

ANTIMALARIAL MEDICINES USE AMONG MOTHERS ATTENDING A SECONDARY PUBLIC HOSPITAL IN NORTH-CENTRAL NIGERIA FOR THEIR UNDER-FIVE CHILDREN: IMPLICATION FOR SUSTAINABLE HEALTH TRANSFORMATION FOR AFRICAN DEVELOPMENT

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Abstract

Around the globe, malaria is a disease of public health importance. In 2010, there were 216 million cases of malaria of which 81% were in World Health Organization (WHO) African region, and an estimated 3.3 billion people were at risk of malaria. Also, an estimated 655 thousand malaria-related deaths of which 86% were children under 5 years of age occurred in 2010. Ninety-one percent of these deaths occurred in WHO African Region. Thus malaria poses a challenge to health transformation for sustainable African development. Prompt treatment of the disease using antimalarial medicines is one of the four basic technical elements of WHO's Global Malarial Control Strategies. This study examined antimalarial medicine use among mothers attending a secondary public hospital in north-central Nigeria for their under-five children. It was a descriptive, cross-sectional and non-interventional study. Two hundred and twenty eligible mothers

were interviewed using structured questionnaire. Statistical Package for Social Sciences Version 17.00 was used for data entry and analysis. The findings revealed that 75.9% of the respondents visited a health centre/hospital for malarial treatment of their under-five children of which 41.9% did not know the name of the antimalarial medicine that was prescribed for their children and 18% did not complete the dosage regimen due to subsided symptoms (76.7%). Some of the respondents had shared the medicines of one child with another (25.9%). Only 45% of the respondents preferred Artemisinin Combination Therapy. There is need for adequate patient/care giver counselling in order to achieve health transformation for sustainable African development.

Keywords: Antimalarial Medicines, Use, Mothers, Under-Five Children, Patient Counselling

Malaria is a protozoal infection caused by *Plasmodium falciparum*, *Plasmodium vivax*, *Plasmodium malarae*, *Plasmodium ovale*, *Plasmodium knowlesi* [Ninan et al, 2012, Medicines for Malaria Venture (MMV), 2013]. It is a disease of public health importance. The reservoir of infection for the *P. falciparum*, *P. vivax*, *P. malarae* and *P. ovale* is man while for *P. knowlesi* is macaque (Figtree, et al, 2010). The vector is female anopheles mosquito (Luchavez, et al., 2008; Figtree, et al, 2010). The transmission is through the bite of the anopheles mosquito (Collins, 2012).

Malaria constitutes a global burden. Malaria is one of the six killer diseases currently responsible for 90% of deaths associated with communicable diseases. In 2010, there were 106 malarial-endemic countries, of which 99 had ongoing malaria transmission. There were also 216 million cases of malaria of which 81% were in World Health Organization (WHO) African region. About 3.3 billion people were at risk of malaria. Also, an estimated 655 thousand malaria-related deaths of which 86% were children under 5 years of age were reported in 2010. Most (91%) of these deaths

occurred in WHO African Region. Nigeria along with other 5 Sub-Saharan African countries contributed 60% of the malarial-related deaths (WHO, 2011).

There are grievous social, health and economic consequences of malaria. By its interference with health, capacity to work and school attendance, the inequalities between health and wealth are exacerbated, with consequent impediment to sustainable development. According to Principle I of the Rio Declaration on Environment and Development, “Humans are at the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature” (WHO, 2002). Thus the goals of sustainable development cannot be attained with the prevailing high prevalence of debilitating malaria.

