FACTORS INFLUENCING COMPLIANCE WITH THE NATIONAL ANTIMALARIAL TREATMENT GUIDELINES BY FACILITY-BASED SECONDARY HEALTH CARE PHYSICIANS IN OYO STATE, NIGERIA

BY

Foyeke Islamiyyah OYEDOKUN
MATRIC NO: 146542
B.SC HUMAN PHYSIOLOGY (ILORIN)

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DEDICATION

This research work is dedicated to Allah (SWT) for being my soul and sole strength and pillar, to my amazing parents for their unflinching financial and moral support and to my loving husband, Omotayo Adebagbo and sons; Demilade and Dolapo Adebagbo who have being my source of inspiration.

ABSTRACT

The National Antimalarial Treatment Guidelines (NATG) stipulates treatment actions for the management of malaria using Artemisinin Combination Therapy (ACT). Available evidence indicates that adoption of treatment guidelines are not matched with corresponding levels of comprehension and compliance. An investigation of practice gaps will generate information which will guide future policy formulation and implementation. The aim of this study was to determine the factors influencing compliance of facility-based secondary health care physicians in Oyo state with NATG.

This descriptive cross-sectional study involved 94 out of 124 physicians on full-time employment from all 36 secondary health care facilities offering malaria management services in Oyo state. They were interviewed using a semi-structured interviewer-administered questionnaire to elicit information on awareness of and perceived challenges relating to implementation of the NATG. This included a 60-point knowledge scale on diagnosis and treatment of malaria with knowledge scores of 0-20, >20-40 and >40-60 rated as poor, fair and good respectively. Case notes of malaria patients seen on the day of interview were stratified into three categories; under-five children, pregnant women and adults. A minimum of one and maximum of three case notes were randomly selected across the strata per physician. Overall, 44, 74 and 128 case notes belonging to pregnant women, under-five children and adults respectively were assessed using a check-list which included an 11-point compliance scale on patient's history documented, laboratory assessment and drug prescribed by dosage. Compliance scores of 0-3, >3-7 and >7-11 were rated poor, fair and good respectively. Data were analysed using descriptive statistics and t-test at p=0.05.

Age of respondents was 40.0±8.6 years, 70.2% were males and mean years of experience was 9.4±3.4. Majority (84.0%) of the respondents had ever received training on NATG, 91.5% of the respondents had heard of the NATG mainly from medical conferences. However, 48.9%, 37.2% and 11.7% had seen, read and have personal copies of NATG respectively. Knowledge score was 32.4±6.4 with 8.5% and 90.4% of respondents having good and fair knowledge of the NATG respectively. Compliance score was 4.3±1.9 with 4.5%, 63.4% and 32.1% of physicians having good, fair and poor compliance respectively. Only 0.8% of case notes had complete history documented, 54.0% had prescription for

ACT, 19.1% Sulphadoxine Pyrimethamine and 26.9% non-recommended Anti-Malarial Drugs. Recommended dosage of ACT was correctly prescribed in 26.0% and 47.8% of case notes belonging to children and adults respectively. Only 24.2% of adults and 5.6% of children had both clinical and laboratory assessments before prescription. High cost (31.4%), unavailability (14.9%) and treatment inefficacy (9.1%) of ACTs were identified as perceived hindrances to compliance with NATG. A statistically significant higher compliance score (4.4±1.7) was observed amongst respondents ever trained on NATG than those never trained (3.7±1.3).

An interplay of factors influenced physician's compliance with the national antimalarial treatment guidelines. Continuing professional training programmes on compliance with current malaria treatment approaches and adequate supervision are recommended.

Keywords: Antimalarial Treatment Guidelines, Physicians compliance, Artemisinin Combination Therapy

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CERTIFICATION

I certify that this study was carried out by Foyeke Islamiyyah Oyedokun in the Department of Health Promotion and Education, Faculty of Public Health, College of Medicine, University of Ibadan, Nigeria.

SUPERVISOR

Professor Oladimeji Oladepo
B.Sc, M.P.H, Ph.D (Ibadan), FRSPH (UK)
Department of Health Promotion and Education,
Faculty of Public Health, College of Medicine,
University of Ibadan, Nigeria

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CHAPTER ONE

1.0 INTRODUCTION

1.1 Background to the study

Globally, an estimated 3.4 billion people are at risk of malaria of whom 1.2 billion are at high risk. In high-risk areas, more than one malaria case occurs per 1000 population. An estimated 207 million cases of malaria occurred globally in 2012 (uncertainty range 135–287 million) and 627 000 deaths (uncertainty range 473 000–789 000). Most cases (80%) and deaths (90%) occurred in Africa (Figure 1.1), and most deaths (77%) were in children under 5 years of age (WHO Malaria Report, 2013).

According to the Roll Back Malaria Campaign of the World Health Organization (WHO), 90 percent of the more than one million deaths worldwide caused by malaria every year take place in Africa, and malaria constitutes 10 percent of the continent's overall disease burden (Multilateral Initiative on Malaria, 2001). There are 97 countries and territories with ongoing malaria transmission including Nigeria, and 7 countries in the prevention of reintroduction phase, making a total of 104 countries and territories in which malaria is presently considered endemic (WHO Malaria Report, 2013).

In Nigeria, the 167 million inhabitants are all at risk for malaria infection. Malaria is endemic and transmission is stable with a seasonal peak from April to October. The duration of the transmission season decreases from south to north. It is perennial in most of the south but only lasts three months or less in the border region with Chad (RBM Nigeria report 2013). Nigeria contributes about a quarter to the total African malaria morbidity and mortality burden (National Malaria Control Programme NMCP, 2005).

In 2008, there were about 100 million suspected cases and 300 000 deaths attributable to malaria among children under the age of five (NMCP 2012). Plasmodium falciparum accounts for 98% of malaria infection in the country. Malaria is estimated as being responsible for 60% outpatient visits to health facilities, about 11% of overall maternal

mortality (4,500 die yearly), 25% of infant mortality (RBM Nigeria report, 2012), and 20% of under-five mortality (NMCP, 2014).

The human and economic costs associated with declining quality of life, consultations, treatments, hospitalization and other events related to malaria are enormous and often lead to low productivity and lost incomes (Erhun, 2005). The financial loss due to malaria in Nigeria annually is estimated to be about 132billion Naira (approximately US $835 million) in form of prevention and treatment cost as well as loss of man-hours due to inability to work (RBM Nigeria Report 2012). Malaria is both a cause and a consequence of poverty in Nigeria (SunMAP 2008).

Global malaria control is being threatened on an unprecedented scale by rapidly growing resistance of *Plasmodium falciparum* to conventional monotherapies such as chloroquine, sulfadoxine-pyrimethamine (SP) and amodiaquine. Multi-drug resistant falciparum malaria is widely prevalent in South-East Asia and South America. Now drug resistance is also seriously affecting Africa, the continent with highest burden of malaria. (WHO/RBM, 2006).

The development of drug resistance is linked to inadequate and inappropriate use of antimalarials at various levels thus leading to exposure of the parasite to less than therapeutic drug levels. This may result from poor prescription from the health worker, non-compliance to prescription and availability of fake and substandard drugs. (National Antimalarial Treatment Guidelines (NATG), 2005).

Until 2005, in Nigeria, malaria was majorly and effectively treated with chloroquine and sulphadoxine-pyrimethamine but due to the emergence of resistance to these drugs of choice, they were no longer effective. Drug therapeutic efficacy trials conducted in the six geo-political zones in Nigeria have shown a high level of resistance to these drugs ranging from 23 to 96% (Amin, Zurovac, Kangwana, Greenfield, Otieno, Akhwale, Snow, 2007). The World Health Organization (WHO) has recommended that an antimalarial agent may not be used as first line when the level of resistance is above 25% in an area (World Health Organization (WHO), 2001), hence the change in the Nigerian national guidelines for malaria treatment in the year 2005 (Amin, 2007).

The Federal Ministry of Health, Nigeria, in May 2005 enacted a policy to adopt the use of Artemisinin Combined Therapy (ACT) as first-line drugs in the treatment of malaria (FMOH, 2005). Any introduction of new treatments will require evidence from audit to understand current prescribing practices, and training to provide guidance (Shretta, Omumbo, Rapuoda, Snow, 2000). The success of a new treatment policy would depend on the adherence of health providers and patients to the recommendations, and, in Nigeria, as in many other countries, there is a powerful pharmaceutical industry that aims to influence prescribing in both the private and public sector (Zurovac, Ndhlovu, Rowe, Maner, Thea, Snow, 2004).

The guidelines stated that the treatment of choice for uncomplicated malaria should be Artemisinin-based Combination Therapy (ACT). The guideline also provides basic information on the roles of and guides the health care providers' at all the three levels in effective management of malaria and acknowledges the need for health education and prevention as well as community mobilization for malaria control.

Series of criticisms have, however, trailed the adoption of the new treatment policy. The policy has compliance issues especially with health workers compliance with all the recommendations for appropriate management of malaria either uncomplicated or complicated forms.

This study examined the extent to which physicians at the secondary health care level in Oyo state comply with the current antimalarial treatment guidelines in case management of malaria.

