

# The Level of Adoption of Malaria Prevention Strategies on Pregnant Women in Sauri, Siaya sub county, Kenya

Rahma Udu<sup>1</sup>, Dan Ochieng<sup>2</sup>, Donald Apat<sup>3</sup>

<sup>1</sup> Technical University of Mombasa. P.O. Box 90420 Tom Mboya Street, Tudor. Mombasa- 80100 Kenya

<sup>2</sup> Jomo Kenyatta University of Agriculture and Technology, Mombasa Campus, Kenya

<sup>3</sup> Mellenium Promise-UNOPS, Kisumu, Kenya

## Abstract

In 2009, the government established Kenyan National Malaria Strategy (KNMS) 2009-2017 to fight malaria yet the prevalence is still high in endemic zones. The objective was to investigate the effect of Malaria Prevention Strategies in Pregnant Women in Siaya County, Kenya. Cross-sectional survey design was employed and the study targeted pregnant women aged 15- 49 years coming to public health facilities for routine antenatal care services. Data collected was cleaned and keyed into an MS Excel spread sheet then exported to SPSS version 20 for analysis. The findings were presented using frequency tables, bar charts and pie charts. Binomial regressions was done to show the interactions between the independent variables on dependent variables. The regression analysis was done at 95% confidence level. The study found that the adoption of two methods of malaria prevention in women, Insecticide Treated Netss and Intermittent Pregnancy Treatment with Fansidar, are not up to the recommendations of the WHO. However, Indoor Residual Spraying was effectively implemented. The findings of the study shed light on the uptake of malaria prevention initiatives and reflect on the effectiveness of these strategies and thereafter influence policy for improvement of the implementation of malaria prevention strategies.

**Key words:** *malaria incidence, Pregnant Women, Insecticide Treated Nets, Intermittent Pregnancy Treatment, Indoor Residual Spraying*

## 1. Introduction

Each year, more than 30 million African women in malaria endemic areas become pregnant and are at risk of infection with *Plasmodium falciparum* [1, 2]. This results in high prevalence of patent parasitemia and clinical malaria [3, 4] in pregnancy. Every year in Kenya, an estimated 6,000 pregnant women suffer from malaria-associated anemia, resulting in approximately 4,000 babies born with low birth weight, thereby affecting their survival. 170 million working days are lost annually due to malaria [5]. Malaria during pregnancy causes up to 10,000 maternal deaths each year and contributes to high rates of maternal morbidity including fever and severe anemia, especially in first time mothers [6, 7]. It is also a cause of low birth weight and placental parasitaemia [8, 9]. This is a huge economic burden nationally, as well as to families and individuals [10]. Despite the high prevalence of malaria, there are various interventions employed by the government. In 2008-2012 Strategic Plans, the Ministry of Public Health and Sanitation (MOPHS) stated its goal of "reducing malaria incidence to 15% through utilization of cost-effective control measures". Prevention of Malaria in pregnancy in Lake and Coast endemic regions through Intermittent Presumptive treatment among pregnant women, Vector control using Long Lasting Insecticides Nets (LLINs), Indoor Residual Spraying and other Integrated Vector Management strategies [11]. In collaboration with partners, the government has developed the 10-year Kenyan National Malaria Strategy (KNMS) 2009-2017 which was launched on 4th November 2009. The goal of the National

Malaria Strategy is to reduce morbidity and mortality associated with malaria by 30% by 2009 and to maintain it to 2017 [12]. Despite considerable efforts to control malaria, it is still the most prevalent and devastating disease in Kenya and tropical Africa. The operational and geographical coverage of these interventions has been scaled up in Kenya in the past decade, yet it has not had the desired results (KNMS) 2009-2017. This may be attributed to a large extent on poor uptake of the interventions by the targeted communities and general population. Despite the aggressive awareness creation about malaria, the requisite behavior change has not taken place to elicit voluntary practices for malaria prevention and control at individual, household and community levels. Despite the distribution of over 10 million treated mosquito nets in the year 2011/2012, the net use practice is a paltry 32%. This is worrying to all of us and we must find ways and means to improve this situation [12]. In 2009, the government established Kenyan National Malaria Strategy (KNMS) 2009-2017 to fight malaria yet the prevalence is still high in endemic zones. The most hit groups are the children under age of 5 and pregnant women. With paucity of data on prevalence of malaria in pregnant women in the endemic zones makes this study urgent. This study was undertaken to provide part of the much needed baseline data to effectively plan and control malaria especially among the population at risk, the pregnant women. Data on the reduction of malaria prevalence on pregnant women remain scanty. This study has potential to provide the much