A lot of efforts have been put in to combat malaria. One of the four basic technical elements of WHO’s Global Malarial Control Strategies is prompt diagnosis and treatment of the disease using antimalarial medicines (WHO 2012). A lot of antimalarial medicines such as chloroquine (CQ), quinine (QUI), sulphadoxine-pyremethamine (SP) and mefloquine (MQ) have been developed and used (MMV, 2013). However, emergence of resistant strains of *P. falciparum* to cheap and widely available antimalarial medicines makes the treatment of malaria very difficult. Currently in Nigeria, artemisinin-based combination therapies (ACTs), recommended in November 2004, and formally adopted nationwide in January 2005 are the first-line treatment of uncomplicated malaria (Federal Ministry of Health, Nigeria, 2005; WHO, 2010). ACTs are highly efficacious (Kamuhabwa and Silumbe, 2013).

Despite ACTs are expensive, 50% of the 26,383 doses of antimalarial medicines purchased from the Pharmacy outlets of the University of Ilorin Teaching Hospital, Nigeria, in 2005 were

ACTs (Mokuolu *et al.*, 2007). In addition, 191 181 million courses were procured globally in 2010 (WHO, 2011).

However, *P. falciparum* resistance to artemisinin has been reported (MMV, 2013; WHO, 2011). Inappropriate antimalarial medicine use may be a factor contributing to the development of resistant strains of *P. falciparum*. A study in Nigeria showed inappropriate prescribing of antimalarial medicines: under-dosage and over-dosage errors, prescription of SP and CQ despite the change in the national guidelines for malaria treatment in Nigeria and prescription of artemisinin derivatives as mono-therapies (Oshikoya, 2007). Another study in Thailand showed 76.21% of the 206 patients with vivax malaria did not complete the medication course (Khantikul, 2009). In addition, a study in Tanzania showed that only 37.2% of the 652 mothers/guardians interviewed knew how to administer the drugs to their sick children after receiving the drugs from the dispenser (Nsimba, 2006). In another study in Tanzania, 33% of parents had low level of understanding of the instructions given by prescribers regarding the use of antimalarial medicines in children at home (Kamuhabwa and Ramji, 2011). The appropriate use of antimalarial medicines is crucial not only to attainment of positive therapeutic outcomes (Fuangchan *et al.*, 2013) but also to deter the spread of antimalarial resistant strains.

Children of under-five years of age are at greatest risk of malaria infection. However mothers have traditionally been the main stay of home life (Watch Tower and Tract Society, 2006) and are the primary care givers of these under-fives. This study was thus aimed at examining the antimalarial medicine use among mothers attending a secondary public hospital in north-central Nigeria for their under-five children.

MATERIALS AND METHODS

Setting

Children Specialist Hospital, Ilorin a secondary public healthcare institution is located in North-Central Nigeria. The vegetation is Guinea Savannah. Malaria is endemic in Nigeria. Transmission occurs round the year with an upsurge during the rainy season of June to September. Children Specialist Hospital popularly called “Centre Igboro” is a household name among the Ilorin indigenes. It is well accessible, acceptable and attended by the patients.

Study design

It was a descriptive, cross-sectional and non-interventional study. A total of 220 mothers (Fisher et al, 1998) who satisfied statistical requirements and met the inclusion criteria were used for this study. A systematic sampling technique was used to select the subjects.

Inclusion criterion

Mothers who had children below 5 years of age.

Exclusion criteria

- a. Mothers who had only one child below 6 weeks of age.
- b. Mothers of children above 5 years of age.

Research instrument

Structured questionnaire was the instrument used for the collection of data. The questionnaire was made up of two sections: section A containing bio-data questions and section B contain questions related to antimalarial medicines use.

Data analysis

The filled questionnaires were checked for accuracy and completeness. Statistical Package for Social Sciences (SPSS) version 17.00 was used for data entry and analysis. Frequency distributions of quantitative variables were generated.

Ethical considerations

Permission for the use of the mothers in the research was obtained from the Management of the Children Specialist Hospital, Ilorin. Consent of the respondents was sought and obtained. Research ethics such as anonymity of respondents and confidentiality of the responses were ensured.