1.2 Statement of problem

Compliance can be simply defined as the act of adhering to, and demonstrating adherence to, a standard or regulation. It is a state in which someone (or something) is in accordance to established guidelines (Oxford concise dictionary, 2009). In the context of this research, compliance measures the extent to which secondary health care providers adhere to the established guidelines for the management of uncomplicated malaria.

A study conducted in 2004 to determine the compliance with the immediate past policy guidelines for the treatment of malaria by doctors in urban Enugu concluded that only 40% of doctors utilized the national treatment guidelines for the treatment of malaria (Harrison, Odunukwe, Agomo, 2004). Since the revision of the policy guidelines in 2005, only a few evaluatory studies have been conducted in the country (Orimadegun, Amodu, Olumese, Omotade, 2008). A study in 2008 reported that only 57 (11.5%) of health care providers enrolled in Ibadan were knowledgeable about current WHO strategies for malaria prophylaxis in pregnancy (Onyeaso, Fawole, 2007).

Results from the 2007 study in Ibadan is instructive but information is scanty on the level of knowledge about current malaria treatment approaches at the state level and especially at the Secondary Health Care (SHC) level in Oyo state. This focus on the SHC level of care stems from documentation by several studies that in the public health sector, Nigerians seeking medical services show preference for obtaining same in the general/state hospitals and not the primary health care facilities. In a 2010 study in Ilorin, Kwara state, 17.0% of respondents showed preference for general/teaching hospitals and only 12.3% for primary health care (PHC). Quick service and availability of drugs were the major reasons for their preference (Abodunrin, Bamidele, Olugbenga-Bello, Parakoyi, 2010).

Any introduction of new treatment guidelines requires evidence from audit to understand current prescribing practices, and training to provide guidance (Shretta et al, 2000). , The success of a new malaria treatment policy in Nigeria would depend on the level of adherence of health providers and patients to the recommendations (Zurovac et al, 2004). In this regard, it becomes imperative to assess the extent to which physicians at the secondary health care level in Oyo state have reached out and strictly complied with the guideline to harmonize malaria management practices within the country.

Studies have documented a poor knowledge of the current guidelines on malaria management among health care providers who are essential to effective malaria control (Onyeaso, Fawole 2007). In this regard, it becomes very necessary to investigate the knowledge base on this crucial issue through physician's practice.

1.3 Justification for the study

The performance of any health system with regards to control of malaria and reduction in malaria related morbidity and mortality can be evaluated by the extent to which it imbibes the best current practices into the tenets of its control strategies (Opara 2012) Consequently, periodic assessment of practice like the one offered by the physicians in this study would yield valuable insights regarding quality of malaria care by this cadre of health workers in Oyo state.

Secondly, the study generates useful information about knowledge and practice gaps in physicians practice in Oyo state secondary health facilities; a necessary template for planning and designing training programs to address needs; basis for effective implementation of current policy.

Omo-Aghoja, Oghagbon, Esume 2006 stated that the reviews or formulation of treatment guidelines are not matched with corresponding levels of continuing medical education and enlightenment programmes to keep clinicians abreast with best practices. Authors of this study state that clinicians are either unaware of the new policies or not familiar with the contents of the new policy and treatment guidelines (). This study has the potential of identify gaps to compliance with the current anti-malarial policy which would addressed through medical curriculum review and refresher training.

Results of this study would contribute to evidence for re-designing malaria programmes in the state for better effective delivery of malaria services by physicians in Oyo state secondary health care facilities. .

1.4. Research questions

The research questions which guided the conduct of this study were as follows:

1) What is the level of awareness of secondary health physicians on the 2005 antimalarial treatment policy guidelines in Oyo state?
2) How well do the secondary health care physicians know their roles in the management of uncomplicated malaria as stipulated by the 2005 national antimalarial treatment guidelines in Oyo state?

3) What is the extent of compliance with the 2005 antimalarial treatment guidelines in the management of uncomplicated malaria among under five children, pregnant women and adults among secondary health care physicians in Oyo state?
4) What are the factors influencing physician compliance with the implementation of the 2005 antimalarial treatment guidelines in Oyo state?
5) What proportion of secondary health care physicians in Oyo state diagnose uncomplicated malaria based on laboratory assessment viz a viz clinical syndromic assessment?

1.5. Study objective

1.5.1. General objective

The broad objective of this study was to determine factors influencing compliance with the National Antimalarial Treatment Guidelines by secondary health care physicians and infer implications for the control of malaria.

1.5.2. Specific Objectives

The specific objectives of this study were to:

1) Determine the level of awareness and the sources of information of the secondary health care physicians on the 2005 antimalarial treatment guidelines.
2) Assess the knowledge of the secondary health care physicians of their diagnostic and prescription roles as stipulated by the 2005 antimalarial treatment guidelines
3) Determine the extent of physician's compliance with the 2005 policy guidelines in the management of uncomplicated malaria among under five children, pregnant women and adults.
4) Identify the factors influencing secondary health care physicians' compliance with the implementation of the 2005 antimalarial treatment guidelines.

1.5.3. Test of Hypotheses

This study tested the existence or not of a relationship between several variables including:

Hypothesis 1: There is no association between knowledge of the contents of the revised antimalarial treatment guidelines and compliance with same amongst secondary health care physicians in the management of malaria.

Hypothesis 2: There is no association between the age/sex/years of experience of secondary health care physicians and their knowledge of the antimalarial treatment policy guidelines.

Hypothesis 3: There is no association between the sex/location of facility of secondary health care physicians and their awareness of the antimalarial treatment policy guidelines.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Malaria and its public health burden

2.1.1 Malaria Prevalence

Globally, millions of deaths attributable to malaria are still recorded. An estimated 3.4 billion people are at risk of malaria of whom 1.2 billion are at high risk. In high-risk areas, more than one malaria case occurs per 1000 population. An estimated 207 million cases of malaria occurred globally in 2012 and 627 000 deaths (WHO Malaria Report, 2013). Malaria is amongst the most common diseases in the tropical areas. Malaria affects 3.3 billion people, or half of the world's population, in 106 countries and territories (Nigeria Malaria Fact Sheet 2011). See figure 2.1 for world map showing malaria endemic countries.

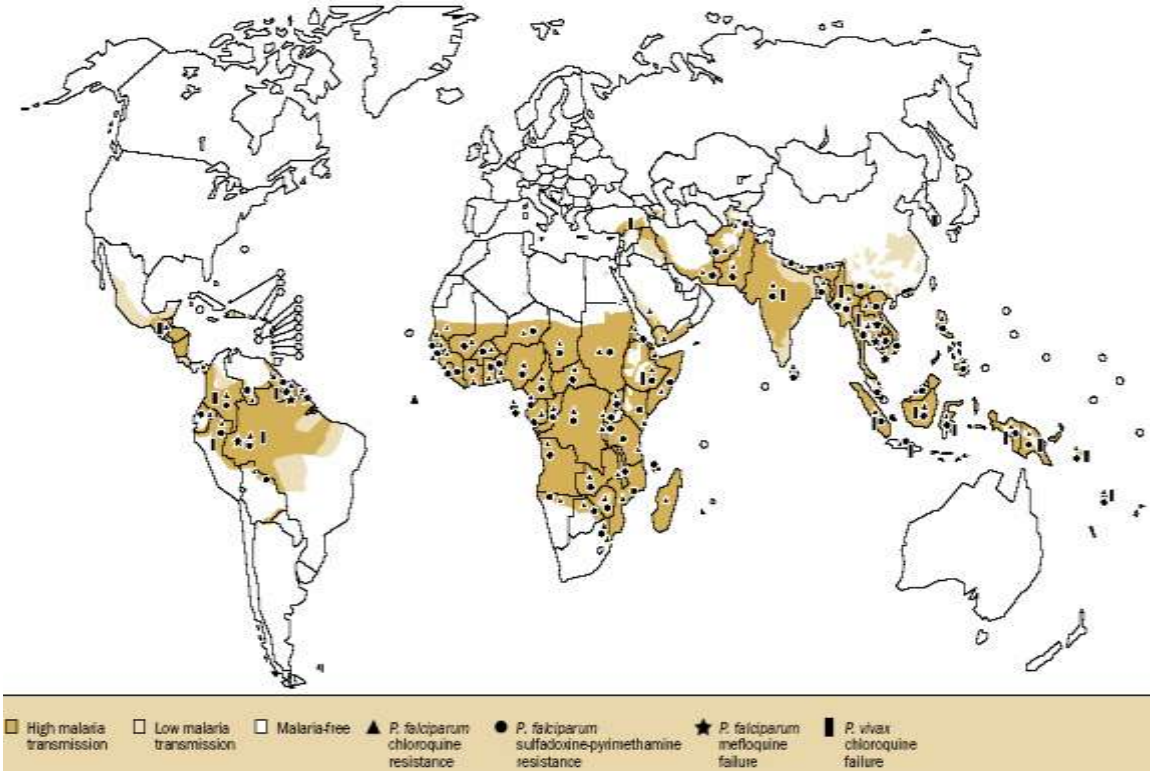


Figure 2.1: The world showing malaria endemic areas.

