

Factors Influencing The use of Itns Among The Jaggery And Tea workers In The Prevention of Malaria In South mugirango Sub - county, Kisii county, Kenya.

¹Masta Ondara Omwono, ²Justus. Osano Osero, ³Alloys Sigar Steven Orago, ⁴Taratisio Ndwiga

¹Department of Public Health, Moi University, Eldoret, Kenya.

²Department of Community Health, Kenyatta University, Nairobi Kenya.

³Department of Pathology, School of Medicine, Kenyatta University, Nairobi, Kenya.

⁴Department of Environmental Health, Moi University, Eldoret, Kenya

Corresponding Author: Masta Ondara Omwono

Abstract: Background; Insecticide treated nets remains the most preferred malaria control intervention measures advocated worldwide if used well. In some place to date its use has been very low with about three percent of people in Africa sleeping under ITNs with twenty percent sleeping under any kind of net. Worse still 51.6% of adults Jaggery and tea workers by age distribution between 18-49 years are at risk of getting malaria infections due to improper ITNs use in South Mugirango Sub-County, Kisii County, Kenya. Malaria is among the top ten diseases that lead to high level of morbidity and mortality. This study therefore focuses on the factors influencing use of ITNs in the prevention of malaria among the Jaggery and tea workers aged 18-49 years in South Mugirango Sub County, Kisii County, Kenya. Methods; This was descriptive cross sectional study design where Kisii County was purposively selected. Overall 209 Jaggery and tea workers were systematically and randomly selected and interviewed. Data was collected through the use of questionnaires; focused group discussions and key informant interview to obtain views. Both qualitative and quantitative data were transcribed; coded and categorized and analyzed using SPSS version 20.0. Chi- Square was used to determine the statistical significance between variables; Results; The results shows that about 209 Jaggery and Tea workers were selected and interviewed; 56% males and 44% females. The majority were between 29-39 years (44.3%) while 95 (49.5%) were married. About 88 (45.5%) had secondary education and 54.5% were tea workers by occupation. Chi-square was used to establish relationships between variables. From the socio-demographic factors only gender and education were found to be statistically related with ($P < 0.001$) and ITNs use among the Jaggery and tea workers. Among the economic variables only cost, accessibility and house structures were found to be related ($P < 0.001$) with ITNs use. Conclusion and recommendations: This study concludes there was low level of ITNs use among the Jaggery and tea workers and they were attributed by socio-demographic factors, economic factors and weather conditions which were found to be statistically associated ($P < 0.001$) with ITNs use. This study therefore, recommends implementation of programs and policy formulation to empower the Jaggery and tea workers in education and economically through income generating activities to strengthen their resource base. This result is useful in addressing ITNs use among the Jaggery and tea workers in the prevention of malaria in Kisii County, Kenya. It will also help the Kisii County government to mobilize the necessary resources and direct it to malaria prevention and control.

Key Words: Morbidity, mortality, ITNs, Malaria intervention, Transmission.

Date of Submission: 26-01-2018

Date of acceptance: 16-02-2018

I. Introduction

Half of the world's population is at risk of malaria transmission yearly and most these malaria cases and deaths occurred in sub-Saharan Africa (WHO 2013). However, Asia, Latin America, and to a lesser extent the Middle East and parts of Europe were also affected with specific risk groups as that with low immunity ,immigrants workers and international travelers from non-endemic areas due to lack of immunity (WHO 2013). Malaria is endemic throughout most of the tropics. More than three billion people worldwide are exposed yearly and over 240 million develop malaria (WHO 2008). From the year 2000 to 2010, the number of reported annual malaria cases in 34 malaria-eliminating countries decreased by 85 percent, from 1.5 million in the year 2000, to 232,000 in the year 2010 (WHO,2011). The common species that causes malaria is *P. falciparum* that is spread by female Anopheline mosquito which bites between dusk and dawn Filler et al, (2011). Other rare mechanism for transmission include: congenitally acquired disease, blood transfusion, sharing of contaminated needles and

