

## Trends of malaria prevalence in under-five's and pregnant women at Kasama general hospital, Kasama district, Northern Zambia

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### ABSTRACT

**Introduction:** Globally, malaria accounts for 429,000 deaths, it accounts for up to 40% of all infant mortality and 20% of all maternal mortality in Zambia. In accordance to WHO, the Zambian government came up with the National malaria Strategic Plan in an urge to completely eradicate the malaria cases in Zambia by 2030. This study aimed at determining the trends of malaria prevalence from 2011 to 2015 in under-fives and the pregnant women including the practices in its prevention. **Methods:** A cross sectional study design was employed. A standardized questionnaire was used on 347 participants sampled randomly using 1/k to determine the practices of pregnant women in the prevention of malaria. Analysis of data was done using SPSS V 20. **Results:** The findings indicated an increase in the prevalence rate in under-fives though it was not significant at 95% confidence interval (*P-value* 0.0980) whereas there was a significant reduction in the prevalence of malaria in the pregnant women (*P-value* 0.03). The results indicated a poor practice with 36.8% not utilizing the preventive knowledge well. **Conclusion:** There was an elevation of malaria prevalence rate in under-fives as opposed to that of pregnant women. Thus, there is need to sensitise the people about malaria and its preventive measures in order to eradicate it.

**Key Words:** Kasama general hospital, Malaria, Prevalence, Kasama, Pregnant women, under-fives

### Introduction

Malaria is an endemic disease that is caused by a parasite that is passed from one human to another by the bite of infected anopheles mosquito. It is not only transmitted by the anopheles mosquito but can also be congenitally acquired, in addition to this; it can as well be acquired through blood transfusions. The parasites after multiplying inside the red blood cells break open within 48 to 72 hours, infecting more red blood cells [1]. Approximately half of the world's population is at risk of malaria. There are less cases of malaria in Latin America, Asia Latin America, Middle East and some parts of Europe. Sub-Saharan Africa records the most cases and deaths. 97 countries and territories had ongoing malaria transmission in 2014 [2].

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According to the world malaria report of 2014, an estimated 3.2 billion people in 97 countries and territories are at risk of being infected with malaria and developing disease, and out of 3.2 billion, 1.2 billion are at high risk. The latest estimates show that 212 million cases of malaria occurred globally in 2015. Malaria is one disease that affects the whole of Africa and largely Zambia with a higher maternal mortality and child mortality rates. According to the millennium development goals review of 2010, malaria incidence in Kasama had increased to 290 cases per 1000 admissions and the malaria case mortality fatality increased to 27 cases per 1000 admissions [3-5]. Specific population risk groups include children who have not yet developed immunity against malaria, immune pregnant women, semi immune pregnant women in areas of high transmission, semi immune HIV infected pregnant women in stable transmission areas and immigrants from endemic areas and their children living in non-endemic areas visiting endemic areas. Though deadly, Malaria can be cured by the use of drugs such as mefloquine, doxycycline, chloroquine,

hydroxychloroquine or atovaquone-proguanil if diagnosed early and is also very much preventable. Some of the methods of prevention of malaria include the use of insecticide treated nets, indoor residue spraying and the use of prophylactic drugs in the pregnant women [6]. Zambia as a country has adopted some of these preventive methods in order to reduce the prevalence of malaria and to completely eradicate the prevalence of malaria by the year 2030. To effectively implement this, the Government of the republic of Zambia has come up with the national strategic plans. Under the sixth strategic plan which was scheduled to end in 2015, increased use of long and lasting insecticide treated nets, indoor residual spraying, improved treatment therapy, prevention of

malaria in pregnancy, improvements in diagnosis using microscopy and Rapid Diagnostic Tests (RDTs) and home management of malaria were implemented [7]. Though there has been the implementation of all these strategic plans, there has been little or no impact on the prevalence of malaria at Kasama General Hospital. After the implementation of the first four strategic plans, there was an observed decline in the prevalence of malaria. However, in the fifth strategic plan, there was a reduction in the prevalence of malaria in the first three years then there was an upsurge in the last two years [7]. Therefore, the present study aimed to determine the trends of malaria prevalence in under-five's as well as pregnant women from 2011 to 2015 at Kasama General Hospital.

## Methods

### Study Site

The study was conducted at Kasama General Hospital located in Kasama, Northern Province, Zambia. KGH is the referral Centre for most of the cases in Northern Province. Therefore, the site covers a large area.