Source: Roll Back Malaria, WHO

In Africa, malaria accounts for 25-35% of all outpatient visits, imposing a great burden on the already fragile health care system (NMCP, 2004). Over 80% of malaria deaths occur in

Africa. Malaria is the 2nd leading cause of death from infectious diseases in Africa, after HIV/AIDS. Almost 1 out of 5 deaths of children under 5 in Africa are due to malaria (Nigeria Malaria Fact Sheet 2011).

Malaria is a major public health problem in Nigeria where it accounts for more cases and deaths than any other country in the world (Nigeria Malaria Fact Sheet 2011). Malaria is endemic in Nigeria with 97% of the population at risk of infection, excluding the high mountainous area of the plateau; the remaining 3% of the population live in the malaria free highlands (see figure 2.2). Transmission of malaria is stable and perennial in all parts of the country and with the largest population at risk in Africa (RBM, 2005). With an estimated 120 million malaria cases per year, Nigeria contributes about a quarter to the total African malaria morbidity and mortality burden (National Malaria Control Programme NMCP, 2005).

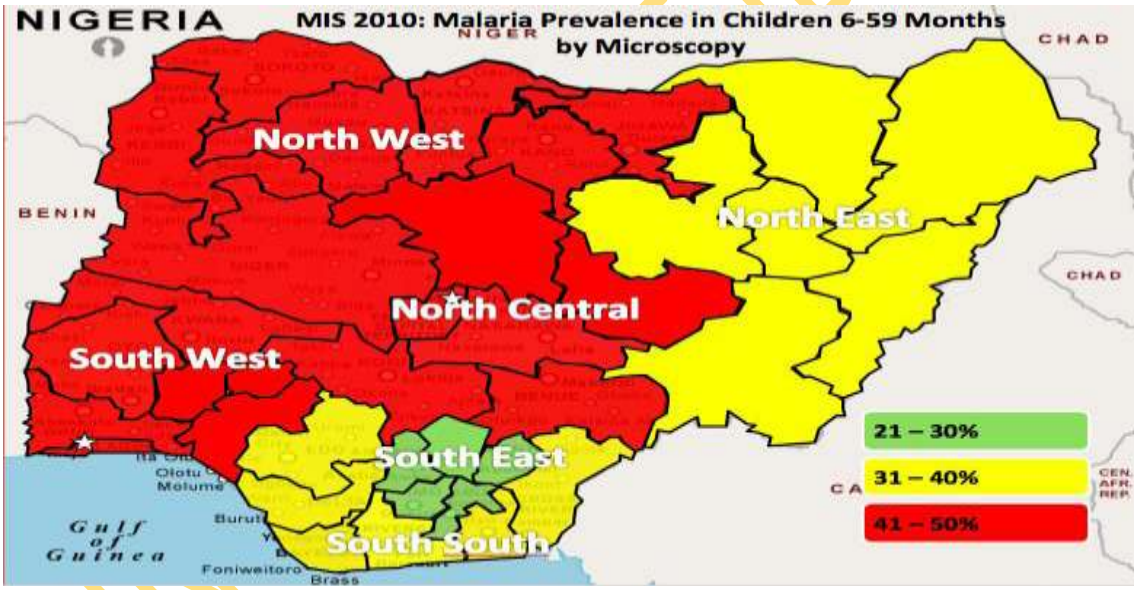


Figure 2.2: Map of Nigeria showing malaria prevalence across states

Source: Nigeria Malaria Fact Sheet, 2011

Oyo state records about 6 million malaria cases yearly, six out of every 10 cases of patients attended to at the state hospitals are as result of malaria. Children from age zero to four years have at least two to four attacks in a year, while half of the adult population has at least one attack in a year (Ekpo et al 2008).

2.1.2 Morbidity and Mortality attributable to Malaria

Nigeria, with a population of over 170 million, contributes a quarter of the malaria burden in Africa – 50% of the population will have at least one malaria attack each year while children that are aged below 5 years (about 24 million) will have 2 to 4 attacks of malaria annually (World Malaria Report 2008). The disease is responsible for 60% outpatient visits to health facilities, 25% of death in children under one year and 11% maternal death (RBM Nigeria report, 2012), and 20% of under-five mortality (NMCP, 2014) and causes the death of an estimated 250,000 children under the age of five every year (Ajadi, Olaniran, Alabi, Adejumobi 2012).

Malaria is an important cause of death and illness in children and adults in Nigeria. Mortality, currently estimated at over a million people per year, has risen in recent years, probably due to increasing resistance to antimalarial medicines. Therefore, it imposes great burden on the country in terms of pains and trauma suffered by its victims as well as loss in outputs and cost of treatments (Onwujekwe et al, 2004). There are an estimated 100 million malaria cases with over 300,000 deaths per year in Nigeria. This compares with 215,000 deaths per year in Nigeria from HIV/AIDS. (Nigeria Malaria fact sheet 2011). In Oyo state, it is reported that 26-27% of children less than five mortality in rural communities was due to malaria, as verified through verbal autopsy (Salako et al. 2001).

2.1.3 Social and Economic costs of malaria

In addition to the direct health burden, there is widespread recognition of the profound social and economic impact the disease has in many affected countries (Burnet Institute, 2008). In Nigeria, the financial loss due to malaria annually is estimated to be about 132 billion Naira; as high as 1.3% of economic growth per annum in form of cost of treatment and transport to source, prevention, loss of man-hours, absenteeism from school and other indirect costs; yet it is a treatable and completely evitable disease. Malaria impedes human development and is both a cause and consequence of under development (NATG, 2005).

Using the production function approach to quantifying a disease burden, studies evaluates the malaria burden on the Nigerian agricultural sector. Results show that the economic burden of malaria, in terms of lost agricultural output, may be as high as N 3.953 million

for every reported case of malaria per 100, 000 persons and therefore colossal. This together with evidence from other related studies suggest that the agricultural sector bears about 75 per cent of the direct economic burden of malaria in Nigeria. This translates to about 3 per cent of the real GDP that is lost annually in agricultural outputs to the malaria disease. This being the case, the government is advised to make the rural areas, where majority of farmers reside, a priority in its malaria control efforts (Jimoh, 2005).

An interesting study used the Willingness to Pay (WTP) approach to evaluate the burden of malaria in Nigeria. The results indicated that households would be prepared to pay an average of about Naira 1,112 (USD 9.3) per month for the treatment of malaria. This is about Naira 427 (USD 3.6) in excess of the average expenditure they currently make on malaria treatment per month. Similarly, households are willing to pay on the average a sum of Naira 7,324 (USD 61) per month for the control of malaria. Again, this is an excess of about Naira 2,715 (USD 22.6) over the cost they currently bear (protection, treatment and indirect costs), and it represents households' average valuation of their intangible costs of malaria illness. This amount represents about Naira 611.7 (USD 5.1) per head per month and Naira 7,340 (USD 61.2) per year. For a country with a population of about 120 million this translates to about Naira 880,801 million per annum representing about 12.0 per cent of Gross Domestic Product. Hence, the malaria burden in Nigeria is enormous, intolerable and has a devastating impact on economic growth (Jimoh et al; 2007).

An estimated 10% of gross domestic output of Oyo state is lost annually to malaria attack (Alaba 2006). In the rural sector alone, aggregate domestic income by about 10 per cent; direct costs of malaria episodes estimated at 246million naira and indirect costs at 5.3 billion naira respectively. Indirect costs included the monetary costs of lost days to malaria episodes whilst direct costs included treatment and transportation cost per episode for a year. Labour time loss per bout of malaria per household is put at 8.5 work days (Alaba et al 2006).

A 2008 study on the impact of malaria on rural house-holds farm income in Oyo state concluded that increase in malaria incidence had a significant effect on the health and farm income of the farmers through increase in the number of days of incapacitation of an

average of 22 days and an income loss of N15231.50 during the days of incapacitation (Ajani, Ashagidigbi 2008).

In the long term, it is important to recognize that health and poverty are closely linked. Reducing the burden of malaria in Nigeria will help to contribute to the economic well-being of communities; and poverty-reduction will be an essential input into improving health. National malaria control programme in Nigeria and their partners need to recognize these links, and identify mechanisms for ensuring that the poorest have access to essential health interventions (Jimoh et al; 2007).

2.2 Malaria control strategies

With current calls for the global elimination of malaria, all of the current strategies available to control malaria need to reach the highest level of effective implementation. The Roll Back Malaria Partnership (RBM Partnership) is the global framework for coordinated action against malaria. It forges consensus among key actors in malaria control, harmonizes action and mobilizes resources to fight malaria in endemic countries. including one made by the Bill and Melinda Gates Foundation, supported by the Director General of the World Health Organization (Bill and Melinda Gates Foundation, 2007), to revive the long-term goal of malaria eradication as outlined in the Global Malaria Action Plan and endorsed at the high level UN Millennium Development Goals meeting held in New York on 25 September (RBM, 2008).

Because prompt and effective treatment was first proposed as a malaria control strategy by the World Health Organization in 1993, many interventions aimed at the various factors that influence prompt and effective treatment have been developed and implemented. These include interventions aimed at improving the prescription and dispensing practices of providers (public and private, formal and informal), and interventions aimed at the purchasing and adherence practices of anti-malarial users and their caretakers (WHO 2008).