organ transplant But *P.vivax* and *P. knowlesi* can also cause severe disease. Malaria deaths peaked at 1.82 million in 2004 and fell to 1.24 million in 2010 (714,000 children <5 years and 524,000 individuals ≥5 years); over 80 percent of the deaths occur in sub-Saharan Africa (WHO, 2012; Lancet, 2012). In Africa it is estimated that about 207 million cases of malaria were reported in 2012 from Sub Sahara Africa with over 627 000 deaths. Malaria is caused by *plasmodium* parasites. The parasites are spread to people through the bites of infected *Anopheles* mosquitoes, called "malaria vectors", which bite mainly between dusk and dawn. There are four parasite species that cause malaria in humans: *Plasmodium falciparum*, *Plasmodium vivax*, *Plasmodium malariae*, *Plasmodium ovale*. *Plasmodium falciparum* and *Plasmodium vivax* are the most common. *Plasmodium falciparum* is the most deadly. A study by Robert et al 2003 found that malaria transmission was high in Sub Sahara Africa. In recent years, Africa accounts for the majority of estimated malaria cases (80%) and deaths (90%), but only about 13% of the world's population. Recent data, however, indicate that effective programs have helped reduce newly reported cases by at least 75% in eight countries (WHO, 2013). In Kenya malaria accounts for 30 percent of all outpatient cases and it causes high morbidity and mortality with negative effects on other sectors of the national economy as well for the Jaggery and tea workers (Oyediran & Achola, 2009). Malaria is responsible for the majority of days lost due to ill health. More recently, environmental changes such as the El Nino phenomenon and changed rainfall patterns have added to the complicated malaria picture (Republic of Kenya 2010). In 2012 over 9 million cases were reported with disease burden being highest in Nyanza and Western with 42 and 41 percent respectively with Nairobi and North Eastern having fewer cases of 5 percent and 4 percent (Republic of Kenya, 2012). In malaria endemic areas it is revealed that there are one insecticide treated net to every five Kenyan due to stagnation of net ownership since 2007. The Government of Kenya spent 31 percent of its national budget with estimated cost of ksh30.7 billion on 43 percent of its outpatient, while in 2011-2012 financial year Ksh. 10.1 billion was the national malaria control budget with 10.2 percent went to prevention and public health administration (Ministry of Health Republic of Kenya, 2009). A study by White et al comparing the cost of treatment of malaria with the ITNs distribution showed that the cost of ITNs distribution was cheaper than diagnosis. Therefore proper ITNs utilization would save the jaggery and tea workers a great deal of money and trauma experienced from malaria complication as well as the economy.

In Kisii, an area classified as highland, there has been an upsurge of malaria cases in the past 20 years. In 1998 a malaria outbreak led to numerous deaths. Land in this region has been extensively fragmented due to population pressure which has brought about important ecological changes affecting the malaria vector, the mosquito. More important, these changes may have influenced the transmission rate of the malaria parasite leading to an increase in malaria prevalence in the community. As a result, morbidity and mortality resulting from malaria is high. High morbidity reduces labor contribution to agricultural activities and ultimately agricultural output as patcannot effectively contribute their labor to farm work. Further, the healthy individuals have to take time off to care for the sick and, when death occurs, to bury the dead in an earlier study on lay people's anti-malaria behavior (Nyamongo, 1998). The aim of this paper was to examine the factors that influence the ITNs use in South Mugirango Sub County Kisii County and to establish whether there is a relationship between independent and dependent variables.

II. Methodology

This was a descriptive cross-sectional study design where both quantitative and qualitative were gathered. The study area was at South Mugirango Sub-County, Kisii County, Kenya which was purposively selected and 209 Jaggery and tea workers both male and female were interviewed on the use of ITNs. Ten investigators to assess use of ITNs administered questionnaires. The questionnaire was pretested by ten research assistants together with observation checklist. The sample size was determined based on 14.5% malaria clinical prevalence among the jaggery and tea workers from the in and outpatient in Kisii hospital. Study participants were systematically sampled from a list of Sugarcane out-growers and KTDA list of tea growers where the workers were followed to find out on the use of ITNs in the prevention of malaria. Desired sample size of 209 of Jaggery and tea workers was obtained using a predetermined interval. The selected subjects were interviewed at their workplaces. The inclusion criteria were those male and female aged between 18-49 years who were at their working places. The study excluded those who were mentally handicapped and not capable of communicating verbally during the interview as they not able to offer quality information. Quantitative was collected using administered structured questionnaire. Qualitative data from Focused Group Discussion was obtained by the interview schedule. Key informant interview were conducted and included; Jaggery and tea Field Officers, Public Health Officers and Administration Officers in-charge of the division and village heads. Data collected was inspected cleaned and coded and then analyzed using SPSS version 20 with statistical significance set at $P < 0.05$. Association of variables were described using the strength of the associations and Chi-Square was used. Ethical consideration was sought from Kenyatta University Ethical Committee. Informed consent was also obtained from the study participants and confidentiality was guaranteed. Autonomy was guaranteed with the participant allowed to be engaged in the study at their own free will.