RESULTS

TABLE I: DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

A: AGE IN YEARS	Frequency	%
16-20	22	10.0
21-25	64	29.1
26-30	77	35
31-35	31	14.1
36-40	24	10.9
46-50	2	0.9
Total	220	100
B: MARITAL STAUS		
MARRIED	206	93.6
SINGLE	12	5.5
SEPARATED	2	.09

TOTAL	220	100
C: TYPE OF UNION IF MARRIED		
MONOGAMY	147	71.4
POLYGAMY	59	28.6
TOTAL	206	100

The Age range of the mothers was 16 -50 years with a mean age of 38.12 ± 5.7 years. Most (93.6%) of the mothers were married in a monogamous setting.

TABLE II: FURTHER DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

A: EDUCATIONAL STATUS	Frequency	%
NO FORMAL EDUCATION	24	10.9
PRIMARY EDUCATION	32	14.5
SECONDARY EDUCATION	85	38.6
TERTIARY EDUCATION	79	35.9
TOTAL	220	100
B: RELIGION		



CHRISTAINITY	56	25.5
ISLAM	164	74.5
TOTAL	220	100

C: INCOME P.A

UNEMPLOYED	75	34.1
>N60,000	106	48.2
N60,000-120,000	21	9.5
N121,000-180,000	8	3.6
N181,000-240,000	3	1.4
N241,000-300,000	0	0
N301,000-360,000	6	2.7
>N360,000	1	0.5
TOTAL	220	100

D: ETHNICITY

YORUBA	182	82.7
IGBO	4	1.8
HAUSA	1	0.5
OTHERS	33	15
TOTAL	220	100

TOTAL NO. OF >5 YRS CHILDREN

1	60	27.3
2	70	31.8
3	43	19.5
4	36	16.4
5	11	5
TOTAL	220	100

The modal educational status and income per annum were secondary school (38.6%) and less than sixty thousand Naira (48%) respectively. Majority of the mothers practiced Islamic religion (74.5%) and were of Yoruba ethnic group. About one-third of the mothers had two children who were below five years of age.

AWARENESS AND KNOWLEDGE ABOUT MALARIA

TABLE III: AWARENESS ABOUT MALARIA

A: AWARE OF MALARIA	FREQUENCY	%
YES	220	100
NO	0	0
TOTAL	220	100

B: SOURCE OF INFORMATION

RADIO	67	30.5
TELEVISION	55	25
FAMILY MEMBERS	68	30.9
HOSPITAL	152	69.1
PHARMACY	23	10.5
DRUG HAWKERS	18	8.2
PATENT MEDICINE STORES	24	10.9
TRADITIONAL AND SPIRITUAL HEALERS	13	5.9

* Multiple responses

All the respondents have heard of malaria (100%). The major source was from the Hospital.

TABLE IV: KNOWLEDGE ABOUT MALARIA

A: LOCAL NAMES FOR MALARIA	FREQUENCY	%
IBA	212	96.4
EVAGORO	3	1.4
MURA	2	0.9
ORU TOTA	1	0.5
TITA	1	0.5
ZEZEBI	1	0.5

TOTAL	220	100
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B: HOW MALARIA IS TRANSMITTED

MOSQUITOE BITE	164	74.5
DIRTY ENVIRONMENT	25	11.4
WATER IN THE ENVIRONMENT	11	5
HEAT	4	1.8
CAN'T REMEMBER	3	1.4
DON'T KNOW	13	5.9
TOTAL	220	100

Most of the mothers said the local name for malaria was “Iba” (96.4%) while majority knew that malaria was transmitted through mosquito bite (74.5%).

TABLE V: FURTHER KNOWLEDGE ABOUT MALARIA

ITEMS	YES		NO	
	FREQ	%	FREQ	%
A: KNOWLEDGE OF SYMPTOMS OF MALARIA	220	100	0	0

B: SYMPTOMS

FEVER	180	81.8	40	18.2
HEADACHE	186	84.5	34	15.5
BODY ACHE	133	60.5	87	39.5
NAUSEA	86	39.1	134	60.9
VOMITING	122	55.5	98	44.5
COLD	172	78.2	48	21.8

D: MALARIA A MAJOR CAUSE OF DEATH

210	95.5	10	4.5
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While all the mothers claim to know about the symptoms of malaria, nearly two third (60.9%), nearly half (44.5%) and above one third (39.5%) did not know that nausea, vomiting and body ache respectively are symptoms of malaria.

