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Preferences and Perceptions about Malaria Prevention methods in Kimasala – Solwezi-A cross sectional Study

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ABSTRACT

Malaria still contributes greatly to morbidity and mortality in Africa. Sub - Saharan Africa accounts for about 90% of all Malaria cases worldwide.In Zambia, Malaria contributes significantly to maternal deaths, maternal anaemia, premature delivery and low birth weight.The Government of the Republic of Zambia in conjunction with the National Malaria control centre has identified mass distribution of Insecticide treated mosquito nets (ITNs) along with improved coverage of Indoor residual spraying (IRS) as some of the key strategies to control Malaria . In order for Malaria prevention strategies to be successful, they must be acceptable to the community. A cross sectional study was carried out in Solwezi in Kimasala area of Zambia to determine the preferences and perceptions about mosquito nets, Indoor residual spraying, mosquito repellents and prophylactic medication. Knowledge about Malaria being preventable was high and mosquito nets were the most preferred method of Malaria prevention. Negative perceptions about Indoor residual spraying, mosquito repellents and prophylactic medication were generally low despite low awareness and ultilisation.

Key words: Preferences, Perceptions, Malaria, mosquito nets, Indoor residual spraying, mosquito repellents and prophylactic medication

Introduction

Malaria is a protozoa disease that is caused by a parasite which belongs to the genus plasmodium and is the world's most widely distributed infection [1]. It is endemic in 106 countries and contributes greatly to morbidity and mortality in Sub-Saharan Africa [2-3]. Annually, about 300-500 million malaria cases occur worldwide and these are responsible for an approximated 1 million deaths. Of these, at least 90% are in children below 5 years [4]. Estimates of The World Malaria Report, 2011 state that, Africa accounted for 81% of all the Malaria cases worldwide while South-East Asia contributed 13% of the cases. Zambia and Malawi along with 17 other African countries accounted for 90% of all World Health Organisation (WHO) estimated cases in 2006 [2].

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The economic burden and annual loss of economic growth due to Malaria in Africa in countries most affected has been estimated at $12 billion annually and 1.3% respectively [5]. Malaria also contributes significantly to maternal deaths, maternal anaemia, premature delivery and low birth weight in Zambia [6]. It is for this reason that many health strategies in tropical countries now focus on Malaria prevention and control. The Government of the Republic of Zambia in conjunction with the National Malaria control centre has identified mass distribution of insecticide treated mosquito nets (ITNs) and improved coverage of Indoor residual spraying(IRS) as some of the key strategies to control Malaria[7].Because human behaviour, vectors and parasites all play a role in transmission and control of Malaria, the effectiveness of Malaria control programs is therefore also determined by a number of human factors which include the acceptability and sustained use of various preventative measures[8]. Indeed sustained use is only possible when the various methods being employed are acceptable. Malaria prevention methods must also be considered in the

context of socio-cultural factors and beliefs as these tend to influence the preference, acceptability and perceptions about various methods [4] [9]. According to Charlotte Gryseels et al, human behavior in all its diversity and variability is not always sufficiently considered in prevention policies [10]. In a study in Eastern Ethiopia, Gobena et al, observed that out of the 27.8% respondents whose houses had IRS, 7.4% of them re-plastered their inside walls following the application of the chemicals [11]. This finding therefore necessitated the need to study the perceptions, misconceptions and myths about IRS and other Malaria prevention methods in a Zambian set up as these affect the successful implementation and effectiveness of malaria prevention strategies. This study focused on the preferences and perceptions about use of mosquito nets, mosquito repellents, indoor residual spraying and prophylactic medication as methods of malaria prevention in Kimasala area of Solwezi in Zambia.

Methodology

Study site

This study was conducted in Kimasala area of Solwezi district in Zambia.

Study design

This was a cross sectional and descriptive study.

Sample size

The following formulae was used to determine the required sample size

$$n = \frac{R^2PQ}{d^2}$$

Where: P was the estimated prevalence of knowledge: but since the estimated prevalence of knowledge was not known, **50%**was used.

R was **1.96**

D was the desired width of confidence interval: **5**

Q was (100-P) which is **50**

Therefore sample size was be 384

Correction to finite population size,

Population for Kimasala Ward according to the 2010 Census of Population National Discriptive Tables is 36,408 [12].