III. Results

3.1 Demographic and socio-economic characteristics of the jaggery and tea workers.

A total of 209 Jaggery and tea workers consented to be interviewed and their data was included in the analysis (Table 1) details the demographic of the study population.

3.2 Gender of the Jaggery and tea workers.

In this study (Table 1) it was found out that there were more males 116 (56%) than females workers 93 (44%) in both the Jaggery and tea industry.

3.3 Age of the Jaggery and tea workers.

The mean age of the respondents was 34 years with (SD) =6.2years and ranged between 18 and 50 years. Most of the Jaggery and tea workers (Table 1) were between the ages 29-39 years at 85 (41%) while those aged between 18-28 years were 69 (33%) with 55 (26%) aged between 40-50 years.

3.4 Marital status of the Jaggery and tea workers.

On marital status (Table 1) it was found out that 95(45%) were married with 42 (20%) being single or living alone, while 29 (14%) were divorced with 23 (11%) being widowed and the rest 11(5%) having no response with a few 9 (4%) living together without any formal arrangement.

3.4 Level of education of the Jaggery and tea workers.

On the level of education (Table 1) the study revealed that 88 (42%) had secondary education with 62 (30%) having had college education while 29 (14%) had primary education with 16 (7%) having vocational while 14(7%) had no education at all. This means that those without education were found to be the lowest users of ITNs.

3.5 Occupation of the Jaggery and tea workers.

This study revealed that more than half of the respondents (Table 1) 116 (56%) were tea workers while 87 (42%) were Jaggery workers with only 6 (2%) percent being engaged with other small scale activities. Most 74 of 116 (18%) of the tea workers were found using the ITNs in carrying tea to the tea buying centers and the reasons was said that nets and netting material were portable and easy to carry compared with the baskets. It was also found out that 42 (20%) of the Jaggery workers cited the reasons for non-use of ITNs was that they worked at night and used the ITNs in making Jaggery shades with the remains from sugarcane to protect them from adverse conditions like rain and hot sunshine during working hours.

Table:1 Characteristics of the jaggery and tea workers

| Variables | Frequency N | Percent |
|---------------------|-------------|---------|
| Gender | | |
| Male | 116 | 56 |
| Female | 93 | 44 |
| Age | | |
| 18-28 years | 69 | 33 |
| 29-39 years | 85 | 41 |
| 40-50 years | 55 | 26 |
| Marital status | | |
| Single | 42 | 20 |
| Married | 95 | 45 |
| Widowed | 23 | 11 |
| Divorced | 29 | 14 |
| Living together | 9 | 4 |
| No response | 11 | 5 |
| Education level | | |
| None | 14 | 7 |
| Primary | 29 | 14 |
| Secondary | 88 | 42 |
| College | 62 | 30 |
| Vocational training | 16 | 7 |

| | | |
|----------------|-----|----|
| Occupation | | |
| Jaggery worker | 87 | 42 |
| Tea worker | 116 | 56 |
| Others | 6 | 2 |

The above (Table 1) shows the characteristics of the Jaggery and tea workers. On gender most of the respondents 116 (56%) were male with 93 (44%) being female. More of the Jaggery and tea workers were age 85 (41%) ranged from 29-39 years. On marital status, it was found that 95 (45%) were married while 42 (20%) were single. The study revealed that 88 (42%) had secondary education with only 62 (30%) had the college education. From their occupation, it was also revealed that most of the workers were engaged in tea farming while 87 (42%) were also sugarcane farmers

3.6 Level of income of the household

Almost all the households accessed some income (**Figure 1**) below. Household income was found to be contributing factor to ITNs use among the Jaggery and tea workers. About 12.4% earned less than Kshs2500 while 13.4% earned Kshs2600-5100. Only 30.6% of the household earned between Kshs5200-7700, (62) 29.7% earned Kshs7800-10300, 19 (9%) earned Kshs10400-12900, with 10 (4.9%) earned more than Kshs13000.