### Study Design

The study utilized a cross sectional study design that aimed at determining the five years' and pregnant

### Sample size

Using the formula below, the study enrolled 348 participants. However, only 307 responded, giving 88.2% response rate.

$$\text{Sample size} = \frac{n}{1 - \frac{n}{\text{population size}}}$$

$$n \text{ is } \frac{Z^2 \times P \times (1-P)}{C^2}$$

Where

P is an estimate of prevalence to be expressed in decimal,

Z = 1.96 and

C being the confidence interval (5%) expressed as a decimal 0.05.

### Data collection

The prevalence was gotten from the hospital registry books for obstetrics and gynecology and the pediatrics department. A standardized questionnaire was also used to determine the practices of pregnant women.

### Data analysis

Data was entered and analyzed using SPSS V20 and excel (megastat). SPSS V20 was used for descriptive statistics, whereas Microsoft excel (megastat) was employed to determine linear regression. A binary logistic regression was done to evaluate the relationship between residence and the practices at confidence interval of 95%.

## Ethical considerations

Approval to conduct this study was obtained from The Tropical Disease Research Centre (TDRC) Ethical Review Committee,

## Results

The study enrolled a total of 34,142 cases of which 15,386 were from the obstetrics and gynecology department and 18,306 were from the pediatrics department (under-five's). Of all these participants a total of 8,406 and 656 had malaria in pregnant women and under-five's respectively.

The sample size for the study was 348. The samples were systematically selected using 1/k and the response rate was at 88.2%. The demographics showed that 55.7% of the participants were from high density areas, 17.3% from middle density areas, 26.7% from low density areas and 0.3% did not indicate anything. (Figure 1). Most of the participants were between the ages of 21-25 (29.6%), as shown in figure 2

Tables 1: shows the prevalence of malaria in the obstetrics and gynecology department for only pregnant women in the years 2011 (61%), 2012 (57.3%), 2013 (58.9), 2014 (47.9%) and 2015 (39.6%). The prevalence was found to be significantly reducing (**P-Value** 0.03) at 95% confidence interval with a coefficient (estimate slope) of -5.1660 as shown in figure 3.

Table 2 shows the trends of malaria in the under-five's at Kasama General Hospital from the year 2011 (2.3%), 2012 (5.6%), 2013 (2.1%), 2014 (6.3%), and 2015 (2.3%). Figure 4 indicates an increase in the prevalence rate of malaria though it was not statistically significant.

Table 3 shows 55.9% of participants hailing from a high density area. Although 93.5% agreed to own a mosquito net, only 85.3% of the participants were

given the nets by the hospital and only 46.6% slept under them at all times, and 47.5% of them occasionally. In the current study 42.7% of participants checked for the holes in their ITNs and repaired them. The findings also indicated that 89.9% of the participants had their houses sprayed by the MOH in the past 5 years of which 34.5% of the participants had their houses sprayed at least 3 times in those five years. Over half (67.4%) of the participants denied using mosquito coils (67.4%) though 32.6% of the participants used anti-mosquito spray on a daily

basis. Of all the participants only 3.3% denied the clearing of bushes around them and 2.6% denied the clearing of stagnant water. Most of the participants (47.7%) attended their first antenatal visit in the second trimester and 90.8% of them received IPT and all ingested it as shown Table 4 shows the practices towards malaria prevention of women attending antenatal at Kasama general hospital. The results indicated that only 36.8% had poor practice of malaria preventive measures..