needed information which has capacity to act as a yard stick in fighting malaria prevalence.

**2. Materials and Methods**

**2.1 The Study Area**

Siaya County falls within the malaria-endemic zone on the eco-epidemiological map of Kenya. It covers 132 square kilometers. Siaya’s well-watered humid and semi-humid zones support arable agriculture and hence a high population density. Siaya’s subsistence farmers rely on maize and beans as their staple crops.

**2.2 Research Design**

Cross-sectional survey design was employed, with both quantitative and qualitative approaches to source, process and analyze the requisite information. The quantitative approach elicited quantifiable and numerical data from pregnant women, which were used to generate descriptive and inferential results.

The Figure 1 below represents the conceptual frame work adopted by the study. The relationship between the independent variables (intervention strategies and the dependent variable (prevalence of malaria). The moderating variables have been shown to have a weak link with the independent variable although; they affect the prevalence of malaria.

**Dependent Variables    Independent Variable**

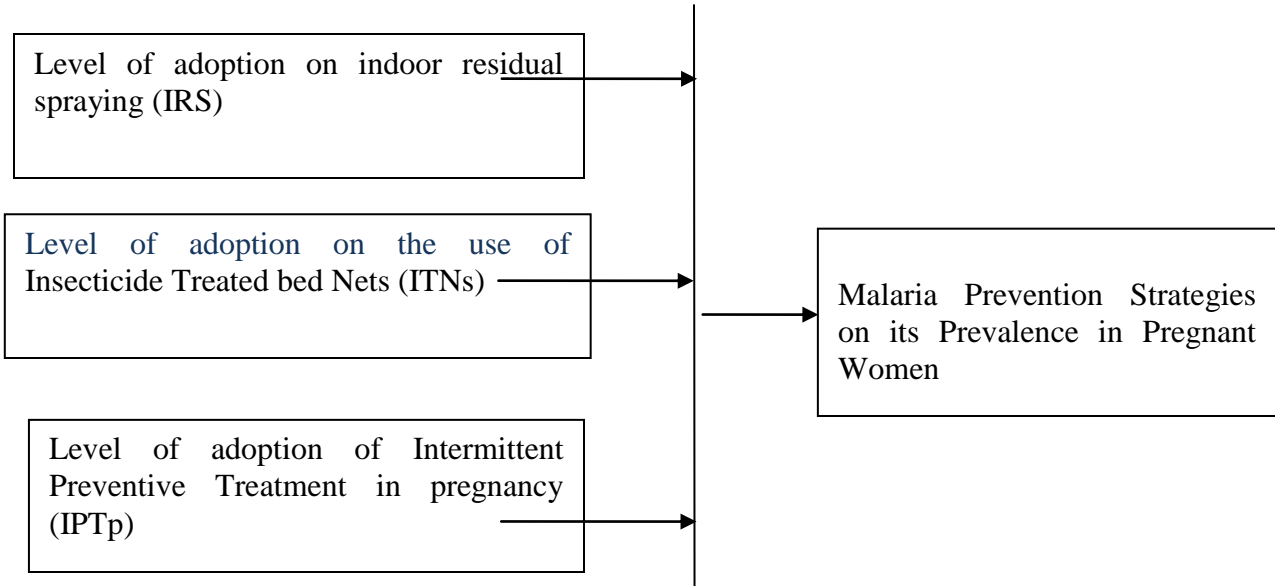


Figure 1: Conceptual framework showing independent variables vs dependent variable.