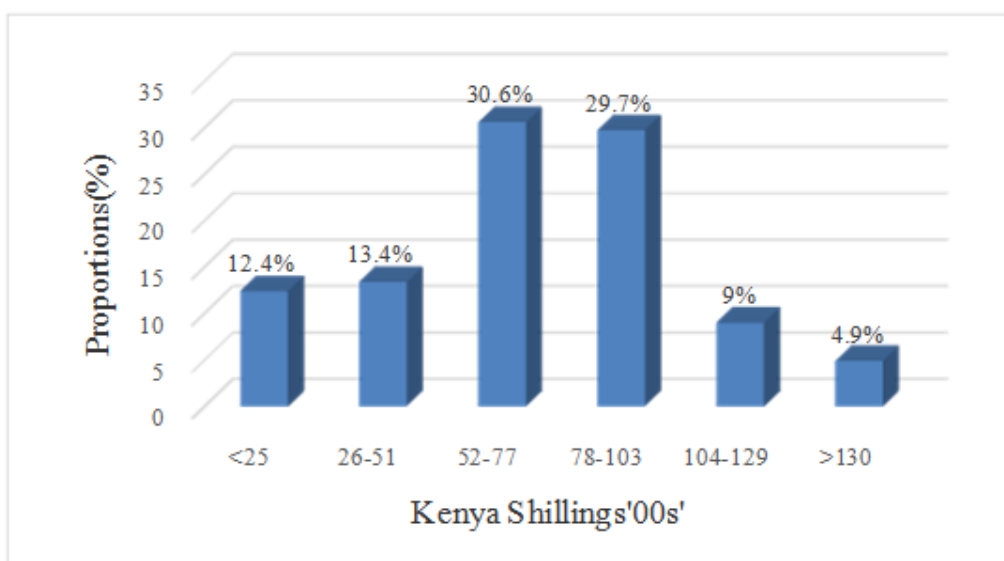


Figure.1: House hold income level of the Jaggery and tea workers

The average income per household was Kshs77 ± 26.50. From FGDs it was revealed that workers in the Jaggery and tea industry earned very little to sustain them and have an extra to purchase ITNs.

3.7 Factors that influenced ITNs use among the Jaggery and tea workers.

From the analysis of this study it was clear that there are some demographic and socio-economic factors among the Jaggery and tea workers which hindered ITNs use. Barriers towards use of bed nets that would negate their use include; gender, age, marital status, education and occupation as can be seen below (Table2).

3.7.1 Demographic factors versus ITNs use.

Table 2 Demographic factors versus ITN use

| Variables | ITN Use | | χ ² Test P-Value |
|-----------|-----------|----------|-----------------------------|
| | Yes N (%) | No N (%) | |

| | | | |
|---------------------|------------|-----------|--------|
| Gender | | | <0.001 |
| Male | 99(51.6%) | 17(100%) | |
| Female | 93(48.4%) | 0(0.0%) | |
| Age | | | 0.131 |
| 18-28 | 52(27.1%) | 17(100%) | |
| 29-39 | 85(44.3%) | 0(0.0%) | |
| 40-50 | 55(28.6%) | 0(0.0%) | |
| Marital status | | | 0.362 |
| Single | 25(13%) | 17(100%) | |
| Married | 95(49.5%) | 0(0.0%) | |
| Widowed | 23(12.0%) | 0(0.0%) | |
| Divorced | 29(15.9%) | 0(0.0%) | |
| Living together | 9(4.7%) | 0(0.0%) | |
| No response | 11(5.7%) | 0(0.0%) | |
| Education | | | |
| None | 0(0.0%) | 14(82.4%) | <0.001 |
| Primary | 26(13.5%) | 3(17.6%) | |
| Secondary | 88(45.5%) | 0(0.0%) | |
| College | 62(32.3%) | 0(0.0%) | |
| Vocational training | 16(8.3%) | 0(0.0%) | |
| Occupation | | | 0.003 |
| Jagger worker | 87(45.3%) | 0(0.0%) | |
| Tea worker | 105(54.7%) | 11(64.7%) | |
| Others | 0(0.0%) | 6(35.3%) | |

The above (Table 2) shows how the variables were related with the ITNs use among the Jaggery and tea workers. Among all the variables it is only gender, education and occupation which were found to be statistically associated with ($P < 0.001$) and ($P < 0.003$) and the ITNs use.