According to the 2010 census of population National Analytical report, 52.5% of the population are less than 18 years [13].

$$\text{New Sample Size (nSS)} = \frac{SS}{1+\frac{SS-1}{Pop}}$$

Where:

- SS is the Sample size calculated above i.e 384
- Pop is the actual population i.e 17,293

This gives 376

The Sample size therefore was 376. Out of the 400 questionnaires distributed, 383 were succefuly completed hence the sample size was 383

Sampling criteria

Simple convenient sampling was used.

Inclusion criteria

Only respondents who were above 18 years and willing to participate in the study were enrolled.

Exclusion criteria

Would be respondents less than 18 years were not enrolled in this study. Respondents not willing to participate were not enrolled.

Data tools

A 51 item semi structured interviewer administered questionnaire was used to collect data. The questionnaire was designed by the researcher. The researcher and his assistants administered the questionnaires to respondents separately.

The questions included among others the age and sex of respondents, marital status, knowledge about Malaria prevention and different methods used, preference for particular methods and perceptions about particular methods of Malaria prevention.

Data processing and analysis

After data collection, raw data was edited for completeness and consistency. It was then categorized and coded. Microsoft Excel 2013 was used for data entry while Statistical Package for Social Sciences (SPSS V 20.0)and Microsoft word 2013 were used for data presentation and analysis.

Ethical considerations

Clearance was obtained from the Tropical Diseases Research Centre (TDRC) Ethics Committeeof Zambia in Ndola and the Copperbelt University School of Medicine. Participants were assured of maximum confidentiality and information obtained from this study was only used only for research purposes. Verbal introduction was also made to the respondents and only those who agreed to participate were enrolled. Participation in the study was based on voluntary basis and no payments or any other form of incentives were offered.

Results

Questionnaire return rate

From a total of 400 questionnaires distributed, 383 respondents successfully managed to complete the responses. This gave a questionnaire return rate 383

/400 X 100 or 96%. The findings of this study are based on these responses.

Social demographic characteristics of the study population

The majority of participants were aged between 18 and 35 years i.e. 298 (77.8%). Participants aged between 36 and 50 years were 62 (16.2%) while those above 50 years were only 23 (6%). Females were the majority of respondents with a representation rate of 214 (55.9%) as compared to the males who had a 169 (44.1%) representation. Most of the respondents 218 (56.9%) were married while 144 (37.6%) were single and 9 (2.3%) were divorced. Of the total number of respondents, 12 (3.1%) were widowed. This is shown in table 1 below.

Table 1: Social demographic characteristics of the study population

Variable	Frequency	Percentage
Age (yrs.)	**N = 383**	
18 -35	298	77.8%
36 - 50	62	16.2%
Above 50	23	6%
	Total = 283	Total = 100%
Sex	**N = 383**	
Male	169	44.1%
Females	214	55.9%
	Total = 383	Total = 100%
Marital status	**N = 383**	
Married	218	56.9%
Single	144	37.6%
Divorced	9	2.3%
Widowed	12	3.1%

Preferences about Malaria prevention methods

A total of 361(94.3%) participants indicated that they knew that Malaria can be prevented and only 22 (5.7%) expressed ignorance about Malaria prevention. In assessing knowledge about different Malaria prevention methods, 373 (97.4%) respondents knew about mosquito nets while only 98 (25.6%) respondents knew about mosquito repellents. A total of 157 (41%) knew about IRS while 94 (24.5%) respondents expressed knowledge about use of insecticidesand32 (8.4%) knew about prophylactic medication. Respondents who indicated knowledge about other methods were 30 (7.8%). As for the preferred method of Malaria prevention, 320 (83.6%) respondents reported that they used mosquito nets while 39 (10.2%) used mosquito repellents and 90 (23.5%) used indoor residual spraying. A total of 52 (13.6%) respondents used insecticides while only 12 (3.1%) used prophylactic medication and 24 (6.3%) reported using other methods. The most cited reason for preferring a particular method was cost 283 (73.9%) followed by convenience87 (22.7%). Other reasons were reacting to a particular method, 16 (4.2%), association with health problems, 3 (0.8%) and other unspecified reasons 51 (13.3%). With regards to using other methods, 303 (79.1%) respondents expressed openness to using other methods.