TABLE VI: KNOWLEDGE ABOUT COMPLICATIONS ASSOCIATED WITH SEVERE MALARIA

ITEMS	YES		NO		DON'T KNOW	
	FREQ	%	FREQ	%	FREQ	%
COMPLICATIONS ASSOCIATED	136	61.8	84	38.2	0	0

WITH MALARIA	SEVERE						
ENLARGED SPLEEN	11	8.1	71	52.2	54	39.7	
ENLARGED LIVER	24	17.6	65	47.8	47	43.6	
ANAEMIA	89	65.4	9	6.6	38	27.9	

Furthermore, majority of the mothers knew that anaemia is a complication of severe malaria. Only 8.1% and 17.6% of the mothers knew that splenomegaly (enlarged spleen) and hepatomegaly (enlarged liver) respectively are complication of severe malaria.

TABLE VII: HEALTH SEEKING BEHAVIOUR OF MOTHERS FOR THE TREATMENT OF MALARIA FOR THEIR UNDER FIVE YEARS OF AGE CHILDREN

ACTIONS	FREQ	%
USE OF HERBAL CONCOTION	18	8.2
GO TO TRADITIONAL AND SPIRITUAL HEALERS	0.0	0.0
BUY MEDICINE FROM DRUG OUTLETS	35	15.9
GO TO THE HEALTH CENTRE/HOSPITAL	167	75.9
TOTAL	220	100

With regards to the mothers' health and treatment seeking behaviour, nearly four-fifth of them visit the health centre

/hospital for malaria treatment of their under-fives. Less than one-fifth use herbal concoction or buy medicines from medicine outlets.

TABLE VIII: KNOWLEDGE OF THE NAME OF MEDICINE PRESCRIBED FOR THE CHILD

NAME OF MEDICINES	FREQ	%
DON'T KNOW	70	41.9
CHLOROQUINE (CQ)	40	24
SULPHADOXINE/PYREMATAMINE (SP)	13	7.8
AMODIAQUINE (AMQ)	0	0
S/P + ARTESUNATE (DIFFERENT PACKS)	4	2.4
QUININE (QUI)	3	1.8
ARTESUNATE (ART)	5	3.0
S/P + ARTESUNATE (CO-PACKED)	2	1.2
AMQ + ARTESUNATE (CO-PACKED)	4	2.4
ARTEMETHER + LUMEFANTRINE(CO FORMULATED)	26	15.6
TOTAL	167	100

About half of the mothers who visit the health centre/hospital to access malarial treatment did not know the name of the medicines that were prescribed for their under-fives. About a quarter mentioned Chloroquine (CQ), less than one-fifth: artemether + lumefantrine while less than ten percent: Sulphadoxine//Pyremethamine.

TABLE IX: USE OF PRESCRIBED MEDICATION

A: DISCONTINUATION OF USE OF PRESCRIBED MEDICATION	FREQ	%
YES	30	18
NO	137	82
TOTAL	167	100
B: REASONS FOR DISCONTINUATION OF PRESCRIBED MEDICATION		
SYMPTOMS SUBSIDED	23	76.7
NO IMPROVEMENT	3	10
OCCURRENCE OF SIDE EFFECTS	4	13.3
TOTAL	30	100
C: SHARING OF MEDICINE OF ONE CHILD WITH ANOTHER		
YES	57	25.9

NO	163	74.1
TOTAL	220	100

About one-fifth of the mothers who visit the health centre/hospital to access malarial treatment discontinued the use of the prescribed medicine mainly due to subsided symptoms while more than a quarter shared the medicines of one child with another child.