■ low density ■ middle density ■ high density

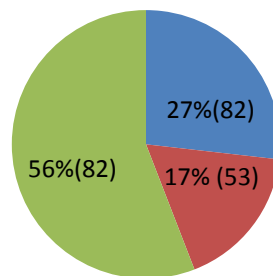


Fig 1: Pie chart representing the participants’ residential areas

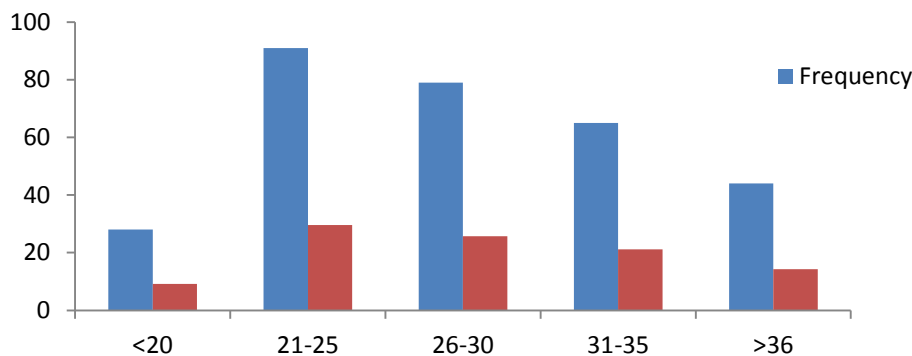


Fig 2: Bar graph showing the participants’ ages

Table 1: Prevalence of Malaria in Obstetrics and Gynecology at Kasama General Hospital

Year	Patients diagnosed with malaria	Total attendance	Prevalance
2011	2430	3972	61.0
2012	1812	3165	57.3
2013	2133	3623	58.9
2014	1117	2333	47.9
2015	914	2293	39.9

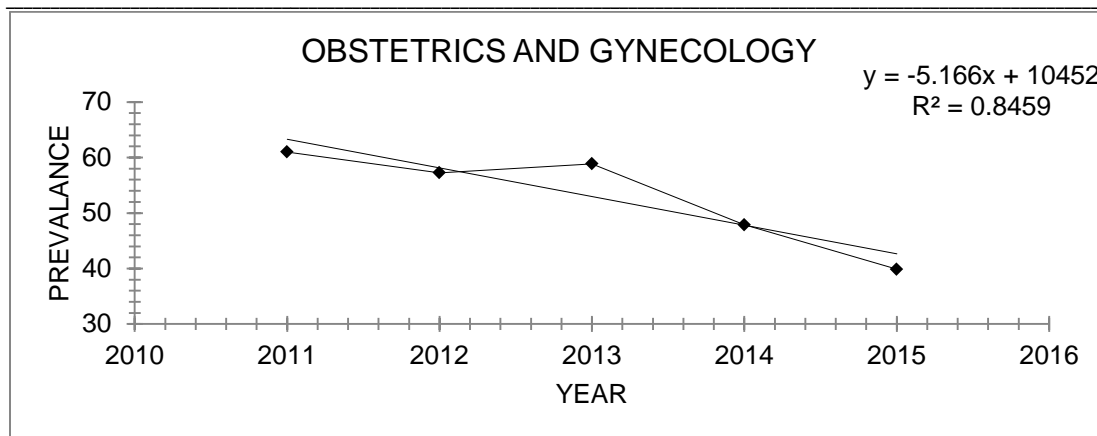


Fig 3: Malaria Trends in the Obstetrics and Gynecology Department

Table 2: Prevalence of Malaria in under-five's at Kasama General Hospital

Year	Diagnosed with malaria	Total attendance	Prevalance
2011	66	2890	2.3
2012	168	3011	5.6
2013	101	4906	2.1
2014	144	2298	6.3
2015	177	5201	2.3

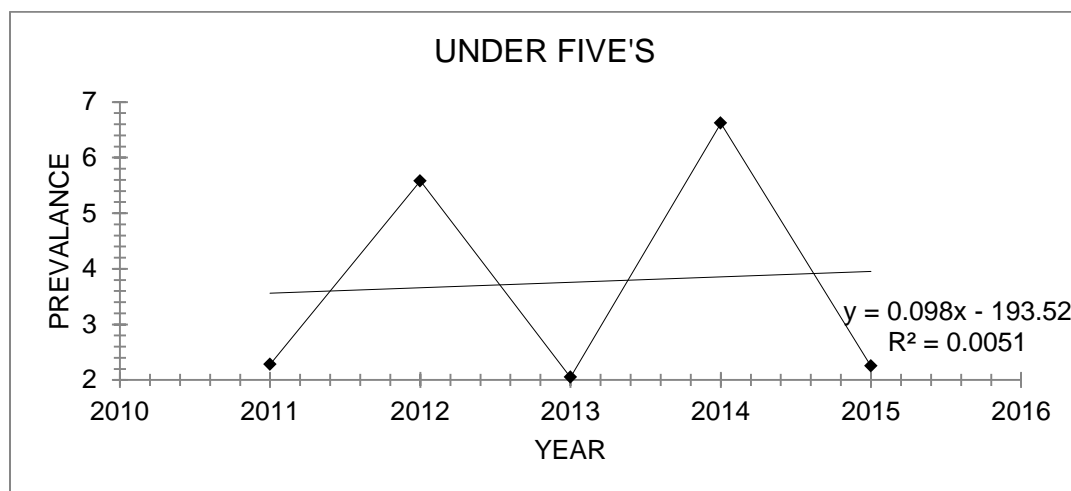


Fig 4: The Malaria Trend in Under-Fives from Pediatric Department

Table 3: The Descriptive Statistics For The Implementation Of The Sixth National Malaria Strategic Plan and the Practices Of People At Kasama General Hospital In Women Attending The Obstetric Clinic +/- Malaria