3.7.2 Economic factors versus ITNs use.

Table 3 Economic factors versus ITNs use

| Variables | ITN Use | | χ^2 Test P-Value |
|-----------------|------------|------------|-----------------------|
| | Yes N (%) | No N (%) | |
| Cost | | | 0.010 |
| Cost high | 144(75.0%) | 17(100.0%) | |
| Cost low | 48(25.0%) | 0(0.0%) | |
| Accessibility | | | <0.001 |
| Yes | 192(100%) | 0(0.0%) | |
| No | 0(0.0%) | 17(100%) | |
| House structure | | | <0.001 |
| Grass thatched | 8(4.2%) | 16(94.1%) | |
| Mud | 58(30.2%) | 1(5.90%) | |
| Semi-permanent | 79(41.1%) | 0(0.0%) | |
| Permanent | 47(24.5%) | 0(0.0%) | |
| Number of rooms | | | 0.521 |
| One | 31(16.1%) | 12(70.6%) | |
| Two | 64(34.9%) | 4(23.5%) | |
| Three | 45(23.4%) | 1(5.9%) | |
| Four | 29(15.1%) | 0(0.0%) | |
| More than four | 20(10.4%) | 0(0.0%) | |

From the above (Table 3) various factors were illustrated such as cost, accessibility, house structure and number of rooms on how they affected the use of ITNs. Among the users 75% said that the cost was high. Accessibility, cost and house structure were only statistically significant with ($P < 0.001$) and ITNs use among the Jaggery and tea workers. About 94.1% of non-users lived in the grass thatched houses with 34.9% of the workers living in two roomed houses.

3.7.3 Weather conditions versus ITNs use.

Table 4 Weather conditions versus ITN use

| Variables | ITN Use | | P-Value |
|--------------------|------------|----------|---------|
| | Yes n (%) | No n (%) | |
| Weather conditions | | | 0.001 |
| Yes | 173(90.1%) | 2(11.8%) | |

| | | | |
|----|----------|-----------|--|
| No | 19(9.9%) | 15(88.2%) | |
|----|----------|-----------|--|

From the study it was found that also weather conditions was statistically significant with $P < 0.001$ and ITNs use. It was also found that the 88.2% of non-users of ITNs cited weather condition as the reasons for not using and gave reasons that they caused suffocation and irritation. Among the users 19 (9.9%) who were found not using said that they do so when mosquitoes are plentiful but keep them away when there are no mosquitoes during the dry seasons.

IV. Discussions

4.1.1 Demographic factors versus ITNs use.

A total of 209 Jaggery and tea workers consented to be interviewed and were included in data analysis (Table 1) details the demographic of the study population. Their mean age was 34 years with (SD) = 6.2 years and ranged between 18 and 49 years. Most of the workers 116 (56%) were males with 93 (44%) percent being females. It was revealed from this study that there were three major factors that influenced ITNs use among the Jaggery and tea workers and they includes; demographic factors, economic factors and the weather conditions. From demographic and socio-economic characteristics the study revealed a low likelihood of the Jaggery and tea workers use of ITNs in the prevention of malaria. Gender was found to play a great role and was statistically significant with the ($P < 0.001$) among the ITNs users. Among the non-users of ITNs 17 (100%) were also found to be males and were not having any in their households. The above (Table 2) illustrates that 99 (51.6%) were male users and 93 (48.4%) female users respectively. Therefore, age and marital status were found not to be statistically significant. The majority of ITNs users' age ranged between 29-39 years with non-users age ranging from 18-29 years respectively. On marital status 95 (49.5%) who were married and were found to be among the users of ITNs while 17 (100%) of the singles were found to be non-users of ITNs in this study. The study findings shows that education and occupation were also found to be statistically significant with the use of ITNs with ($P < 0.001$) and ($P < 0.003$) respectively. Most 88 (45.5%) of the Jaggery and tea workers had attained secondary education. On their occupation it was revealed that 105 (54.5%) were tea workers and users of ITNs. The results showed that 62 (32.3%) who attended college and 16 (8.3%) vocational training were found using ITNs than those with no education at all. From this study it was also revealed that there was significant relationship between tea workers and Jaggery workers with $P < 0.003$ and ITNs use. Among the non-users (64.5%) were found to be tea workers. However, among all the variables, only education showed a slight influence on the knowledge of ITNs use (Table 2).