TABLE X: PREFERENCE FOR ANTIMALARIAL MEDICINE

ANTIMALARIAL MEDICINES PREFERENCE	FREQ	%
CHLOROQUINE	50	22.7
SULPHADOXINE/PYREMATAMINE (SP)	39	17.7
AMODIAQUINE (AMQ)	2	0.9
QUININE	6	2.7
ARTEMISININ MONOTHERAPY	8	3.6
ARTEMISININ-BASED COMBINATION THERAPY	99	45
ANTIBIOTICS	16	7.3
TOTAL	220	100

Only 45% of the mothers preferred ACT while about a quarter and one-fifth still preferred chloroquine sulphadoxine-pyremethamine respectively.

DISCUSSION

The Age range of the mothers was 16 -50 years with a mean age of 38.12 ± 5.7 years. Most (93.6%) of the mothers were married in a monogamous setting, educated with secondary education being the modal class and practiced Islamic religion. The finding with regard to religion is expected since most of the inhabitants of Ilorin practice Islam as a religion. However the finding in this study with regards to marital status is discordant adherents of Islamic religion who practice polygamy. The finding in this study regarding educational status is also non-congruent with general notion that Ilorin women have low educational status. The findings in this study may due to the implementation of MDG Goal 3, Target 3A: eliminate gender disparity in primary and secondary education preferably by 2005, and all levels by 2015. There are campaigns to education the girl child with slogans such as “when you educate a girl child you educate a nation. Also, most of the mothers had 3 children below five years of age. With regards to ethnicity, most of the mothers were Yoruba. This may be due to the location.

The mothers have high level of knowledge about malaria. This may be responsible for their health and treatment seeking behaviour in visiting the health centre/hospital to seek for treatment of malaria for their children. This positive behaviour could result in positive health transformation for sustainable development.

However 41.9% of these mothers visit the health centre/hospital to seek for treatment of malaria for their children did not know the names of the antimalarial medicines prescribed for their children. Moreover, 18% of these mothers discontinued the use of the prescribed medicine majorly due to subsided side effect. This is similar to the study in Thailand in which 76.21% of the 206

patients with vivax malaria did not complete the medication course (Khantikul, 2009). This is an indication for non-adherence. This contributes to the development of resistant strains of Plasmodium.

Also, 25.9% of the mothers shared the drugs of one child with another. This is another indication of non-adherence. Low level of understanding of medicine use instruction may be responsible as is found in the study from Tanzania (Kamuhabwa and Ramji, 2011). This non-adherence to antimalarial medicine use is one of the factors responsible for therapeutic failure and development of plasmodium resistance to antimalarial medicines. Non-adherence to antimalarial medicine therapy will negatively impact on health transformation and sustainable development. The major reason for non-adherence from this study was the subsided malaria symptoms. There is need for proper counselling of the mothers by the Physicians and Pharmacists with regards to the need to complete the prescribed medicine even though the symptoms may subside.

With reference to antimalarial medicine preference, only 45% of the mothers had preference for ACTs despite change in antimalarial treatment policy in 2005 that recommends ACT for the treatment of uncomplicated malaria. There is need for health education on ACTs being first-line treatment of uncomplicated malaria. This will contribute immensely to the attainment of the malaria-related MDG that would lead to positive health transformation and sustainable development for Africa.

CONCLUSION

The mothers of under-5 children had good knowledge about malaria. Majority of them have positive health care seeking

behaviour. However, more than half did not know the name of the medicines that were prescribed for them. Some of them use antimalarial medicines inappropriately. There is need for adequate patient/care giver counselling in order to achieve positive health transformation for sustainable African development. Moreover, the low preference for ACTs, calls for appropriate health education intervention in order for malaria-related MDG that would lead to positive health transformation and sustainable development for Africa.