Current control efforts focus on reducing malaria-attributable morbidity and mortality. Prompt evaluation of all febrile illness, case-recognition and use of appropriate

antimalarial therapy are essential to malarial control in order to optimize clinical outcomes of malaria-infected patients (Orimadegun 2008). Effective case management of uncomplicated malaria is a cornerstone of successful malaria control. This entails early diagnosis and prompt treatment with effective antimalarial medicines (Uzochukwu 2010). The *WHO Guidelines for the treatment of malaria*, which were first published in 2006, provide global, evidence-based recommendations on the case management of malaria, targeted mainly at policy-makers at country level, providing a framework for the development of specific and more detailed national treatment protocols that take into account local antimalarial drug resistance patterns and health service capacity in the country (WHO 2010).

Malaria control, in Africa is premised on an integrated approach comprising prevention including vector control and treatment with effective antimalarials. One such malaria control efforts in Africa is the Presidential Malaria Initiative (PMI). PMI's goal is to work with partners to reduce by half the burden of malaria in 70 percent of the at-risk populations in sub-Saharan Africa (approximately 450 million residents), thereby eliminating malaria as a major public concern and promoting development throughout Africa. PMI works with national malaria control programs and coordinates its activities with national and international partners, including the Roll Back Malaria Partnership, the Global Fund to Fight AIDS, Tuberculosis and Malaria; the World Health Organization; the World Bank; Malaria No More; the Bill and Melinda Gates Foundation; nongovernmental organizations, including faith-based and community groups; and the private sector (USAID 2011).

Since the Roll Back Malaria (RBM) Initiative was launched in 1998, a new era has been ushered in which involves scaling up prevention and treatment activities and moving towards eradication (Ramalingam 2009). The Roll Back Malaria Partnership (RBM) set the target for 2010 of "80% of malaria patients are diagnosed and treated with effective anti-malarial medicines, e.g., artemisinin-based combination therapies (ACT), within one day of the onset of illness" (RBM, 2005). Data on progress toward this goal are fairly scarce, but information in the 2013 World Malaria Report suggest that between 2010–2012, the mean proportion of all children with confirmed malaria who received an ACT

was 16% (range, 1%–42%). Increased access to care for fever, as well as appropriate diagnostic testing and therapeutic management at all places of care, is needed to ensure that all patients with malaria receive prompt and effective treatment. (WHO World Malaria report 2013).

Roll Back Malaria (RBM) in Nigeria anchors on the global strategies for malaria control which are multi-pronged and of proven efficacy. These include prompt and efficient case management; Intermittent Preventive Treatment of Malaria in pregnancy and Integrated Vector management including use of Insecticide Treated Nets (ITNs), Indoor Residual Spraying (IRS) and Environmental Management. Other cross cutting interventions include advocacy, Communication and Social Mobilization, Effective Programme Management, Monitoring and Evaluation, Partnership and Collaborations (RBM Nigeria report 2008).

Over the past few years in Nigeria, there has been a substantial increase in the amount of attention and funding focused on attempts to reduce the burden of the disease and this focus has been accompanied by the development of various short and medium term targets for intervention coverage and disease reduction. Recent reviews have provided information on the factors that influence treatment seeking behavior (Williams et al, 2004) and behavior of certain categories of healthcare providers (Brugha et al, 1998), but to date no over-arching comparison has been made of the relative effectiveness of the various interventions to improve these behaviors or their resulting impact on the diagnosis and effective treatment of patients with malaria within the first day of their illness.

Efforts to combat the disease are constrained by poverty, ignorance on the part of the people and weak health infrastructure at national, State and Local Government Area levels, as manifest in weak surveillance systems, shortage of drugs and laboratory supplies, Above all, operational finances are inadequate. Traditionally, the malaria problem has been seen as a challenge for the health sector alone with little or no involvement by other sectors or the general community (WHO, 2010).

In Oyo state, the Malaria Action Programme for States (MAPS); a PMI-funded integrated malaria project which spans from 2010 to 2015. Oyo is one of the MAPS focal states

including Benue, Cross River, Ebonyi, Nasarawa and Zamfara states. The MAPS project has distributed a total of 893,000 mosquito nets to a total of 2,232,500 beneficiaries in 13 local government areas; the target for the Insecticide Treatment Nets (ITNs) is 1.8million by 2015. Thousands also benefit from free malaria tests. The Oyo State Government has announced the commencement of its fight against malaria, in partnership with the United States Agency for International Development (USAID) and the World Health Organization (WHO) http://nigeriamaps.org/?p=291. With a substantial reduction in the incidence of malaria, the State seeks to reduce out-of-pocket expenses of the citizenry as well as reduce outpatient attendance at our hospitals.

To reach the RBM targets, there's the need to identify those interventions that are most successful at improving access to prompt and effective malaria diagnosis and treatment. The aim of this study is to document factors influencing compliance with the National Antimalarial Treatment Guidelines by secondary health care workers and infer implications for the control of malaria as well as identify those provider and/or user behavior interventions that are most effective in improving prompt and effective treatment of malaria.

2.2.1 Gender and Malaria Control

A gender approach contributes to both understanding and combating malaria. Gender norms and values that influence the division of labor, leisure patterns, and sleeping arrangements may lead to different patterns of exposure to mosquitoes for men and women. There are also gender dimensions in accessing treatment and care for malaria, and in the use of preventative measures such as mosquito nets. A thorough understanding of the gender related dynamics of treatment-seeking behavior, as well as of decision-making, resource allocation and financial authority within households is key to ensuring effective malaria control programmes. Therefore, gender and malaria issues are increasingly being incorporated into malaria control strategies in order to improve their coverage and effectiveness in different contexts (WHO 2007).

In some societies, men have a greater occupational risk of contracting malaria than women if they work in mines, fields or forests at peak biting times, or migrate to areas of high

endemicity for work (Ruben 1993). Women who get up before dawn to perform household chores may also be exposed to mosquitoes and consequently to malaria infection. (Vlasoff 1998). The division of labour as a result of gender roles may play a significant part in determining exposure to mosquitoes. However very few studies have been conducted to specifically look at this. Similarly, in addition to leisure activities, sleeping arrangements may also affect malaria transmission. In some societies, men tend to sleep outdoors and this may increase their risk of exposure to mosquitoes (Rahman 2005). Women often have to ask for their husband's permission to access treatment for themselves and/or their children (Molyneux 2002).

Evidence from some countries indicates that restricted mobility of women may also impede their attendance at primary health care clinics for malaria testing (Lampetti 1999). Levels of education may also affect malaria treatment seeking and prevention behaviors. A study in southeastern Nigeria found that higher levels of education were associated with improved knowledge and practices in relation to appropriate prevention and treatment strategies (Krause, Sauerborn 2000). These varied findings on access to health services may be explained by varying gender roles and relations across societies, and the gender dynamics of decision-making and access to financial resources. Social customs too can affect the treatment-seeking behavior of women and men and their access to health services (Muller 1998).

2.3 Antimalarial Treatment Policies

National antimalarial treatment policies are essential to provide countries with a framework for the safe and effective treatment of uncomplicated and severe malaria as well as for the prevention of malaria in travelers and in vulnerable groups, such as pregnant women and young children. As a general principle, such policies should aim at the greatest possible reduction of malaria mortality and morbidity, while containing the development of resistance and remaining compatible with limited national health budgets and health care infrastructures. National antimalarial treatment policies should aim to offer antimalarials that are highly effective (WHO 1999).

National antimalarial treatment policies aim to offer antimalarials that are highly effective. The main determinant of policy change is the therapeutic efficacy and the consequent effectiveness of the antimalarial in use. Other important determinants include: changing patterns of malaria-associated morbidity and mortality; consumer and provider dissatisfaction with the current policy; and the availability of new products, strategies and approaches. Selecting the most appropriate and efficacious drug is only one of many facets of changing malaria treatment policy (WHO 2010). Effective policy change is a long, involved process that extends for months to years and requires input from a multitude of stakeholders, both public and private (Durrheim et al, 2003). Cost, efficacy, availability, safety and acceptability of the replacement drugs; ineffective communication and limited trust between scientists and policy makers; status of the public health care system in general; legal and regulatory statutes; fluidity of national borders; degree of decentralization; local epidemiological context; and vested interests of stakeholders (particularly the pharmaceutical industry) are examples of factors that can significantly influence the process of drug policy formation and implementation (Holly, Mark, Herrera, Chang 2009).

Indeed, on top of extra costs for the drugs themselves, a change in treatment policy requires time, resources and substantial management capacity at national and local level. A better understanding of these issues and the costs involved benefits countries planning and implementing policy change (Mulligan, Mandike, Palmer, Williams, Abdulla, Bloland, Mills 2006).

2.3.1 Nigerian Antimalarial Treatment Policies

Studies have shown that during the pre-resistance years, chloroquine was the main drug used in the chemotherapy of malaria in all sectors of Nigerian health care provision. It was administered as standard doses during this period and anti-histamines, especially promethazine, were routinely co-administered with chloroquine (Gbotosho, Happi, Sijuade, Ogundahunsi, Sowunmi, Oduola 2009). The practice of prescribing sub-therapeutic doses of chloroquine became prominent between 1992 and 1997, which coincided with the emerging resistance and resistance dissemination phases and revealed deficiencies in the private sector in relation to poor adherence to National and WHO

guidelines for malaria. Poor drug use practices such as the use of sub-therapeutic doses are among factors that can lead to the emergence and spread of drug resistant strains of *Plasmodium falciparum* (White et al, 1996).