4.1.2 Economic factors versus ITNs use.

On economic factors, this study concurred with a study done by Somi. MF 2007 *et al*, (2007) on social economic burdens who found out that there are other variables within household that could influence or deter the use of ITNs and these included: cost, accessibility, house structure and the number of rooms. Furthermore, for ITNs to effectively utilized they must be readily affordable, accessible and available. This study was in contrast with Andersen et al 1968 behavioral model on the use of health services by families. Among ITNs users, 75% cited that the cost was very high and this impacted negatively on the use and about 100% of non-users also concurred with the same. About 94.1% of non-users were found living in the grass thatched house as this led to lack of the facilities for hanging. Therefore this study found out that enabling factors within the community such economic empowerment; access and availability determined ITNs use among the Jaggery and tea workers. However, on how they came to know about ITNs, 40.1% percent cited radio while 20.3% said Tv/posters. Also 26.7% cited that they got information from the health workers. From the analysis it was evident that the major sources of information about ITNs among the Jaggery and tea worker was the radio. From the economic characteristics of respondents in this study, the majority 144 (75%) of users said that cost of nets was high with only 48 (25%) of the user said that they were comfortable with the cost (Table 3). Cost was found to be statistically significant with ($P < 0.010$) and ITNs use. Those who said that the cost was high were found to have been engaged in small scale tea and sugarcane farming activities which did not generate enough income to meet their household daily requirement including the purchase of ITNs. A study by Chuma JM et al, (2006) rethinking the economic cost of malaria in the household found that affordability was measured in terms of how much they had paid for the nets they were using if not given free by the government. The respondents said that it ranged from Kshs 450 to ksh 1200 depending on the type of a net. This means that although the average cost of Kshs 800 still was high to some respondents. It was revealed that none users 17 (100%) had none in their household did not bother to find out where they could get the affordable mosquito net due to their limited finances (Table 3). Lack of financial resources was frequently mentioned by key informants as a key barrier to obtaining nets. Low income among the Jaggery and tea workers was observed as a reason of not able to purchase an extra net as they earned kshs 7600 (Figure 1) and prioritized their immediate needs such as food and shelter compared to nets. From this study (Table 3) it was revealed that house structure will always determine the

ITNs use. House structure was found to be statistically significant with ITNs use with ($P < 0.001$) as 79 (41.1%) lived in semi-permanent structures. Although the awareness level has improved over time, studies by Osero *et al.* (2005) and Adeneye *et al.* (2007) have shown that a lot of factors militate against actual ownership and correct use of ITNs. This study found out that the number of rooms were not statistically significant ($P < 0.521$) with the ITNs use. The majority 70.6% of non-ITNs users lived in one room and grass thatched as these were related with their level of income. This study concurred with one done by Alaii *et al.* (2003) who also found that there were other factors that affected ITNs use in western Kenya. It was found out that both pregnant Jaggery and tea workers in the household were given preferences to sleep under the mosquito net. This showed that there is a relationship of mosquito nets ownership in the household and malaria episodes among those who had less than two as a result of disruption of sleeping arrangements especially when they had visitors. Most of the Jaggery and tea workers did not use ITNs due to lack of knowledge and sometimes due to ignorance and these concurred with study done by Baume C, *et al.* (2007) on whether nets are used. Therefore these findings on factors that influenced ITNs use were traced from their demographic and socio-economic and cultural context within which they lived. Furthermore it was revealed that literacy played a role as a mechanism of social transformation among the Jaggery and tea workers in relation to the use of ITNs in the prevention of malaria in South Mugirango and this concurred with a study previously documented by Rashed, *et al.* (1999). On level of income (Figure 1) revealed that almost all households accessed some income. About 12.4% earned less than Kshs 2500 while 13.4% earned Kshs 2600-5100, 30.6% of the household earned between Kshs 5200-7700, 62 (29.7%) earned Kshs 7800-10300, 19 (9%) earned Kshs 10400-12900, with 10 (4.9%) earned Kshs 13000. The average income per household was Kshs 7750 \pm 2650. From the FGDs it was revealed that workers in the Jaggery and tea industry earned very little to sustain them and have extra to purchase ITNs. This study therefore concurs with other studies done by Mac Cormack *et al.* (1989) which reported that households with low income would not consider purchasing any health items at the expense of the basic needs and this could have been the reasons why some households (8.1%) had none. Furthermore from their occupation it was revealed that more than half of the respondents (Table 1) 116 (56%) were tea workers while 87 (42%) were Jaggery workers with only 6 (2%) were engaged with other small-scale activities to generate an income. Most 74 of 116 (18%) of the tea workers were found using the ITNs in carrying tea to the tea buying centers and the reasons were said that nets and netting materials were portable and easy to carry compared with the baskets. This was in contrast with a study by Macintyre K, *et al.* (2006) on examining the determinants of possession and use. Therefore it was found that the majority 55.5% were aware of ways of preventing malaria but demonstrated a high level of ignorance on the use of ITNs as they believed that they cause dreams, suffocation and irritation respectively.