Table 2: Preferences about various Malaria prevention methods

Variable	Frequency	Percentage
Do you know about Malaria prevention?	N = 383	
Yes	361	94.3%
No	22	5.7%
	Total = 383	Total = 100%
What method(s) of prevention do you know about?		
Mosquito nets	373	97.4%
Mosquito repellents	98	25.6%
Indoor residual spraying (IRS)	157	41%
Insecticides	94	24.5%
Medication	32	8.4%
Others	30	7.8%

What method(s) do you use?		
Mosquito nets	**320**	**83.6%**
Mosquito repellents	**39**	**10.2%**
Indoor residual spraying (IRS)	**90**	**23.5%**
Insecticides	**52**	**13.6%**
Medication	**12**	**3.1%**
others	**24**	**6.3%**
Reason(s) for preference		
Affordability	283	73.9%
Convenience	87	22.1%
Reacting to other methods	16	4.2%
Other methods are associated with health problems	3	0.8%
Other reasons	51	13.3%
Can you use other methods apart from the one(s) you use/chose?	N = 383	
Yes	303	79.1%
No	80	20.9%
	Total = 383	Total = 100%

Note: Respondents could choose more than one method

Perceptions about Mosquito nets

A total of 363 (94.8%) respondents reported having used a Mosquito net in the past while 20 (5.2%) had not. A total 298 (77.8%) respondents stated that they still used Mosquito nets even at present while 85 (22.2%) reported stopping to use Mosquito nets after using them previously. Some reasons cited for stopping to use Mosquito nets included; expense 65 (17%), not breathing properly 22 (5.7%), feeling of suffocation,15 (3.9%), failure to sleep,4 (1%) and other reasons 56 (14.4%).In terms of being comfortable when using a net, 34 (8.9%) respondents stated they did no breath properly, 29 (7.6%) respondents stated that they felt like suffocating and 21 (5.5%) cited loss of sleep while 9 (2.3%) stated that they felt restricted under a net. However, a total of 280 (73.1%) respondents reported being comfortable under a mosquito net.

Table 3: Perceptions about Mosquito nets

Variable	Frequency	Percentage
Have you ever used a Mosquito net?	N = 383	
Yes	363	94.8%
No	20	5.2%
	Total = 383	Total = 100%
Do you still use a Mosquito net?	N = 383	
Yes	298	77.8%
No	85	22.2%
	Total = 383	Total = 100
Reasons for stopping to use a Mosquito net		
Expense	65	17%
Can't breathe properly	22	5.7%
I feel like suffocating	15	3.9%
I can't sleep	4	1%
others	56	14.6%
Comfort when using a Mosquito net		
I feel comfortable	280	73.1%
I can't breathe properly	34	8.9%
I feel like suffocating	29	7.6%
I can't sleep	21	5.5%
I feel restricted	9	2.3%
Others	39	10.2%

Perceptions about Indoor Residual spraying (IRS)

A total of253 (66.1%) respondents had IRS in the past. Of these,248 (64.8%) stated they were comfortable with IRS and 35.2% were not. Reasons cited for not being comfortable IRS included; Thoughts that the chemicals were poisonous,33(8.6%),Reacting to thechemicals44 (11.5%), thoughts that the chemicals can cause cancer8 (2.1%), thoughts that the chemicals are not effective50 (13.1%) and other reasons19 (5%).

Table 4: Perceptions about Indoor Residual Spraying (IRS)

Variable	Frequency	Percentage
Have you ever had Indoor residual spraying in the past	N = 383	
Yes	253	66.1%
No	130	33.9%
	Total = 383	Total = 100%
Are you comfortable with Indoor Residual spraying?	N = 383	
Yes	248	64.8%
No	135	35.2%
	Total = 100%	Total = 100%
Reason(s) for not being comfortable with Indoor Residual Spraying		
The chemicals are poisonous		
I react to the chemicals	33	8.6%
The chemicals can cause cancer	44	11.5%
The chemicals are not effective	8	2.1%
others	50	13.1%
	19	5%

Perceptions about Mosquito repellents

A total of 161 (42%) respondents reported ever using mosquito repellents to prevent Malaria while 222 (58%) had not used mosquito repellents in the past. As for reasons for not using mosquito repellents, 125 (32.6%) cited expense while 26 (6.8%) reported reacting to the chemicals. Another 8 (2.1%) thought the chemicals can cause cancer while 10 (2.6%) thought the method was not effective. Only 65 (17%) cited other reasons. This results are shown in table 5