### 2.3 Target Population

The study targeted pregnant women coming to public health facilities, including dispensaries, health centre's, as well as sub-district and district hospitals for routine antenatal care services in Sauri Sub County. According to the 2009 Population and Housing Census, the District had a population of 64,960 of which 14,970 are women in the reproductive age that is 15-49years. Only pregnant women were targeted by blood screening of Malaria. Pregnant women aged 15 to 49 years, who had gestated for at least six months (24 weeks) and consented to participate in the study voluntarily. WHO recommends that pregnant women should access IPT<sub>p2</sub> within the 20<sup>th</sup> week of pregnancy. By pegging the inclusion criterion at 24<sup>th</sup> week, the study provides an allowance for late clinic attendees, who may have not accessed the second dose within the recommended time. Women who were on co-trimoxazole prophylaxis and those who had received treatment for malaria during the pregnancy was excluded in the study.

### 2.4 Sample Size Determination and sampling process

With a finite population of 384 in mind, since the researcher was interested in pregnant women visiting the Sauri sub county Health Centre, all the women who visited the clinic for the period of the study participated in the study. The sample size was determined using the Cochran formula 1999 [13] to make sure it is statistically representative.

### 2.5 Data Collection Instruments

The Researcher applied a standard survey questionnaire to source information through exit interviews with pregnant women. Among other information, the questionnaire captured data on socio-demographic and economic attributes, knowledge of ITNs, IRS and IPT<sub>p</sub>, ANC clinic attendance, health education attendance, ITNs and IRS use, IPT<sub>p</sub> uptake as well as perceptions about various aspects of the IPT<sub>p</sub> intervention. The questionnaire was translated into Swahili language to facilitate communication, ease its implementation and standardize responses. The questionnaire was pre-tested in September 2016 at Yala Health Centre using 32 respondents, with each member of the team conducting four interviews. The researcher applied the split-half technique to estimate reliability of the instrument.

### 2.6 Data Processing and Analysis

Data processing involved coding open-ended and multiple responses, digitalization and cleaning for misplaced codes. Microsoft Excel was used to analyze and process the data. Data was presented using narration, pie charts, bar graphs and tables. For some variables, the researcher transformed the scale of measurement to suit the chosen analysis techniques.

In order to assess the respondents' knowledge on IPT<sub>p</sub>, the responses to questions on the definition of IPT were rated as: 1 (very good) if respondents defined IPT as treatment for prevention of malaria during pregnancy, recognize SP as the drug of choice and the correct interval for IPT treatment. Respondents were rated 2 (average) if they knew that IPT was given to prevent malaria during pregnancy or that IPT is the use of SP during pregnancy and 3 (poor) if respondent could not define it correctly.

To further investigate the timeliness of ANC attendance, a categorization of 'early first attendance' was defined as a first visit to ANC at or before 4 months gestation, and those registering at fifth month till delivery were considered as "late first attendance"[14]

### 2.7 Ethical Considerations

The ethical clearance for the study was sought from the Pwani University Ethical Review Committee. The study participants were provided with consent forms prior to participating in the study and participation was completely voluntary. All participants consented after by fully explaining purpose of the study, potential benefits, and the fact that their participation was voluntary. The researcher also informed participants about their right to withdraw or consent at any time during the process without a penalty. Respondents were assured that the data collected would be for purposes of the study and would be treated with uttermost confidentiality. We avoided information on personal identifiers, assured participants that we would use the information for research purposes only, with access limited to the investigators only.

### 3. Results and Discussion

#### 3.1 Demographic and Social characteristics of the respondents

By age, 153 respondents, corresponding to 43 % of the women fell within the 20-29 age bracket, 162 (46%) were aged between 30 and 39, while 39(11%) were 40 years or older.

