergetic efforts through vector surveillance approach, educational campaigns, and wide distribution of long-lasting insecticidal nets (LLINs) have successfully reduced malaria burden in endemic regions. Among several interventions, long-lasting insecticidal nets (LLINs) have played an important role in reducing the global malaria burden since 2000 (WHO, 2017a). Evaluation of LLINs success over years has resulted in treatment modification of nets due to the development of insecticide-resistance by malaria vectors, thereby leading to pyrethroid-PBO nets being given an interim endorsement as a new WHO class of vector control products (WHO, 2017b). Although LLINs are a key tool use widely by people at risk of malaria, some communities have not been able to translate the available malaria control interventions to effective opportunities to curtail the disease. Also, there is evidence that relatively few people in endemic regions access and use LLINs (WHO, 2017b).

It is very clear that the provision of LLINs and education are both instrumental for attaining high bed net coverage and usage rates. Yet, community-specific behaviors remain significant obstacles to achieving optimal results (Widmar *et al*., 2009). Therefore, the objective of this study was to assess the effect of Health Education through Community leaders on increased knowledge of Households Regarding malaria control, treatment and prevention in intervention and control villages of New Halfa Locality-Kassala State (2017-2020). Overall knowledge about malaria control, treatment and prevention in intervention and control villages of New Halfa Locality. The overall knowledge of respondents about breeding sites was significantly high among intervention villages (2.4) compared to control villages (2.2) after health education intervention, $p< 0.05$. Furthermore, the overall mean knowledge about malaria control was increased among intervention villages from (1.9) vs. (2.1), (p=.049) in control villages. In addition the overall mean knowledge of respondents regarding uncomplicated malaria symptoms from (2.5) vs. (2.7) (p=.000) , sever malaria symptoms from (.7) vs. (.9) (p=.000), uncomplicated malaria treatment (.8) vs. (.9), (p=.028), severe malaria treatment (.8)

vs. (1.0), (p=.003) , fever treatment from 1.1 to 1.2, (p=.000) net washing (5.1) vs. (5.4), (p=.000) were greater in intervention villages versus control village due to health education intervention during LLINs distribution campaigns in the targeted villages, p< 0.05. There were significant differences between overall mean knowledge in intervention and control villages regarding mosquito breeding sites (p=.001), malaria control (p=.049), uncomplicated malaria symptoms (p=.000), severe malaria symptoms (p=.000), uncomplicated malaria treatment (p=.028), severe malaria treatment (p=.003), fever treatment (p=.000) and net washing (p=.000).

MATERIALS AND METHODS

Study design

Randomized community trials (Controlled intervention study) in New Halfa locality among two communities were randomly assigned to intervention group which receive health education messages regarding the use of LLINs and control group where there is no health education. There are two groups one for intervention and the other served as control. Sample for LLINs 50 households (H.H) from each village. The ten villages were divided to 2 group (intervention group and control group randomly), intervention group were delivered by health education intervention by assigned community leaders during the whole study period for one year and control group were leaved without any intervention.

Study area

New Halfa is located in the semi-arid belt of Sudan approximately 500 km east of Khartoum; it is located within the New Halfa irrigation scheme in Kassala State. The area is about 450 meters above sea level and has a population consisting of indigenous nomads and resettled Nubian immigrants from WadiHalfa in northern Sudan. Most villages are situated along the Atbara River, where cotton, wheat, sorghum and a variety of vegetables are cultivated. Climatically, the area is classified as dry savannah with rainfall ranging between 300 to 411 mm per annum. The rainy season lasts from July to early October. Temperatures range between 16°C and 45°C. The principal malaria vector species *An. arabiensis* has shown resistance to DDT, and Malathion (Himeidan *et al*., 2004 and 2007).