Table 5: Perceptions about Mosquito repellents

Variable	Frequency	Percentage
Have you ever used mosquito repellents in the past?	N = 383	
Yes	161	42%
No	222	58%
	Total = 383	Total = 100%
Reason(s) for not using Mosquito repellents		
They are expensive	125	32.6%
I react to the chemicals	26	6.8%
They can cause cancer	8	2.1%
They are not effective	10	2.6%
Other reasons	65	17%

Perceptions about Prophylactic Medication

A total of 221 (57.7%) respondents reported ever using medication to prevent malaria. As for the reasons of non-usage, 76 (19.8%) cited expense while 6 (1.6%) reported reacting to the chemicals. Only 2 (0.5%) respondents thought the chemicals can cause cancer while 22 (5.7%) respondents thought the chemicals are associated with other health problems while 62 (16.2%) cited other reasons. This is shown in table 6 below

Table 6: Perceptions about prophylactic Medication

Variable	Frequency	Percentage
Have you ever used prophylactic medication in the past?	N = 382	
Yes	221	57.7%
No	162	42.3%
	Total = 383	Total = 100%
Reasons for not using Prophylactic medication		
Expense	76	19.8%
I react to the chemicals	6	6%
The chemicals can cause cancer	2	2%
Chemicals cause other health problems	22	22%
Other reasons	62	62%

Discussion

Because human behavior, vectors and environmental factors all play a role in the transmission, treatment and prevention of Malaria, it's important to explore human behavior in the context of social cultural factors as this may impact on effectiveness of malaria prevention strategies. Charlotte Gryseels et al,highlights that human behavior in all its diversity and variability is not always sufficiently considered in prevention policies although it plays a key role in effectiveness of Malaria prevention strategies[10]. This study therefore set out to determine the preferences and perceptions about malaria prevention methods in Solwezi Kimasala area. In this study, 94.3% of the respondents indicated that they knew that Malaria can be prevented. Only 5.7% respondents expressed ignorance about Malaria being preventable. This showed that knowledge about Malaria being preventable was generally high in the study site. This is similar to the findings of a study done in the Niger Delta which reviewed that 96.4% of respondents knew that malaria can be prevented and most believed that mosquito nets were the most useful way of keeping mosquitoes out [8]. The study also reviewed that Malaria prevention methods that respondents in Kimasala knew about included mosquito nets (97.4%), Indoor residual spraying (41%), mosquito repellents (25.6%), insecticides (24.5%) and prophylactic medication (8.4%). Other methods reported were not getting socked with rains (myth), use of traditional herbs (lwenye) and destruction of breading sites. It could therefore be observed that most respondents knew about mosquito nets while prophylactic medication was least known. A study in Lobito town of Angola reviewed that 85% of respondents were aware about ITNs and 80% were ready to use them although the most implemented method was the domestic insecticide canister (60%) and mosquito coils (36%) [14].In the study in Angola, mosquito nets were generally used to protect babies. A similar study done in Uganda reviewed that less than half (48.6%) of respondents knew about IRS and education status was a contributing factor [15]. This is similar to what this study reviewed though education status was not considered. However, a study in India reviewed higher levels of knowledge about various Malaria prevention strategies [16].

In terms of the most preferred method of Malaria control, the study reviewed that 83.6% respondents used mosquito nets, 10.2% used mosquito repellents, 23.5% used IRS, 13.6% used insecticides and 3.1% used prophylactic medicine while 6.3% used other methods.

The study reviewed that mosquito nets were the most used method of Malaria prevention. This differs from the findings of a study in Angola were Insecticide canister and mosquito coils were most preferred [14] but similar to the findings of a study in Mozambique [17].

As for the reason for using a particular method(s), 73.9% respondents cited affordability while other reasons cited included convenience and reacting to other methods. It was good to note that 79.1% of

respondents were open to use other methods as well hence the need to intensify activities that promote knowledge and usage of other malaria prevention methods alongside the much promoted ITNs and IRS.