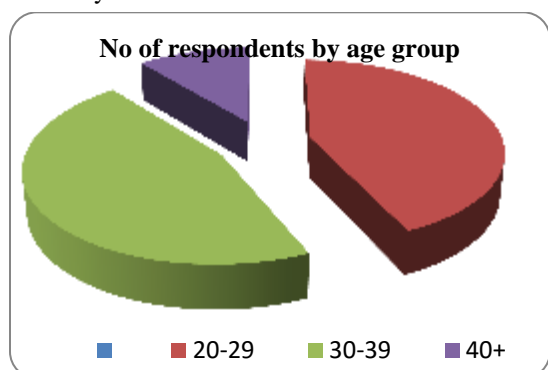


Figure 2: Demographic characteristics

In terms of the level of education, 15 (4%) of the respondents had a university education, while 60 (17%) had a tertiary level education. 190 (54%) of the respondents had secondary level education while 70 (20%) had primary level education. Nineteen (5%) of the respondents had no education at all. In terms of marital status, majority of the respondents were married. 240 (67%) were married with 81(22%) being single women. Thirty (8%) of the women were divorced while 13 (4%) were widowed. For income status, 244(70%) had low income(between 0-15, 000), 79(22%) with medium income(between 15, 000 to 45, 000) and 31(8%) with high income(more than 50 %). The income was categorised as asuch based on the economic status of the community at the time. Majority of the respondents were pregnant women, in the age bracket 30 - 39 years . The majority group is composed of young adults who have secondary level education and those in marital unions and in low income status (Table 1)

Table 1: Socio-demographic characteristics of the respondents in percentages

	Number (n)	Percentage (%)
<b>Age category</b>		
20 – 29 years	153	43
30 – 39 years	162	46
40 and above	39	11
<b>Level of Education</b>		
None	19	5
Primary	70	20
Secondary	190	54
Middle college	60	17
University	15	4
<b>Marital Status</b>		
Married	240	67
Single	81	22
Divorced	30	8
Widowed	13	4
<b>Income Status</b>		
Low	244	70
Medium	79	22
High	31	8
<b>Religion</b>		
Christian	230	66

Muslim	81	22
Traditional	30	9
Others	13	3

This study found that demographic factors such as gender, age, and marital status, level of education and level of income were associated to Malaria preventive strategies uptake. The uptake was highest among ages 20 –29 years and lowest among those aged 40 years and above. The considerably increase of Malaria preventive uptake in this age category can be attributed to the fact that this is the prime child bearing age for women in this region and most of them are accessing reproductive health services for them and their babies. These young women (20 – 29 year) have also received increased sensitization on reproductive health issues in schools.

Married women had the highest concern uptake (29.2%). This could be probably because of the increased awareness about their responsibility in being healthy enough and live longer to take care of their children to adulthood. Married women are more cautious of malaria prevalence than single respondents.

The uptake was highest among respondents with middle college education (41.7%) and University education (33.3%) while it was lowest among respondents with no education (15.8%). Respondents with higher level of education had highest screening uptakes due to increased awareness on Malaria and screening services by the media and college curricula

compared to their primary school counterparts. The uptake was highest among those with middle income (50.6%) and lowest among those with low income (19.7%). According to WHO (2000), the high cost of Malaria preventive strategies especially in developing countries is a big hindrance to the uptake of such services by women. Those with highest economic status usually opt to use intergrated malaria preventive strategies .

### 3.2 Data on uptake of ITNs

On the level of adoption of ITNs, the respondents were asked whether they used mosquito nets or not. To this, 194 respondents representing 55% of the women said that they used the ITNs. 160(35%) of the women said that they did not use ITNs. Of the women who said that they used nets, 150 of them, representing 42 %, used treated nets. Forty four (12%) of the women did not use treated nets. Of those who used treated nets, 40 (11%) said that they treated their nets twice a year, 100(28%) treated their nets yearly while 10(3%) said that they treated their nets after one year. Those who did not use nets reported such as reasons as nets not having been distributed to them from the ANC visits in the hospitals, the fact that nets generate heat at night, especially during the hot season and some said that they used the nets that they were given for some other reason, for example to fence around a kitchen garden