In Nigeria, P. falciparum, resistance has been observed to almost all currently used antimalarials (amodiaquine, chloroquine, mefloquine, quinine and sulfadoxine–pyrimethamine) except for artemisinin and its derivatives. The geographical distributions and rates of spread have varied considerably (WHO 2006). In 2001, the efficacy drug trials carried out in the geo-political regions of the country showed that the therapeutic efficacy of chloroquine varies between 3.7% in the South-east, 9.1% in the South-south, 53.2% in the North central, 77.3% in the North West, 40.9% in the south west and 50.8% in the North West. The survey identified that chloroquine and sulphadoxine-pyrimethamine; the two front line drugs have had its efficacy performance reduced beyond a level to be tolerated (above 25% according to World Health Organization) while Artemether+lumefantrine and Artesunate-amodiaquine (Artemisinin Combination Therapy; ACTs) are highly efficacious (FMOH, 2005)

The Drug Therapeutic Efficacy tests (DTET) conducted on two such combinations, namely, artesunate + amodiaquine and artemether + lumefantrine in 2004 showed adequate clinical and parasitological response (ACPR) of 94.6% and 96.8% respectively The Federal ministry of health then changed the policy on malaria treatment to Artemisinin-based Combination Therapy (ACT) (FMOH 2004).

The Nigeria National Antimalarial Treatment Guidelines 2005 is a set of recommendations and regulations concerning antimalarial drugs and their utilization in the country. The goal of the antimalarial treatment policy is to use the available resources efficiently to maximize the reduction in mortality and morbidity due to malaria. The purpose of antimalarial treatment policy is to provide rapid and long lasting cure; reduce morbidity, including malaria related anaemia; prevent the progression of uncomplicated malaria into severe and potentially fatal disease; reduce the unfavourable effects of malaria in pregnancy through intermittent preventive treatment and minimize the likelihood and rate of development of drug resistance (FMOH 2005).

The 2005 National Antimalarial Treatment Guidelines contains information to guide health workers' decision on whether a sick patient requires antimalarial treatment or not; recommends age-appropriate treatment for uncomplicated and severe malaria; chemoprophylaxis for various at risk groups; criteria for review of antimalarial treatment policy and regulation and deployment of antimalarial medicines. The guideline also states the relationship between the various health care levels in the country and their management capabilities of malaria using a management algorithm (FMOH 2005).

Figure 2.3 below is the algorithm for the management of uncomplicated and severe malaria at different levels of care including the secondary level of care.

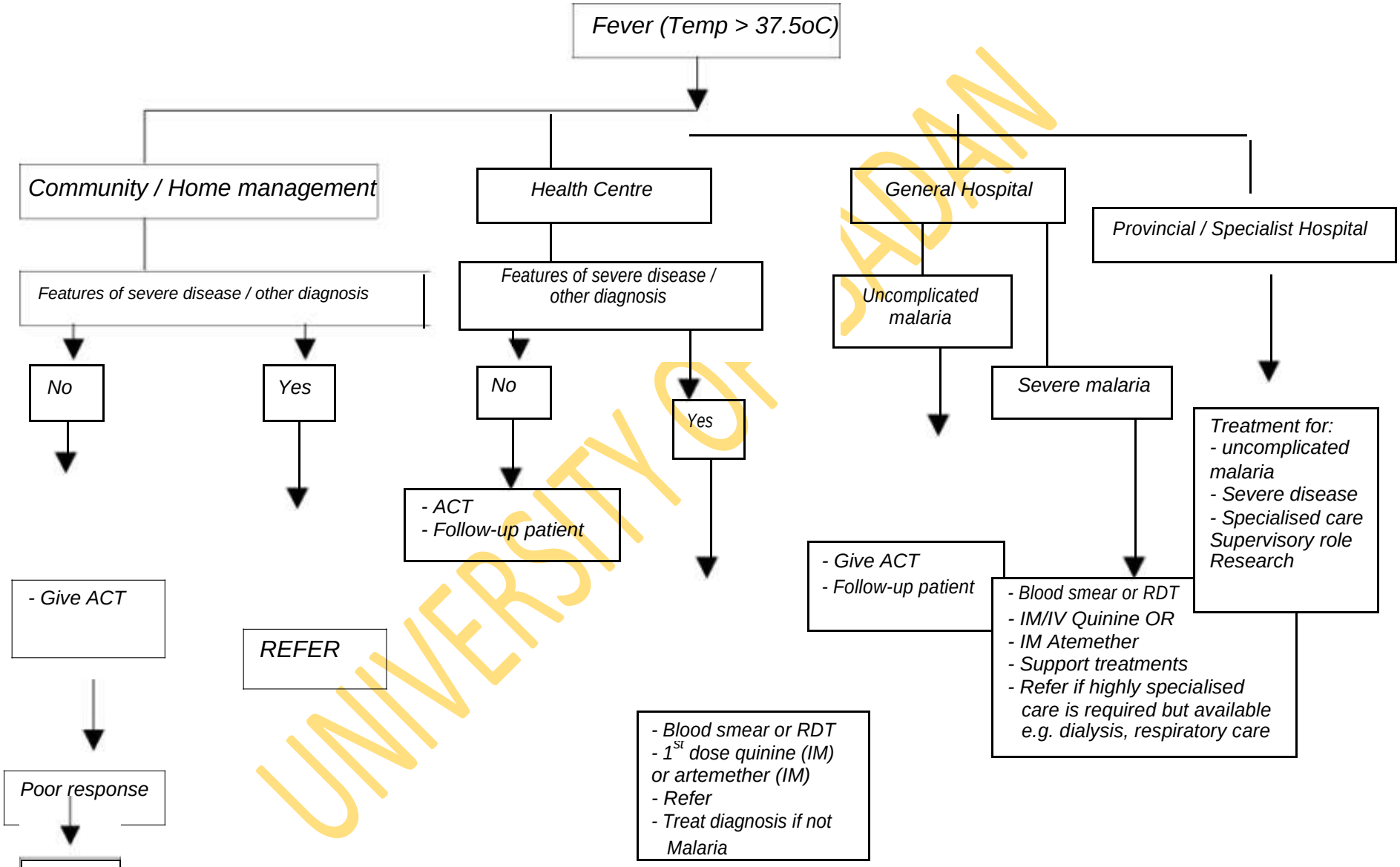


Figure 2.3: Algorithm for the management of uncomplicated and severe malaria at different levels of care
Source: National Antimalarial Treatment Guidelines 2005

As Nigeria introduces these treatment regimen including the adoption of ACTs into national drug selection instruments; standard treatment guidelines and essential drugs list, efforts to improve malaria treatment practices should target both private and government-supported health providers. Training programmes in malaria case management need be made priority. It will be critical to develop or adopt training materials on the use of these products. Such training will be in the form of IEC activities to the consumers/public as well as structured in-service training to health care providers on appropriate prescribing and dispensing of ACTs. Since several drug combinations have multiple-dose regimens and co-administration of different tablets, major communication efforts and health promotion activities for the general public will be needed to ensure good compliance with the treatment regimens (RBM, 2012).

Also private-public partnership in the procurement, distribution and use of good quality anti-malaria drugs should also be encouraged to minimize the circulation of substandard drugs. Recent report of studies in some Southeast Asian countries revealed that a significant proportion of the artemisinin drugs used in those countries were substandard (Cockburn et al, 2005). It is important to establish effective surveillance mechanisms to prevent the same unscrupulous suppliers from contaminating the Nigerian anti-malarial drug supply chain.

National malaria control programmes must deal with the complex process of changing national malaria treatment guidelines, often without guidance on the process of change. Selecting a replacement drug is only one issue in this process. There is a paucity of literature describing successful malaria treatment policy changes to help guide control programs through this process (Holly et al, 2009).

2.4 Physicians' Knowledge of Antimalarial Treatment Policies

Several studies have assessed physicians' knowledge of anti-malarial treatment guidelines. Below are the findings of a study to assess knowledge and practice of health care providers on current concepts on malaria prophylaxis in pregnancy in two local governments in Ibadan, South western Nigeria using a self-administered questionnaire. Respondents were selected from 45 health facilities: 48 (9.7%) community health

extension workers (CHEWS), 139 (28.9%) auxiliary nurses, 220 (44.3%) formally trained nurses and 90 (18.1%) medical doctors.

Only 57 (11.5%) respondents were knowledgeable about current WHO strategies for malaria prevention in pregnancy. Three hundred and eighty six respondents (77.7%) were aware of intermittent preventive treatment (IPT). Awareness about IPT was highest among CHEWS (95.8%). Pyrimethamine was prescribed mainly by healthcare providers in the secondary (60.6%) and primary (60.3%) levels of care. Chloroquine was prescribed by 42.5% of respondents. Sulfadoxine-pyrimethamine was significantly more commonly prescribed by primary health care providers than in other levels of care. Prescription for insecticide treated nets was high. Respondents' practice of anti-malarial chemoprophylaxis was influenced by the cadre of the health care provider and level of practice. There are several knowledge gaps on current malaria prevention strategies in pregnancy among healthcare providers. Multiple strategies are required to improve health care workers' knowledge and practice of malaria prevention during pregnancy (Onyeaso 2007).