	Response	Frequency	Percentage %
Own a mosquito net	Yes	287	93.5
	No	20	6.5
Mosquito net given by hospital	Yes	262	85.3
	No	45	14.7

How often do you sleep under an ITN	Always	142	46.6
	Sometimes	145	47.5
	Never	18	5.0
Frequency of household members sleeping under an ITN	Always	131	42.7
	Sometimes	157	51.1
	Never	19	62.2
How often do you check for /repair your ITN	Always	101	32.9
	Sometimes	165	53.7
	Never	41	13.4
IRS by MOH	Yes	279	88.9
	No	32	10.4
How many times house has been sprayed	1	26	8.5
	2	39	12.7
	3	105	34.5
	4	84	27.4
	5	39	12.7
	6	6	2.0
	7	3	1.0
	8	1	0.3
	9	1	0.3
	10	2	0.7
Use of anti-mosquito spray	Always	100	32.6
	Sometimes	181	59.0
	Never	25	8.1
Use of mosquito coils	Yes	93	30.5
	No	210	68.9
Frequency of use of mosquito coils	Always	29	9.2
	Sometimes	69	22.5
	Never	207	67.4
Clearing of bushes	Always	114	37.4
	Sometimes	181	59.3
	Never	10	3.3
Frequency of clearing of stagnant water	Always	148	48.5
	Sometimes	181	48.9
	Never	8	2.6
Age of pregnancy at first antenatal visit	First trimester	131	45.0
	Second trimester	144	49.5
	Third trimester	16	5.5
Were u given prophylaxis	Yes	275	94.2
	No	17	5.8
Was the medicine ingested	Yes	278	94.2
	No	17	5.8

Table 4: Distribution of the Malaria prevention practices among respondents

	Frequency	Percent
Good practice(>12)	89	30.9
Fair practice(8-11)	93	32.3
Poor practice(<7)	106	36.8
total	288	100
Minimum=2	SD=2.908	
Maximum=16	Mean =9.594	

## Discussion

In this study the trend of malaria prevalence was seen to be significantly reducing in the pregnant women (obstetrics and gynecology) at a rate of 21.1% in five years (2011 to 2015). These findings are similar to a study that was done by Ebomwonyi et al [8] where the prevalence rate of malaria in pregnant women was also seen to be reducing. Though most women in our study had a poor malaria prevention practice, they all had a good practice in the intermittent prophylaxis treatment. This can be the reason for the reduced trend observed in our study. The current study also revealed a varying trend in malaria prevalence in the under-fives with an overall slight increase; however, the increase was not significant which is unlike what was seen in a study done in Nigeria where, the trend of malaria was seen to reduce. The reduction was attributed to the improvement in the malaria preventive measures and drug treatment of diagnosed cases [9]. Even though the same preventive measures are been implemented in Kasama, the lack of reduction in the trend can be attributed to the fact that their mothers have a poor practice. Despite the reduction in the trend seen in pregnant women, the prevalence rates were still higher than those seen in under-fives. This was in line with other studies where a lower prevalence in children than adults was established [10, 11]. This finding was different from other studies [12, 13] inclusively is a study that was done by Kalubula et al in Lusaka where the prevalence rates in the under-fives was more than that of the pregnant women due to the fact that under-fives have a more reduced immunity as compared to the elderly [12]. The disparity seen in our study can be assumed to arise from parents prioritizing the safety of their children. However, the results seen in this study need further study to establish why the rates in the pregnant women were higher.

## Limitations

There was a recall bias in most of the participants and a malaria test was supposed to be done on each patient to link their practices to their malaria results.

## Conclusion

A decrease in the trend of malaria prevalence was seen in pregnant women whereas there was an increase in under-five's. In addition to the interventions of the malaria strategic plan, there is need to educate people on the preventive practices of malaria if we are to achieve a malaria free zone by 2020.

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