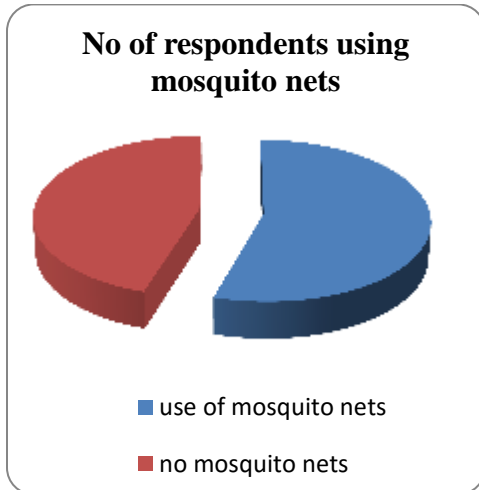


Figure 3: Showing use of mosquito nets

Insecticide treated nets have been established to kill mosquitoes which cause malaria and have repellent properties that decrease the number of mosquitoes which enter the house [15]. ITNS have been documented to be twice as effective as untreated nets

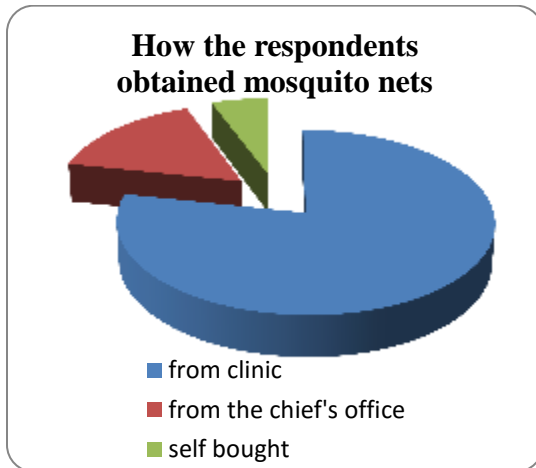


Figure 4: Showing where the respondents obtained their nets from

The mothers were also asked the distance from their homes to the clinic they attended. Nine (3 %) women said that they lived within 5 kilometers of the clinic, 83(23%) lived within 5-10 kilometres, 48(14%) respondents said that they lived between 10-15 km while 4(1%) said that they lived more than 15 kilometers.

On the source of health information, 134(38%) respondents responded that they obtained health information from radio stations, 15(4%) from

[16]. ITNs also offer a high degree of protection, about 70 % better than no nets [17]. According to [18], mosquito nets should be treated atleast once a year. In areas in which mosquitoes are present throughout the year, mosquito nets should be treated atleast twice a year.

Regarding the means through which they obtained their nets, 152 (43%) said that they obtained the nets in the antenatal clinic. Thirty one (9%) of the respondents obtained their nets from the chief's office, while 11(3%) purchased their nets. Asked whether they ever purchased a net, 100(28%) women responded that they have ever done so, while 254(72%) responded that they have never purchased nets. All of the women said that they bought the nets at a cost Kshs 250.

Concerning their opinion on how they had been treated by the healthworkers, 265(74%) said they had been treated in a friendly manner, Sixty three (18%) said that they had been treated by health workers in an unfriendly manner.

television, 70(20%) from the health facilities, 80(23%) from friends and 11(3%) from partners.

### 3.3 Data on level of adoption of Indoor Residual Spraying

The respondents were asked whether their residential areas had been sprayed with insecticides in order to protect them from malaria. Three hundred and fifteen(89%) of respondents said that their houses had been sprayed, while 39, corresponding to 11 % said that their residential places had not been sprayed. All the respondents who said that their houses had been sprayed said that it had been done courtesy of the government during the house- to- house spraying campaigns.