The study concluded that one of the major challenges facing the implementation of malaria prevention strategies in pregnancy is creating awareness among healthcare providers. The evaluation revealed that the majority were deficient in current evidence-based recommendations (Onyeaso 2007). A policy document has been produced by the Nigerian health authority to guide health care workers on strategies for the prevention and control of malaria during pregnancy. Therapeutic regimes used by healthcare workers are usually not in compliance with such guidelines as shown in the Republic of Benin where physicians and health care workers were unaware of their national policies for the control of malaria.

This study has highlighted several knowledge gaps on current malaria prevention strategies in pregnancy among healthcare providers. Lack of awareness is apparently the major obstacle to changing practice (Fawole, 2004); incorporating new strategies into routine antenatal care programmes will therefore require active dissemination of this information among the various cadres of health workers providing antenatal care. Possible solutions include institutionalizing malaria prevention strategies in pregnancy (Jasper et al,

2004) and continuing professional development programmes on current concepts by healthcare providers. Professional associations by their strategic positions should indeed take the lead in this area. Some researchers have advocated the creation of an organization to promote consultation and communication between health care authorities and workers (Nahum et al, 2000).

2.5 Physicians' Compliance with Antimalarial Treatment Policies

A Nigerian survey of malaria control practices showed that less than a fifth of the primary and secondary health facilities studied used the recommended malaria treatment guidelines (FMOH, 2000). Lack of adherence to malaria treatment guidelines was associated with inappropriate prescribing practices in rural Nigeria (Phillips-Howard et al, 2003). Poor drug use practices like use of sub-therapeutic doses or failing to complete prescribed doses are among factors that could lead to emergence and spread of mutant resistant strains of *Plasmodium falciparum* (White et al, 1996). Poor adherence to prescriptions tends to occur more with drug regimens that have long treatment durations such as artemisinin monotherapy that takes seven days than artemisinin combination treatments that take only three days (WHO, 2000). The practice of artemisinin monotherapy in Nigeria if unchecked, could compromise the efficacy of artemisinin compounds.

Prescription practices have been shown to influence the emergence of resistance to anti-malarial drugs (Yousif et al, 2000), thus the success of a new treatment policy would depend on the adherence of health providers and patients to treatment recommendations (Zurovac et al, 2004). This becomes important in order to protect the clinical shelf-life of the artemisinin-based combinations since they remain the most valuable drugs currently available for the management of malaria. Appropriate drug utilization has a huge contribution to global reductions in morbidity and mortality with its consequent medical, social and economic benefits (Teferra et al, 2002). Irrational use of ACT could undermine one of the goals of combination therapy, which is to prevent the emergence of resistant malaria parasites. Drug use patterns can be evaluated in terms of prescribing and dispensing practices as well as patients' use of the drug. The role of prescription practices in the emergence of anti-malarial drug resistance in Nigeria has not been fully elucidated (Gbotosho et al 2009).

A 2012 study to assess physicians' prescribing patterns of antimalarial drugs during pregnancy at the obstetrics and gynaecology department of the University of Maiduguri Teaching Hospital (UMTH), Borno state, Nigeria found that Sulphadoxine-pyrimethamine were prescribed for prophylaxis in 72.67% of cases. Artemisinin alone/combinations 66(21.22%) were prescribed for treatment of clinical infestations, followed by quinine 3(0.96%) and chloroquine 1(0.32%). There was a significant association between the antimalarial drugs prescribed and the goal of therapy. The diagnostic approach used for the prescription of the various antimalarial drugs for treatment in these pregnant women showed that 80% of the diagnoses were based on clinical signs and symptoms while only 20% were based on laboratory investigations. In conclusion, the antimalarial drugs prescribing patterns was found to be inappropriate. There was lack of compliance with prompt parasitological confirmation by microscopy or alternatively by Rapid Diagnostic Tests (RDTs) in all pregnant women suspected of malaria before treatments were started and generic prescriptions (Okoro, Nwambu 2012).

A retrospective quantitative study was designed to examine case records of patients treated for malaria in either a government or a private hospital in Ibadan, south-west Nigeria, over a 20-year period, cutting across three phases of resistance to chloroquine in Nigeria: pre-resistance, emerging resistance and dissemination of resistance. Patient prescriptions were examined for use of anti-malarial drugs, sub-therapeutic doses of chloroquine, co-administration of anti-histamines with chloroquine. This study focused on evaluating the prescribing practices of medical practitioners in public and private hospitals prior to introduction of ACT in Nigeria and the potential contribution of the prescribing practices to the emergence of chloroquine resistant malaria in south-west Nigeria, in order to forestall a repeat of this with ACT; to provide valuable guidelines on the use of ACT in Nigeria in order to prolong the clinical utility of the drug (Martin et al 2007).

Case record files of 2,529 patients were examined. Chloroquine was the main drug used in treatment of malaria throughout the periods studied, with frequency of prescription at both sites ranging from 91.4% to 98.3% during the pre-resistance years. It was administered as standard doses during the pre resistance years. Anti-histamines, especially promethazine, were routinely co-administered with chloroquine at this period too. However, the practice

of prescribing sub-therapeutic doses of chloroquine at the private health care facility coincided with the latter phase of emerging resistance and phase of dissemination of resistance. Frequency of prescription of sub-therapeutic doses increased from 6.7% in 1983 (pre-resistance years) to 43.6% in 1997 (dissemination of resistance phase) at the private health care facility. Frequency of co-administration of anti-histamines with chloroquine also reduced during the period of dissemination of resistance (Martin et al 2007).

The study revealed that chloroquine was the most commonly prescribed anti-malarial drug throughout the phases studied. The prescription of substandard doses of chloroquine was more prevalent coinciding with the period of dissemination of resistance. The results from the present studies confirm the influence of prescription of inappropriate doses of anti-malarial drug on dissemination of drug resistance falciparum malaria and the need to improve malaria treatment practices in Nigeria. This study describes a lack of adherence to national treatment guidelines, especially in the private sector, and a relationship between prescription practices and dissemination of drug resistant falciparum malaria. As Nigeria adopts the use of ACT, there is an urgent need to improve malaria treatment practices in Nigeria in order to prolong the clinical shelf-life of the combination (Martin et al 2007).

In a survey of the attitude and practices in the treatment of malaria among doctors practicing in Enugu urban, Nigeria, standard questionnaire technique was used among 300 doctors practicing in Enugu urban. Chloroquine and sulfadoxine – pyrimethamine were the commonest drugs used for treating uncomplicated malaria, while quinine was the commonest drug used for treating severe malaria. More than 60% of the doctors prescribe intramuscular chloroquine in the dosage of 5ml (~200mg) daily for 3 days for adults and 5mg/kg/daily for 3 days for children. Recommended dosage of quinine was used by 41.8% of the doctors in treating children, and 50% of doctors in treating children, and 50% of doctors in treating adults. Comparison between duration of practice, or area of intramuscular chloroquine and intravenous quinines showed no significant difference with P values > 0.05. It was concluded that incorrect use of parental antimalarial drugs occurs at all levels and specialties of medical doctors practicing in Enugu (Harrison et al, 2004).

In another study to assess prescribing practices for uncomplicated malaria in government and private health facilities in Cross River State, an audit of 665 patient records at six private and seven government health facilities was done in 2003. Clinicians in the private sector were less likely to record history or physical examination than those in public facilities, but otherwise practice and prescribing were similar. Overall, 45% of patients had a diagnostic blood slides; 77% were prescribed monotherapy, either chloroquine (30.2%), sulphadoxine-pyrimethamine (22.7%) or artemisinin derivatives alone (15.8%). Some 20.8% were prescribed combination therapy; the commonest was chloroquine with sulphadoxine-pyrimethamine. A few patients (3.5%) were prescribed sulphadoxine-pyrimethamine-mefloquine in the private sector, and only 3.0% patients were prescribed artemisinin combination treatments (Meremikwu et al, 2007).

This study has shown a wide variety of anti-malaria drug prescribing, but with overall prescribing in government and private facilities being remarkably similar. Monotherapy with chloroquine, sulphadoxine-pyrimethamine and artemisinin compounds were the first, second and third most common prescription practices respectively. As this audit was conducted in a period when Nigeria was transiting from chloroquine to artemisinin-based combination therapy (ACT) as recommended treatment for uncomplicated malaria, it is not surprising perhaps that this audit reflects old recommendations. What is, however, of concern was the high use of artemisinin monotherapy which was neither a recommendation in the old nor the new national treatment policy (FMOH, 2005). The current WHO treatment guideline for uncomplicated malaria discourages artemisinin monotherapy (WHO, 2003). Irrational use of artemisinin and its derivatives as monotherapy could negate one of the goals of combination therapy which is to prevent the emergence of drug resistant malaria parasites (White et al, 1996).

The study also concluded that malaria treatments were varied, but there were not large differences between the public and private sector. Very few are following current WHO guidelines. Monotherapy with artemisinin derivatives is relatively common (Meremikwu et al, 2007). There is need to develop and effectively disseminate evidence-based practice guidelines as a strategy for improving prescribing practice in both public and private health care facilities.