REFERENCES

Collins, W. E. (2012). *Plasmodium knowlesi*: a malaria parasite of monkeys and humans. *Annual Reviews of Entomology*, 57: 107-121. doi: 10.1146/annurev-ento-121510-133540.

Federal Republic of Nigeria (2005). National Antimalarial treatment policy. Abuja, Nigeria: Federal Ministry of Health, National Malaria and Vector Control Division

Figtree, M., Lee, R., Bian, L., Keennedy, T., Mackertich, S., Urban, M.,... Hudson, B.J. (2010). *Plasmodium knowlesi* in Human, Indonesian Borneo. *Emerging Infectious Diseases*, 16(4): 672-674.

Fuangchan, A., Dhippayom, T., & Kongkaew, C. (2013). Intervention to promote patients' adherence to antimalarial medication: a systematic review. *The American Journal of Tropical Medicine and Hygiene*, 12- 0598.

Kamuhabwa, A.A and Ramji, K. (2011). Antimalarial Drugs for Pediatrics – Prescribing and Dispensing Practices in a Tanzanian City. *Tropical Journal of Pharmaceutical Research*, 10(5): 611 -618.

Kamuhabwa, A.A. and Silumbe, R. 2013). Knowledge among drug dispensers and antimalarial drug prescribing practices in public

health facilities in Dar es Salaam. *Drug, Healthcare and Patient Safety*, 5:181-189. doi: 10.2147/DHPS.S50071.

Khantikul, N., Butraporn, P., Kim, H.S., Leemingsawat, S., Tempongko, S.B., & Suwonkerd, W. (2009). Adherence to Antimalarial Drug Therapy among Vivax Malaria Patients in Northern Thailand. *Journal of Health, Population, and Nutrition*, 27(1): 4 -13.

Luchavez, J., Espino, F., Curameng, P., Espina, R., Bell, D. Chiodini, P.,... Singh B. (2008). Human Infections with *Plasmodium knowlesi*, the Philippines. *Emerging Infectious Diseases*, 14(5):811-3. doi: 10.3201/eid1405.071407.

Medicines for Malaria Venture (2013). Malaria & Medicines. Retrieved from

<http://www.mmv.org/malaria-medicines/five-species>. Accessed 13/6/2013.

Mokuolu, O. A., okoro, E. O., Ayertoro, S. O., & Adewara A. A. (2007). Effect of Artemisini-based treatment policy on Consumption pattern of Antimalarials. *American Journal of Tropical Medicine and Hygiene*, 76(1) 7-11.

Ninan T., Nalees, K., Newin, M., Sultan, Q., Than, M. M., Shinde, S., ... Yusof, M. N. (2012). *Plasmodium knowlesi* malaria infection in human. *Brunei Ineternational Medical Journal*, 8(6): 358-361.

Nsimba, S. E. (2006). Assessing prescribing and patient care indicators for children under five years old with malaria and other disease conditions in public primary health care facilities. *The Southeast Asian Journal of Tropical Medicine and Public Health*, 37(1 206-214).

Oshikoya, K. A. (2007). Antimalarial Prescriptions for Children Presenting with Uncomplicated malaria to a Teaching Hospital in Nigeria after the Change of National Guidelines for Malaria Treatment. *World Journal Medical Science*, 2(1): 49-53.

Watch Tower and Tract Society of Pennsylvania (2006). *The Secret of Family Happiness*. Brooklyn, New York, USA: Watch Tower Bible and Tract Society of New York.

World Health Organization (2002). *Health and Sustainable Development*. Geneva, Switzerland: WHO Press.

World Health Organization (2010). *Guidelines for the treatment of Malaria*. Geneva, Switzerland: WHO Press.

World Health Organization (2011). *World Malaria Report 2011 Fact Sheet*.

http://www.who.int/malaria/world_malaria_report_2011/WMR2011_factsheet.pdf.

Accessed 13/6/2013.

World Health Organization (2012). *World Malaria Report 2012*. Geneva, Switzerland: WHO Press.