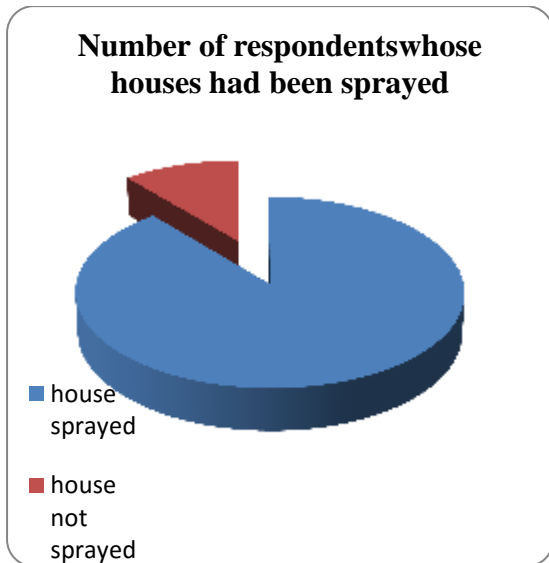


Figure 5: Showing the proportion of houses sprayed with IRS. Asked whether any member of their family had a problem with the sprays, 333(94%) of the respondents replied that none in their families had any issues with the chemicals while 21(6%) responded that some in their family had allergy problems like asthma and allergic rhinitis and that it made the houses stuffy and triggered allergic reactions. Others said that they were concerned about their pets which they said suffered from the effect of the sprays.

The evidence from randomized comparisons of IRS versus no IRS confirms that IRS reduces malaria incidence in unstable malaria settings [19]. However, for IRS to be effective, at least 80% of homes and barns in an area must be sprayed [20].

### 3.4 Data on use of IPTs

When asked whether they had taken their IPT dose during this pregnancy, 311(88%) said that they had. Forty three(12 %) said that they had not taken even a single dose of IPT during their current pregnancy. One hundred and eleven(31%) said that they had taken one dose, 134 (38%) had taken two doses and 66(19%) had taken three doses so far. The above data is significant with the background information that 98(28%) of the respondents started visiting ANC in their first month of pregnancy, 100(28%) in their second month, 118(33%) in their third month and 37(10%) in their fourth month. 24 (7 %) started ANC visits in their fifth month while another 14(4%) started visiting in their sixth month. One hundred and twenty one(34%) of the respondents were in their 1st trimester, 201(57%) in their second trimester and 63(18%) in their third trimester.

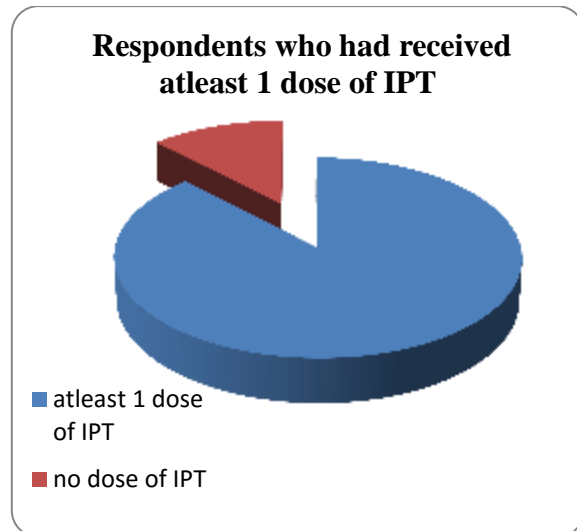


Figure 6: Showing proportion of respondents who took atleast one dose of IPT

The respondents were asked whether they experienced any side effects from IPT. Thirty four(10 %) of them said they experienced some undesirable effect, some of which include nausea. Three hundred and twenty(90 %) did not report any side effects of the medication, or said that any effect they might have felt was minor and did not warrant any complaint about the medication.