A study to assess the prescription pattern and level of knowledge in the use of antimalarial drugs including ACTs among medical practitioners in Osogbo metropolis, southwest Nigeria, an endemic area of Plasmodium falciparum infection found that 82.4% prescribed chloroquine despite the widespread resistance, indicating that this remains the most prescribed antimalarial drug. 45.7% apply the dosage regimen correctly; 66.7% prefer the use of chloroquine injection; 85.6% give chlorpheniramine with chloroquine because of pruritis; 14.4% give it because of its synergistic and reversal mechanism. Other commonly prescribed drugs include sulphadoxine-pyrimethamine (71.1%), halofantrine (53.6%), amodiaquine and quinine (51.1%), mefloquine (20.6%), artemisinin or ACTs (18.6%) and co-trimoxazole (17.5%). Of these, the dosage regimen was applied correctly for: sulphadoxine-pyrimethamine (30.9%), halofantrine (12.8%), amodiaquine (3.2%), and co-trimoxazole (2.1%), and ACTs, quinine and artemisinin monotherapy (1.1%). About 40% of practitioners prefer the use of combination therapy in the future (Ogungbamide et al, 2005).

In another study, the conformity of the prescribed antimalarials for the children that presented to the paediatric outpatient clinic to the World Health Organization's recommendation and the national guidelines for malaria treatment in Nigeria was the aim of the research. Artemesinin based combination drugs constituted 26.2% of all the antimalarials prescribed followed by Sulphadoxine+Pyrimethamine 564 (20.0%). Artemether+lumefantrine was the least 40 (1.4%). Majority of these drugs were prescribed based on provisional diagnosis rather than on diagnostic investigations. Most of the prescriptions including Sulphadoxine+Pyrimethamine were written in their brand names and were associated more with under dosage errors. It was concluded that more efforts should be geared towards malaria prevention than chemotherapy. Nigeria policy for malaria treatment should include continuous surveillance of rational prescription of the available drugs, especially the artemesinin-combined drugs and implementation of the new guidelines (Oshikoya, 2007).

Another study aimed at determining the pattern of malaria presentation and treatment in a military health facility. A retrospective analysis of data of all malaria cases treated at Obisesan Naval Medical Centre (ONMC) between January and December 2006. Over a

quarter (27%) of the total cases were under-5 years of age, 47.2% were less than 15 years while 58 (3.4%) were pregnant women. In spite of the availability of a functional laboratory, 1419 (83.2%) cases were diagnosed on clinical assessment only while 94 (5.5%) were based on both clinical assessment and laboratory tests. Nine hundred and sixteen cases (53.7%) were prescribed Artemisinin-based combination therapy (ACT), 485 (28.4%) had Chloroquine only, 287(16.8%) had Sulphadoxine-Pyrimethamine combination, 7(0.4%) had Quinine while 11 (0.6%) had other anti-malarial drugs (Hussain, Echoga, Iwarere 2009).

It was concluded that children below 15 years and pregnant women constituted about half (50.6%) of the total cases. In spite of the availability of a functional laboratory, diagnosis of malaria for 83.2% cases was based on clinical assessment only. Slightly more than half of the total cases were prescribed ACT while the rest were prescribed monotherapy anti-malarial drugs. Recommendations, therefore included that ACT should be the first line drug for the treatment of uncomplicated malaria in ONMC. The health workers should be sensitized on appropriate malaria diagnostic procedure (Hussain et al 2009).

A study aimed at describing the trend in the use of antimalarials for the treatment of malaria in children under 5 years from year 2000 to 2006 in south-eastern Nigeria. Adherence to the 2005 National Antimalarial Treatment Policy was assessed. The study was retrospective and longitudinal, using data obtained from in-patients folders of children under 5 years, hospitalized for malaria infection in 11 secondary health care centres in south-eastern Nigeria. The result of the study showed that chloroquine was mostly used for treating severe malaria in children less than 5 years. This is despite the indication of a switch to quinine and parenteral artemisinins by the National Treatment Policy. Prescriptions of drugs were also not by INN names.

However, many prescribers do not practice polypharmacy and most of the drugs used in secondary health care centres for treatment of severe malaria were in the essential drug list. The study thus concluded that there was the need for further studies to establish factors that affect the dissemination and use of treatment guidelines in Nigeria (Ukwe et

al, 2008). This study aims at describing the adoption/use of these treatment guidelines in Oyo state, south western Nigeria.

In a similar vein, this next study examines the diagnosis of malaria and pattern of prescription of antimalarial drugs in the most vulnerable age group (the under 5 children) in Sokoto in order to identify the possible shortcomings and suggest solutions so as to improve the treatment outcome in future. The hospital records of 430 children with malaria infection admitted for treatment in a chosen tertiary health facility between January to December 2005 were selected for study. Forty-eight case records were excluded due to incomplete information. Data on demographic, clinical features of disease, diagnostic procedures, drug administration and the treatment outcome were collected from the patients' records (Orimadegun et al, 2008).

Analysis of the data revealed that more male (213) than female (169) children were admitted for malaria treatment: Fever with convulsion (55.8%) was the commonest presenting symptoms, and anemia was the most frequent complications of malaria recorded. Chloroquine was found to be the most prescribed antimalarial agent and overall antemisinin-based drug was prescribed either as a first or second line treatment in only 18.2% of the cases. The death rate recorded was 16% (Orimadegun et al, 2008).

In conclusion, the study postulated that the pattern of antimalarial drugs prescription in the study center in most cases did not meet the recommended guidelines. The prescriptions were predominantly chloroquine, instead of artemisinin based. The death rate was comparatively high. Measures to raise the level of awareness among the practitioners on the current National policy on malaria treatment through seminars and workshops were suggested.

Early diagnosis and prompt treatment including appropriate home-based treatment of malaria is a major strategy for malaria control. A major determinant of clinical outcome in case management is compliance and adherence to effective antimalarial regimen. Home-based malaria treatment with inappropriate medicines is ineffective and there is

insufficient evidence on how this contributes to the outcome of severe malaria (Orimadegun et al, 2008).

Another study evaluated the effects of pre-hospital antimalarial drugs use on the presentation and outcome of severe malaria in children in Ibadan, Nigeria. A total of 168 children had treatment with an antimalarial treatment at home before presenting at the hospital when there was no improvement. There were no significant differences in the haematocrit levels, parasite counts and nutritional status of the pre-hospital treated and untreated groups. The most commonly used antimalarial medicine was chloroquine. The risk of presenting as cerebral malaria was 1.63 times higher with pre-hospital use of chloroquine for treatment of malaria, with a four-fold increase in the risk of mortality.

The present study has shown that pre-hospital antimalarial treatment of febrile children remains a significant practice among child caregivers in Nigeria as previously reported from the same area (Ajayi et al, 2006). The prevalence of CQ use, 54.2% in this present study, is high despite the recent National drug policy change from CQ to ACTs. Data has shown that pre-hospital administered CQ was associated with an increased risk of severe malaria, with a concurrent increase in mortality. This may be due to a recent upsurge in the incidence of CQ resistance malaria in Nigeria. These findings corroborates a recent report by Sowunmi and co-workers (Sowunmi et al, 2006) that observed failure to clear parasites within three days and the prevalence of fever two days after commencement of CQ were strong indicators or predictors of malaria treatment failure in Nigerian children.

In addition, there is some evidence to suggest that households of a high social class are more likely to use antimalarials to which there is less parasite resistance. As majority of our patients were from lower socioeconomic class, reducing the cost, improving the availability and access to quality pre-packaged artemisinin-based antimalarial may improve pre-hospital treatment of malaria and thus prevent resistance (Orton et al, 2005). White, 2004 observed that the main obstacles to the success of combination treatment in preventing the emergence and spread of resistance, is incomplete or inadequate treatment. Thus, factors such as availability, wide coverage of good quality drugs and adequate antimalarial treatment regimens need to taken into cognizance to prevent emergence of

resistance to ACTs. Furthermore, early diagnosis and prompt treatment are major strategies for malaria control. In the light of these findings, early treatment with ineffective medicines can result in worse outcome.

Thus, home treatment with chloroquine significantly influences the outcome of severe malaria. This finding underscores the need for wide-scale monitoring to withdraw chloroquine from circulation in Nigeria and efforts intensified at promoting prompt treatment with effective medicines in the community (Orimadegun et al, 2008).

Another study from Nigeria has shown that correct use of chloroquine increased from 2.6% to 52.3% among home caregivers after training, however as high as 47.7% still wrongly treat febrile children (Ajayi et al, 2008). This finding underscores the need to review the present policy on home management of malaria. If this is not adequately addressed, even the use of more efficacious antimalarials like the ACTs, still poses a risk to effective home based management of malaria at the community level.

Worldwide, malarial infestation in pregnancy is a major public health concern and ranks amongst the commonest complication of pregnancy in Nigeria (Hviid, 2006). It is an important preventable cause of significant maternal morbidity and mortality with associated fetal wastage (Okonofua et al, 1996). Recognizing its adverse impact on pregnancy outcome, if not promptly and adequately managed, a number of key programmes have been designed to help combat the scourge. These include the African initiative on malaria, the roll back malaria program and very recently its incorporation as one of the key items on the list of the millennium development goals (Haslegrave et al, 2005**).** .Nigeria like other malaria endemic countries, has consistently signed onto these initiatives.