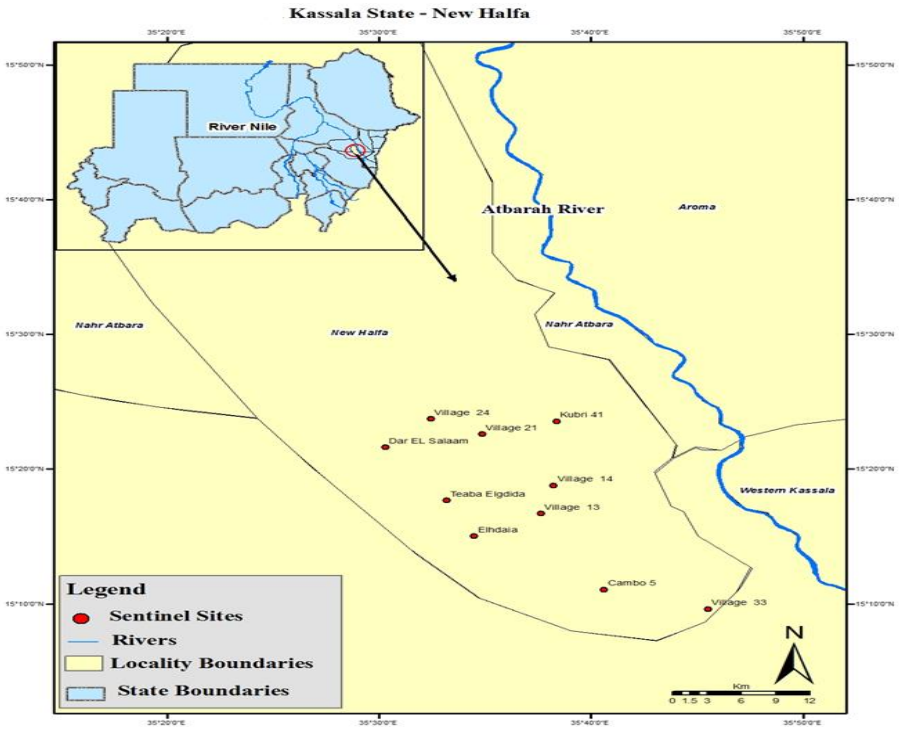

Fig.1: Map of the study area

Study population

The study population includes all households residing in Newhalfa locality.

Inclusion criteria

The inclusion criteria were all households who were agree to participate in the study.

Exclusion criteria

The exclusion criteria were all households who were not agree to participate in the study.

Sample size and sampling technique

There are two groups one for intervention and the other served as control. Sample for LLINs 50 households (H.H) from each village. The ten villages were divided to 2 group (intervention group and control group randomly), intervention group were delivered by health education intervention by assigned community leaders during the whole study period that proposed to be one year and control group were leaved without any intervention. Each study village was separated from each other by buffer zone of minimum 5 km, for the purpose of baseline survey, med term survey(after 6 month) and post intervention survey after one year, 50 household were selected randomly from each village using Random Number Generator software from Google with total household of 250 for each study arm intervention arm and control arm with overall total of 500 household for each survey, the 50 households generated from Google random software were used to select household from already exit list of village household from New Halfa locality that prepared during LLINs distribution campaign, the selected household number generated from software were used for selection of household from registration list for each survey).

Data collection tools

Standard Questionnaire was used to collect data from the head of household at each village. The information collected should include the owner and using LLINs, distributed to household and observation of LLINs conditions. This Questionnaire was done with the committee for integrated vector management - Federal Ministry of Health and WHO.

Plan of data analysis

SPSS was used for data analysis. $\chi 2$ tests were used to assess association between categorical variable. Analysis of variance was used to test the difference between group of means for continues data. Confidence interval and P-value was reported for every summary measure interpreted taking significance level of P=0.05.

Ethical considerations

The research was obtaining ethical approval from research ethical committee of Gezira University and Ministry of Health.

RESULTS

Table 1 indicates the source of information about malaria control, prevention and treatment in intervention and control villages of New Halfa Locality. The major source of information was TV in control (23.2%) and intervention villages (22.8%) with no significant difference, p> 0.05. The other sources of information were radio (p=.000) and newspapers (p=.018) with significant differences in both control and intervention villages

Table 2 indicates that there was no significant difference between intervention and control regarding sleeping under net last night (p=.87). The proportion of households slept under nets was not significantly slightly increased in intervention villages (51.9%) compared to control villages (48.1%).

The most reasons for not sleeping under nets in control and intervention villages was significantly no mosquito, no need, hot weather, bad feeling, owner absence and other reasons not mentioned as shown in table 3.