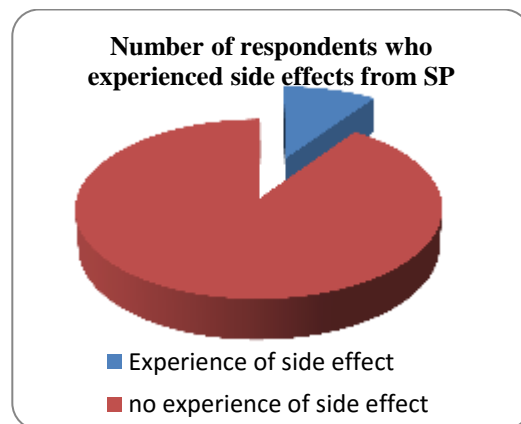


Figure 7: Showing proportion of respondents who had experienced side effects of SP

Asked about whether they took the medication under observation from the healthcare workers(DOT), 298(84%) said that they did after nurses insisted they take the medication on the spot. 16 percent requested to take medication at home because they had some complication at the time, mostly nausea. Eight(8) percent of the women said that they were not comfortable with the use of cups provided in the clinic, citing that they were not sure of their cleanliness, especially because they were shared. They preferred to take the SP at home instead with water and cups which they were sure were clean.

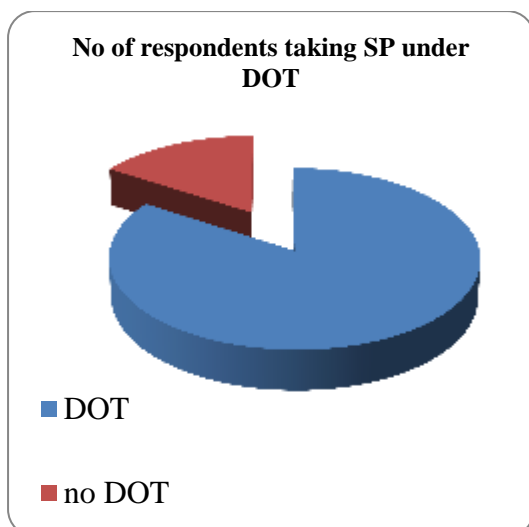


Figure 8: Proportion of respondents who took SP under DOT

In a study in Tanzania, one of the district medical officers interviewed opined that the DOT scheme would be effective if the problem with the shortage of clean water and sharing of cups in the clinic at peripheral health facilities was solved. This was alluded to in this study whereby respondents said they would be willing to take the IPTp medication in the clinic if they were allowed to bring cups and water from home [21].

The respondents were also asked whether they thought IPT was effective for prevention of malaria. Two hundred and fifty one (71%) responded that they considered the tabs effective for prevention of malaria. Twenty nine percent responded that they did not think that the tabs would be effective for prevention of malaria, because they knew SP is no longer the drug of choice for treatment of malaria.

According to studies, when SP is administered in the 2nd or 3rd trimesters, there is consistent data showing safety and effectiveness for the protection and against placental and peripheral malaria infection as well as anemia during pregnancy [22]. It is also effective in reducing the incidence of low birth weight. In areas which are malaria stable, endemic malaria transmission should receive two to three doses of SP as intermittent therapy for prevention. The World Health Organization recommends at least two doses of SP of sulfadoxine, 500 mg and pyremethamine, 25 mg to be given to expectant women after quickening with the subsequent dose not given before one month after the previous one, and all given before the last month of gestation [22].

## 4.0 Conclusions

### 4.1 Data on level of adoption of the ITNs

From the above results, it was evident that only 31 percent of pregnant women used nets properly (those who treated their nets once or twice a year). In other words, only thirty one percent of respondents in this study have met the WHO recommendation on use of ITNs. This proportion is very low. Majority of women are thus vulnerable to malaria despite the fact that the nets being used are free. This improper use of nets is likely due to lack of awareness on the use of ITNs.

The proportion of pregnant women who do not have nets is almost half the number of women who used it in this study. The fact that the government distributes free mosquito nets should be a big boost to the distribution of nets especially to women who are poor and cannot be able to afford nets. However, despite this fact, many pregnant women did not use mosquito nets. Predominate reasons for not using nets included heat generation by nets and inappropriate use of nets. A good proportion of women also said they were not given nets at the clinics.