The study reviewed that even though 94.8% respondents had used mosquito nets in the past, only 77.8% had continued to use mosquito nets. Reasons that were cited for stopping included expense 17%, not breathing properly, 5 .7%, feeling like suffocating 3.9%, inability to sleep 1% and other reasons 14.4%. Despite some respondents stopping to use nets, most respondents (73.1%)reported being comfortable sleeping under a mosquito net. Reasons for stopping to use a net were similar to findings of a study in the Niger Delta which reviewed that respondents in general suggested that the net limited the space in the room and maneuverability hence acceptability was determined by the amount of space available and the number of occupants of that space [8]. The study in the Niger Delta also reviewed that nets were perceived to restrict ventilation and in some instances were reported as "claustrophobic" or "confining" [8]. Nets were also associated with respiratory problems in some cases. In this study, 7.6% respondents reported they felt like suffocating while 5.5% reported not being able to sleep.

Of the 66.1% respondents who ever had indoor residual spraying, 64.8% stated that they were comfortable with their houses being sprayed. A study in Mozambique reviewed that IRS was generally well received in most neighborhoods even though mosquito nets were preferred [17].This was also similar to findings of studies in Tanzania and South Africa [18] [19].

Of the respondents who did not prefer IRS, 8.6% thought the chemicals were poisonous, 11.5% reported reacting to the chemicals while only 2.1% thought the chemicals can cause cancer. 13.1% respondents thought the chemicals are not effective and 5% cited other reasons. A study in Uganda showed that 66.4% respondents reported that IRS would have negative effects [15].

Most respondents (84.4%) thought the chemicals used for IRS may lead to cancers and respiratory tract infections, while 77.7% thought the chemicals would pollute the environment. Another (33.1%) thought the chemicals would pollute the food. [15]. This was in line with what a study in Limpopo province of South Africa found where 93.6% believed IRS insecticides can cause harm and a number of side effects that included skin reactions, effects on the reproductive system and the possibility of miscarriages [19]. Another study in Eastern Ethiopia observed that out of the 27.8% respondents whose houses had IRS, 7.4% of them re-plastered their inside walls following the application of insecticides [11]. Such occurrences however were not reported in this study.It could therefore be observed that even though IRS was not the most preferred method in the study site, there were relatively low negative perceptions about this method.

The study reviewed that 42% respondents reported ever using mosquito repellents to prevent Malaria. With regards to reasons for not using mosquito repellents, 32.6% cited expense while 6.8% reported reacting to chemicals. Another 2.1% thought the chemicals can cause cancer while 2.6% thought the method was not effective and 17% cited other reasons. The number who had used repellents was however slightly higher than 25.6% who reported knowing about repellents as a method of Malaria prevention. The findings of this study can be compared to a study in Cambodia where despite high acceptability of mosquito repellents, daily usage was still very low and was estimated at 8% [10]. In the study in Cambodia, 37.2% respondents considered repellents to be both a medicine and poison while 86% reported experiencing skin related reactions such as dry skin, hot skin and itchy rash as a result of repellents. It can be seen in this study that despite less respondents indicating that they used mosquito repellents to prevent malaria, more had actually used them in the past. Negative perceptions about use of repellents were also low and the major limiting factor was cost and lack of knowledge about this method.

The study also reviewed that even though more respondents reported ever using prophylactic medication to prevent Malaria in the past, usage did not correlate with actually knowing that prophylactic medication is a method of Malaria prevention. The commonest cited reason for non-usage was expense 19.8%.

It could therefore be observed that like with other methods of Malaria prevention except mosquito nets, ultilisation and knowledge of various malaria prevention methods was low in Kimasala Solwezi.

Conclusions

Knowledge about Malaria being preventable was high in the study site despite a few misconceptions. This could be used as an advantage to advance various prevention strategies. Knowledge about different Malaria prevention methods was generally low except

for mosquito nets. Other methods that respondents used were burning of local herbs (lwenye) to fend off mosquitoes. Mosquito nets were the most preferred method of Malaria prevention and negative perceptions about mosquito nets were generally low. Negative perceptions about Indoor residual spraying, mosquito repellents and prophylactic medication as methods of malaria prevention were generally low despite the low ultilisation and awareness about them. This could be used as an advantage to promote usage various methods of Malaria prevention.

Study Limitations

The study focused on perceptions and preferences about IRS, ITNs, mosquito repellents and insecticides only and other Malaria prevention methods were not considered. The study was only descriptive and no associations were determined. During this study, the impact of Malaria prevention interventions and prevalence in the study site were not assessed. Some respondents had difficulties in understanding certain terminologies such as prophylactic medication and mosquito repellents hence this could have confounded the results of this study.

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