4.1.3 Weather versus ITNs use:

From the study it was illustrated that weather conditions were statistically significant with ($P < 0.001$) and ITNs use. Among the 88.2% of non-users of ITNs cited weather condition as the reasons for not using and gave reasons that they caused suffocation and irritation. Also among the users 19 (9.9%) who were found not using said that they do so when mosquitoes are plenty but keep them away when there are no mosquitoes during the dry seasons.

V. Conclusion And Recommendations

5.1 Conclusion:

This study therefore concludes that the demographic factors, economic factors and weather condition affect ITNs use among the Jaggery and tea workers. The (88.2%) of non-users of ITNs is a high number that is likely to contract malaria infection.

5.1 Recommendations:

The study recommends that the county government should involve the low earners in income-generating activities as this will empower Jaggery and tea workers to earn a living to improve their living conditions. Also health education and promotion should be intensified to improve their perceptions, beliefs and the myths on the use of ITNs.

Acknowledgement

We sincerely thank all Jaggery and tea workers who participated voluntarily in this study and made it to be a success. To the administration Officers, Public Health Officers, Field Sugarcane Officers and Kenya Tea Development Officers we are grateful for allowing this research to be conducted in the study area and permission to publish the findings. More appreciation goes to Rose Nyanchama Orure for her guidance and support during the study. Lastly, we are grateful to all people who helped us either directly or indirectly to make this study a success.