In a study by [23] discomfort, primarily due to heat, and perceived (low) mosquito density were the most widely identified reason for non-use. Social factors, such as sleeping elsewhere, or not sleeping at all, were also reported across studies as were technical factors related to mosquito net use (i.e. not being able to hang a mosquito net or finding it inconvenient to hang) and the temporary unavailability of a normally available mosquito net (primarily due to someone else using it).

It can be concluded that the study findings show that the level of adoption of ITNs is below that which studies have demonstrated to be effective for the prevention of malaria in pregnancy.

### 4.2 Data on level of adoption of indoor residual spraying

On indoor residential, the findings from this research found that the coverage of spraying satisfied the minimum limit recommended by WHO for effective parasite control [24]. While WHO recommends 80 percent, the area had a higher level of up to 94 percent. With low parasite population, the complementary effect of the other strategies may be decisive in helping reduce the prevalence of malaria among pregnant women in the sub-county.



### 4.3 Data on level of adoption of intermittent preventive treatment

While 88 percent of the women who participated in the study had taken at least one dose of IPT, the percentage of the women who had completed the three doses as recommended by the MOH was only 19 percent. The percentage of women who had taken up to two doses was 69 percent, and it is not easy to tell what percentage will complete the three doses as recommended by the MOH.

Among the women who reported to have requested to have the medicine to take at home, some had complained about the water being unclean and the hygienic condition of the cups as suspect. This is an impediment towards ensuring that pregnant women take the medication under DOT. It is not easy to determine what percentage of the women who requested to carry the tabs home actually did take them.

With majority of the mothers starting clinic within one month of pregnancy, it is easy for clinicians to have them start the IPT around the time of quickening as recommended by the MOH. When the IPT is started as recommended by the MOH, it is expected to yield higher success rate in terms of preventing malaria infection in pregnancy, and it is easy to spread the duration within which the three doses are taken to comply with MOH guidelines.

## 5. Recommendations

Based on the conceptual framework and the evidence gathered from the findings of this study, the following are recommended.

First, concerning ITNs, there is need to improve the utility of ITNs among pregnant women. For the part of the problem resulting from lack of information, the Ministry of Health should continue to mobilise resources to educate the society, with special focus to pregnant women and their families on the relationship between ITNs and malaria prevention. Diverse forms of media should be used, including television, flyers, radio, billboards, lively health talk events etc. These are important instruments to help the message pass across to the women.

Education can also be used to address the issue of some women who have nets but failing to use them appropriately. Health messages with information on how malarial parasites can pass from one person to another should be packaged well so as to attract the attention of the women. The onus lies with the Ministry of Health to ensure that literature provided address the real problem causing misuse or lack of use of the nets that are provided by the government. Some women complained that they did not get ITNs during their clinic visits. This could be either due to the fact that less number of nets are provided by the

government for distribution to the many pregnant mothers visiting clinics, or the chain of distribution of the nets is inefficient. The MOH should audit the source of the problem and address it adequately. Where the nets being issued by the government do not reach the mothers who are their intended recipients, there should be accountability structures to ensure that the problem is curbed. If however, the number of nets issued from the MOH is not enough, the government should do something to ensure that the number of nets is equivalent to the number of women.

Secondly, the government should continue to encourage efforts at indoor residential spraying. The synergy provided by the three strategies can go a long way in curbing malaria infection among pregnant women. While the coverage of spraying was satisfactory, the timing of the homestead visits should be friendly to the residents. This will allow co-operation from the communities where the activity is being carried out.

Thirdly, IPTp as a third line measure is very important where there is possibility of ineffectiveness of the first two methods. At the government level, MOH should tailor information targeting women who may not have information regarding the effectiveness of IPTp in preventing malaria infection. The study found out that some women are hesitant to comply with IPTp recommendations because they do not believe that it can treat malaria.

At the facility level, the clinicians issuing IPTp should be educated on the appropriate ways give IPTp to ensure that pregnant women actually take them. DOT should be facilitated at the delivery point, and capacity should be created so that high standards of hygiene may not be a deterrent to some women declining to take the tablets as DOT.

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## Conflict of interests

The authors declare that they have no competing interests.

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