Table 4 shows the frequency distribution of number of bed nets per household. The number of bed nets per household in control villages was found to be 3.7 (1.9%) during the survey I , 3.1 (1.5%) during survey Π and 3.2 (1.6%) during the survey Ш with mean of 3.2 (1.6%). However, the number of bed nets in intervention villages during surveyI , survey Π, survey were found to be 3.7 (1.9%), 3.2 (1.4%) and 2.9 (1.4%) respectively with a mean of 3.3 (1.7%). The number of households in control group during the survey I was 2541 (44.8%), the survey Π 1838 (32.4%) and during survey Ш 1300 (22.9%). While the number of households in intervention villages during survey I was 2526 (41.8%), survey Π 1997 (33.1%) and during survey Ш was 1514 (25.1%). The ownership of bed nets was 100% in the control village during surveyI, survey Π and survey Ш, however the ownership was slightly decreased in intervention villages during survey I (99.4%) and during survey Ш (99.6%). Regarding use of nets, the use of bed nets during survey I in control villages was found high 70.8% compared to intervention villages (64.1%) while a remarkable increased in bed nets use during survey Π (82%) and survey Ш (55.8%) in intervention villages compared to control villages (74.8%), (47%) respectively. This may be due to health education packages.

Source of information	Response		Intervention		Total	χ2	p-value
			Control (Villages)	Intervention (Villages)			
TV	Yes	n	407	416	823	.064	.415
		%	23.2%	22.8%	23.0%		
Radio	Yes	n	331	432	763	12.5	.000**
		%	18.8%	23.7%	21.3%		
News papers	Yes	n	18	35	53	4.9	.018**
		%	1.0%	1.9%	1.5%		

Table 1: Respondents source of information about malaria control, prevention and treatment in intervention and control villages of New Halfa Locality (n=3583).

**P-value significant at less than 0.05 levels.

Intervention		Sleeping under net last night		Total	χ2	p-value
		No	Yes			
Control (Villages)	n	602	1144	1746	1.95	.087
	%	49.9%	48.1%	48.7%		
Intervention (Villages)	n	605	1232	1837		
	%	50.1%	51.9%	51.3%		
Total	**n**	**1207**	**2376**	**3583**		
	%	**100.0%**	**100.0%**	**100.0%**		

Table 2: Proportion of households sleeping under net last night in intervention and control villages of New Halfa Locality (n=3583).

**P-value significant at less than 0.05 levels.

Reasons not sleep under net	Intervention				Total		χ2	p-value
	Control (Villages)		Intervention (Villages)					
	n	%	n	%	n	%		
No mosquitoes	77	13.5	100	15.7	177	100.0	40.1	.000**
No malaria	54	9.4	53	8.3	107	100.0		
Hot weather	45	7.9	33	5.2	78	100.0		
Bad smell	35	6.1	55	8.7	90	100.0		
Bad feeling	46	8.0	44	6.9	90	100.0		
Old/damage net	51	8.9	46	7.2	97	100.0		
Net dirty	45	7.9	34	5.4	79	100.0		
Owner absence	89	15.6	84	13.2	173	100.0		
No need	72	12.6	81	12.8	153	100.0		
Other	58	10.1	105	16.5	163	100.0		
Total	**572**	**100.0**	**635**	**100.0**	**1207**	**100.0**		

Table 3: Respondents reasons of not sleeping under net last night in intervention and control villages of New Halfa Locality (n=3583)

**P-value significant at less than 0.05 levels

	Control				Intervention			
	Survey I	Survey II	Survey III	Mean	Survey I	Survey II	Survey III	Mean
	N (%)	N (%)	N (%)	(SD)	N (%)	N (%)	N (%)	(SD)
Number of bed nets/HH, Mean (SD)	3.7 (1.9)	3.1 (1.5)	2.7 (1.2)	3.2 (1.6)	3.7 (1.9)	3.2 (1.4)	2.9 (1.4)	3.3 (1.7)
Total number of bed nets found in HH	2541	1838	1300	5679	2526	1997	1514	6037
Having nets:								
Yes	684 (100.0)	587 (100.0)	487 (100.0)	1758 (100.0)	675 (99.4)	617 (100.0)	527 (99.6)	1819 (99.7)
Net Use								
Yes	479 (70.8)	437 (74.8)	228 (47.0)	1144 (65.5)	435 (64.1)	504 (82.0)	293 (55.8)	1232 (67.7)
Total	**677**	**584**	**485**	**1746**	**679**	**615**	**525**	**1819**