References

- [1]. Alaii J, Hawley W, Kolczak M, ter Kuile F, Gimnig J, Vulule J, Odhacha A, Oloo A, Nahlen B, Phillips-Howard P: Factors affecting use of permethrin-treated bed nets during a randomized controlled trial in western Kenya. *Am J Trop Med Hyg.* 2003, 68: 137-141.PubMedGoogle Sc
- [2]. Armstrong, J.,Minja, H., & Mponda, H (2002). R-treatment of mosquito nets with insecticides. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 96,368-369.
- [3]. Andersen R. A. (1968). *Behavioral Model of Families' Use of Health Services*. Chicago, IL: Center for Health Administration Studies, University of Chicago.
- [4]. Baume C, Marin M: Intra-household mosquito net use in Ethiopia, Ghana, Mali, Nigeria, Senegal and Zambia: Are nets being used? Who in the household uses them? *Am JTrop Med Hyg* (2007), 77:963-971.
- [5]. *Bull World Health Organ* (2002), 80:892-899.WHO, (2003); Scaling up Insecticide treated netting programmes in Africa. WHO/CDC/RBM/2002.43.
- [6]. Chuma JM, Thiede M, Molyneux CS: Rethinking the economic costs of malaria at the household level: evidence from applying a new analytical framework in rural Kenya.*Malaria J* (2006), 5:76. PubMed .
- [7]. Ettling M, McFarland DA, Schultz LJ, Chitsulo L: Economic impact of malaria in Malawian households.*Trop Med Parasitol* (1994), 45:74-79.
- [8]. Erhun et al. (2005) Malaria prevention: Knowledge,attitude and practice in south western Nigeria community, *African journal of biomedical research* 8(2005):25-29ISSN 1119-5096
- [9]. Guyatt, H. and Ochola, S.Use of bed nets given free to pregnant women in Kenya, 2003, pp 1549-1550.
- [10]. Lengeler, C. and Snow, R (2010). From efficacy to effectiveness: insecticide-treated bed nets in Africa. *Bulletin of the World Health Organization*,74(3), 325-328.
- [11]. Mac cormark 1989: Costing the distribution of insecticide-treated nets: a review of cost and cost-effectiveness studies to provide guidance on standardization of costing methodology.
- [12]. Macintyre K, Keating J, Okbaldt YB, Zerom M, Sosler S, Ghebremeskel T, Eisele TP: Rolling out insecticide treated nets in Eritrea: examining the determinants of possession and use in malarious zones during the rainy season. *Trop Med Int Health.* 2006, 11: 824-233. 10.1111/j.1365-3156.2006.01637.x.View ArticlePubMedGoogle Scholar.
- [13]. Onwujekwe O, Hanson K, Fox-Rushby J: Inequalities in purchase of mosquito nets and willingness to pay for insecticide-treated nets in Nigeria: challenges for malaria control interventions. *Malar J.* 2004, 3: 6-
<http://www.malariajournal.com/content/3/1/6>.PubMed CentralView ArticlePubMedGoogle Schola
- [14]. Osero, J. S., Otieno, M. F. and Orago, A. S. S. Mother's knowledge on malaria and vector management strategies in Nyamira district, Kenya. *East Afr. Med. J.* 2006; 83: 507-512.
- [15]. Oresanya et al, (2008); Utilization of Insecticide treated nets by under-five children in Nigeria. Assessing progress towards the Abuja target. Abuja, Nigeria.
- [16]. RBM (2001): Report on specifications for netting material, Geneva, Switzerland. Simon JL, Larson BA, Zusman A, Rosen S: How will the reduction of tariffs and taxes on insecticide treated bed nets affect household purchases?
- [17]. Ministry of Health Republic of Kenya (2012): Households Surveys in Kenya.
- [18]. Rhee, M. and Sissoko, M.: Malaria prevention practices in Mopti region, Mali.*East Afr. Med. J.* 2005; 82: 8 Aug pp 396-402.
- [19]. Somi MF, Butler JR, Vahid F, Njau J, Kachur SP, Abdulla S: Is there evidence for dual causation between malaria and socioeconomic status? Findings from rural Tanzania.*Am J Trop Med Hyg* (2007), 77:1020-1027.
- [20]. Simon K Kariuki et al ,(2013) ;Effect of malaria transmission reduction by insecticide-treated bed nets (ITNs) on the genetic diversity of Plasmodium falciparum merozoite surface protein (MSP-1) and circumsporozoite (CSP) in western Kenya
- [21]. Somi MF, Butler JR, Vahid F, Njau JD, Kachur SP, Abdulla S: Economic burden of malaria in rural Tanzania: variations by socioeconomic status and season.*Trop Med Int Health* (2007), 12:1139-1147.
- [22]. Ter Kuile Fo, Terlouw DJ, Kariuki SK, et al, (2010). Impact of permethrin treated bed nets on malaria, anaemia and growth in infants in an area of intense perennial malaria transmission in Western Kenya. *American Journal of Tropical Medicine and Hygiene.* 68 (4 Suppl): 68-77.
- [23]. UNICEF/WHO: World malaria Report RBM, 2005.(2009)Malaria: A major cause of child death and poverty in Africa.
- [24]. WHO, (2013): Malaria vector control and personal protection: report of a WHO study group, Geneva, (2006).www.who.int/malaria/wmr2008,WHO 2012,lancet 2012.

1Masta Ondara Omwono "Factors Influencing The use of Itns Among The Jaggery And Tea workers In The Prevention of Malaria In South mugirango Sub - county, Kisii county,Kenya..". IOSR Journal of Nursing and Health Science (IOSR-JNHS) , vol. 7, no.1, 2018, pp. 61-68.