Table 4: Percent of household ownership of long-lasting insecticidal nets (LLINs) and mean number of bed nets per house, by study arm in intervention and control villages of New Halfa Locality

DISCUSSION

Constant and appropriate use of long-lasting insecticidal nets (LLINs) during pregnancy is one of the World Health Organization (WHO) recommended measures to control malaria in pregnancy (WHO, 2019), including full coverage with the free distribution of LLINs to ensure universal access. This study aimed to assess the effect of health education on the usage of LLINs as a malaria prevention intervention in the New Halfa locality in 2017. This study indicated that the major source of information about malaria control, prevention and treatment was TV in control and intervention villages with no significant difference and the other sources of information were radio and newspapers with significant differences in both control and intervention villages. The finding of the study in line with Diema Konlan *et al*. (2015), who found that television, was the commonest source amongst most of the respondents (74%). More than half of the respondents also had their source of information from health professionals (65%), schools (62%), family/friends (60%), and the Internet (51%). The newspaper was the source of information assessed by only a few of the respondents (19%). Bello-Bravo *and* Lutomia (2017) found that most of their study participants (75%) use the Internet as means of finding information about malaria and majority also indicated that their source of information and resources about malaria were through clinics, hospitals, and doctors; in turn, this corresponds with this study findings that revealed that more than half of the respondents also had their source of information from health professionals (66%). Bukari (2015) found health workers (79%) as the significant source of information on malaria transmission and ITN usage. Television was the source of information for only 6% while relatives/friends formed 4%. Other sources of information on malaria prevention identified by this study were schools (62%), family/friends (60%), and newspaper (19%).

The mean number of bed nets per household in control villages was found to be 3.2. However, the mean number of bed nets in intervention villages was 3.3. However, the ownership of bed nets was 100% in control village during surveyI, survey II and survey III, but the ownership was slightly decreased in intervention villages during survey I (99.4%) and during survey III (99.6%). The result in line with the WHO recommendation on LLINs coverage and ownerships. The high ownership level that was observed in this study was higher of that recorded in studies done in Ethiopia (Kateera *et al*., 2015, Aderibigbe *et al*., 2014).

Also, the study showed the use of bed nets during survey I in control villages was found high at 70.8% compared to intervention villages (64.1%) while remarkable increase in bed nets use during survey II (82%) and survey III (55.8%) in intervention villages compared to control villages (74.8%), (47%) respectively. This may be due to health education packages. The level of usage observed in this study agrees with reports from other authors. For instance, 63% was reported by (Kilian *et al*., 2016) from post campaign studies in Nigeria, 76.5% usage was reported in Sierra Leone (Gerstl *et al*., 2010), 68.3% in Togo, 65% in Ethiopia, 72% in Rwanda (Biswas *et al*., 2010), and lower than 81% in India (Gerstl

et al., 2010). But the level of usage is still far from 100% global utilization target. The increase usage could be linked to training and education provided to LLINs owners on usage. This is conforming with the result that was reported in Sierra Leone (Gerstl *et al*., 2010, Deribew *et al*., 2010).

The present study showed that the proportion of households slept under nets was not significantly slightly increase in intervention villages (51.9%) compared to control villages (48.1%). This perhaps partly contributed to the increase usage observed in the study area as supported by reports from other studies (15) that associated not sleeping on a bed with non-usage of LLINs. This proportion is lower than the obtained in a study conducted by Omonijo and Omonijo (2019) they found high percentage (91.5%) of people sleeping on bed nets and also is lower than reported in a study conducted in East Rwanda (62.9%) (Kateera *et al*., 2015).

Furthermore, the most reasons for not sleeping under nets in control and intervention villages was significantly no mosquito, no need, hot weather, lousy feeling, owner and other reasons not mentioned. These reasons mentioned is differ from that reported in other studies which stated that the reasons given for low level of usage included lack of awareness of LLIN, non-ownership of the nets, high cost of ITNs, and alternative malaria prevention and mosquito control other than ITNs (Ibor *et al*., 2012).

CONCLUSION

It can be concluded that the overall knowledge was fair in the present study. This could be attributed to the media campaign sessions during net distribution and to the role of community leaders in these campaigns. Also, in other words this study has demonstrated the effectiveness of health education as vital tool for improving the knowledge of malaria and utilization of LLINs.

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