Existing data suggest that management of malaria is becoming increasingly controversial as multiple drug resistance emerges (Dhih, 2005). An important feature in all these changing pattern of resistance is that it also affects drugs used in pregnancy for prophylaxis and treatment of clinical malaria. It has therefore become imperative in view of the development of resistance to the various classes of drugs, that treatment guidelines

be reviewed and/or formulated where one does not exist. The latest Nigerian National Antimalarial Guidelines and Treatment Policy were released in February 2005 by the Federal Ministry of Health (FMOH 2005) further supporting the attention given to this condition in the country.

This guideline recommends Intermittent Preventive Therapy (IPT) with Sulphadoxine/Pyrimethamine as the mode of prophylaxis in pregnancy, and for treatment of clinical infestations. Quinine is recommended as first line agent in all trimesters while artemisinin based combinations are considered safe second line agents in second and third trimesters. However, in the first trimester, the artemisinin based combinations can be used where there are no suitable alternatives.

In this vein, a study was conducted to assess the prescription pattern of antimalarials in pregnancy, clinical response to treatment and determination of the knowledge of recommended guidelines and policy of antimalarial use in pregnancy, by Nigerian Obstetricians. Questionnaires were administered on 84 doctors at various stages of training in obstetrics and gynecology. Eighty-three (83%) respondents agreed that malaria in pregnancy was commonly encountered by them. Sulphadoxine-pyrimethamine (33%), chloroquine (21%) and pyrimethamine (20%) were the most commonly used drugs for malaria prophylaxis. Seventy one (71%) of the total respondents exclusively used chloroquine as first line therapeutic agent. Reasons for this include efficacy, safety and cost. Eighty-one (81%) doctors reported moderate to very rapid response to their choice of drugs. Treatment failure was more commonly encountered with the first line agents. There was no difference in the content of knowledge of all cadres of doctors, and 64%~83% of them across cadres had the correct knowledge of what is nationally recommended (Lawrence et al, 2008).

The research concluded that malaria remains a major entity in pregnancy in Nigeria. The obstetricians have adequate knowledge of recommended guidelines and policies, but poorly implement them. Further research was thus, advocated for to generate global consensus on this. From the foregoing, it becomes imperative to ask the question as to why a larger percentage of the practitioners are still not using the recommended drugs for

both prophylaxis and first line agent for the treatment of malaria in pregnancy. A recent report on malaria in pregnancy indicates that the coverage of intermittent preventive treatment (IPT) of malaria in Sub-Saharan Africa is low (Hill et al, 2006). The authors reasoned that possible factors for this low coverage include poor health worker's practices, ineffective integration of malaria and reproductive health programmes.

Another notable result from the above study is that the practitioners insisted that from their practice experience, their first line and second line agents have continued to give them good results with a larger proportion (>90%) of their patients exhibiting moderate to very rapid response, to their first and second line agents respectively. They wondered the basis on which the WHO and Federal Ministry of Health's guidelines and policies were enunciated. This observation clearly shows that policy pronouncements are in some instances not matched with actual implementation. This is buttressed by the fact that despite Newman, *et al*. (2006) reporting of a rapid uptake of the new policy changes of intermittent prophylactic treatment in West Africa the situation in Nigeria is still as revealed by this study and hypothesize that it is likely to be same in other malaria endemic zones.

2.6 Factors influencing Physicians' Compliance with Antimalarial Treatment Policies

Strategies for improving compliance require accurate information about current practices. Clarity of guidelines, strong evidence, adequate funding of guidelines and support by opinion leaders especially professional bodies are some of the factors that positively influence the use of clinical guidelines (Sheldon et al, 2004). There is a need for in-depth study of factors that affect the use of treatment guidelines in Nigeria.

The objective of this next study was to determine the factors related to adherence, when using the amodiaquine/sulphadoxine-pyrimethamine (AQ/SP) association, a transitory strategy before ACT implementation in Senegal (Aurélia et al, 2009). The study was conducted in five rural dispensaries. Children, between 2 and 10 years of age, who presented mild malaria were recruited at the time of the consultation and were prescribed AQ/SP. The child's primary caretaker was questioned at home on D3 about treatment compliance and factors that could have influenced his or her adherence to treatment. A

logistic regression model was used for the analyses. The study sample included 289 children. The adherence rate was 64.7%. Two risks factors for non-adherence were identified: the children's age (8–10 years) and the profession of the head of household (retailer/employee versus farmer). Previously seeking care satisfaction with received information, and the quality of history taking were significantly associated with good compliance (Aurélia et al, 2009).

The results of the study above show the importance of information and communication between caregivers and health center staff. The experience gained from this therapeutic transition emphasizes the importance of information given to the patients at the time of the consultation and drug delivery in order to improve drug use and thus prevent the emergence of rapid drug resistance (Aurélia et al, 2009). The study thus concluded that although improved anti-malarial drug usage faces significant logistical constraints, a number of simple, practical interventions – both at the community and clinic level – are effective: development of consultation guidelines, health staff training, health education in schools, patient counseling and illustrated instructions could be useful tools. Nevertheless given the multiplicity of factors contributing to poor adherence to medication, a multi-factorial approach is required; it cannot be solved through a single action. Improving compliance implies that patients and health staffs understand both how and why drugs should be taken correctly (Ross-Degnan et al, 1999).

A 2004 study showed that only 40% of the doctors utilized the National guidelines for treatment of malaria in Enugu Urban, 3.0% patients were prescribed artemisinin combination treatments for uncomplicated malaria in government and private health facilities in Cross River State and artemesinin based combination drugs constituted 26.2% of all the antimalarials prescribed for the children that presented to the pediatric outpatient clinic (Harrison et al 2004). Identified impediments to adherence to antimalarial treatment guidelines include insufficient supply of AL and hence fears of stock outs and concern about AL costs as an impediment to AL prescription, training messages that contradicted the recommended guidelines also led to health worker non-adherence, compounded by a lack of follow-up supervision. In addition, the availability of non-recommended antimalarials such as amodiaquine caused prescription confusion. Some health workers

maintained that shortage of staff had resulted in increased patient caseload affecting the delivery of the desirable quality of care and adherence to guidelines (Harrison et al, 2004).

A systematic literature review of all interventions to improve provider- and/or user-side behavior in the prompt and appropriate treatment of uncomplicated malaria (with appropriate evaluation design and Roll Back Malaria outcome indicators) found 23 studies for review. Only 16 studies targeted providers, nine in the public sector and seven in the private sector. Just four interventions were conducted at national scale. These data suggest that very little is known about what interventions work in improving prompt and effective treatment of malaria. In the context of scaling up effective malaria control and malaria elimination plans and in increasing access to artemisinin combination therapies (ACTs), increased research in this area is crucial.

Inferring from all the above literatures reviewed, it is evident that chloroquine resistant p. falciparum malaria has been established. To this effect, policy guidelines in several countries including Nigeria have been reviewed to embrace the use of artemisinin-based combination therapies (ACTs). Compliance with these guidelines has implications for the control of malaria. Assessment of compliance have been conducted and documented for a few states in the country. This research intends to probe into the factors influencing compliance of secondary health physicians with the National Antimalarial Treatment Policy in Oyo state.

2.7 Conceptual Framework

The PRECEDE framework/model is the theoretical model selected to guide this study. PRECEDE stands for Predisposing, Reinforcing and Enabling Causes in Educational Diagnosis and Evaluation. The PRECEDE model has five phases; phase 1 – social diagnosis, phase 2- epidemiological diagnosis, phase 3 – behavioral and environmental diagnosis, phase 4 – educational and organizational diagnosis and phase 5 – administrative and policy diagnosis. The fourth phase (Educational Diagnosis) shall be used for this study. This phase is used in the diagnosis of behavioural antecedents.

Phase 4 identifies three kinds of causes of health behaviors - predisposing factors, enabling factors, and reinforcing factors. The critical element here in is in the selection of the factors, which if modified, will be most likely to result in behavior change. This selection process includes identifying and sorting (positive and negative) these factors in appropriate category, prioritizing factors among categories, and prioritizing within categories. Prioritization of factors is based on relative importance and changeability. Educational and organizational diagnosis looks at the specifics that hinder or promote behaviors related to the health issue (U.S. Department of Health and Human Services, 2005).

According to the model, behavioural antecedents could be categorized into three types as follow: predisposing, enabling and reinforcing factors. The tenets of this model were useful for the selection of some variables for study or measurement in this study. The basic elements of each type are summarized as follow:

- The **Predisposing factors:** These include antecedent factors that provide the rational or motivation for behaviour to occur. This component of the PRECEDE was used to guide the framing of some of questionnaires. Questions, which probed into predisposing factors, included those relating to, awareness, knowledge and attitudes towards the adoption and use of the revised National Antimalarial Treatment Guidelines in the management of uncomplicated malaria by Facility based secondary health care physicians.
- The **Enabling factors:** These are factors, which relate to the presence or absence of resources such as money, time, adequate skills, training materials, which can influence

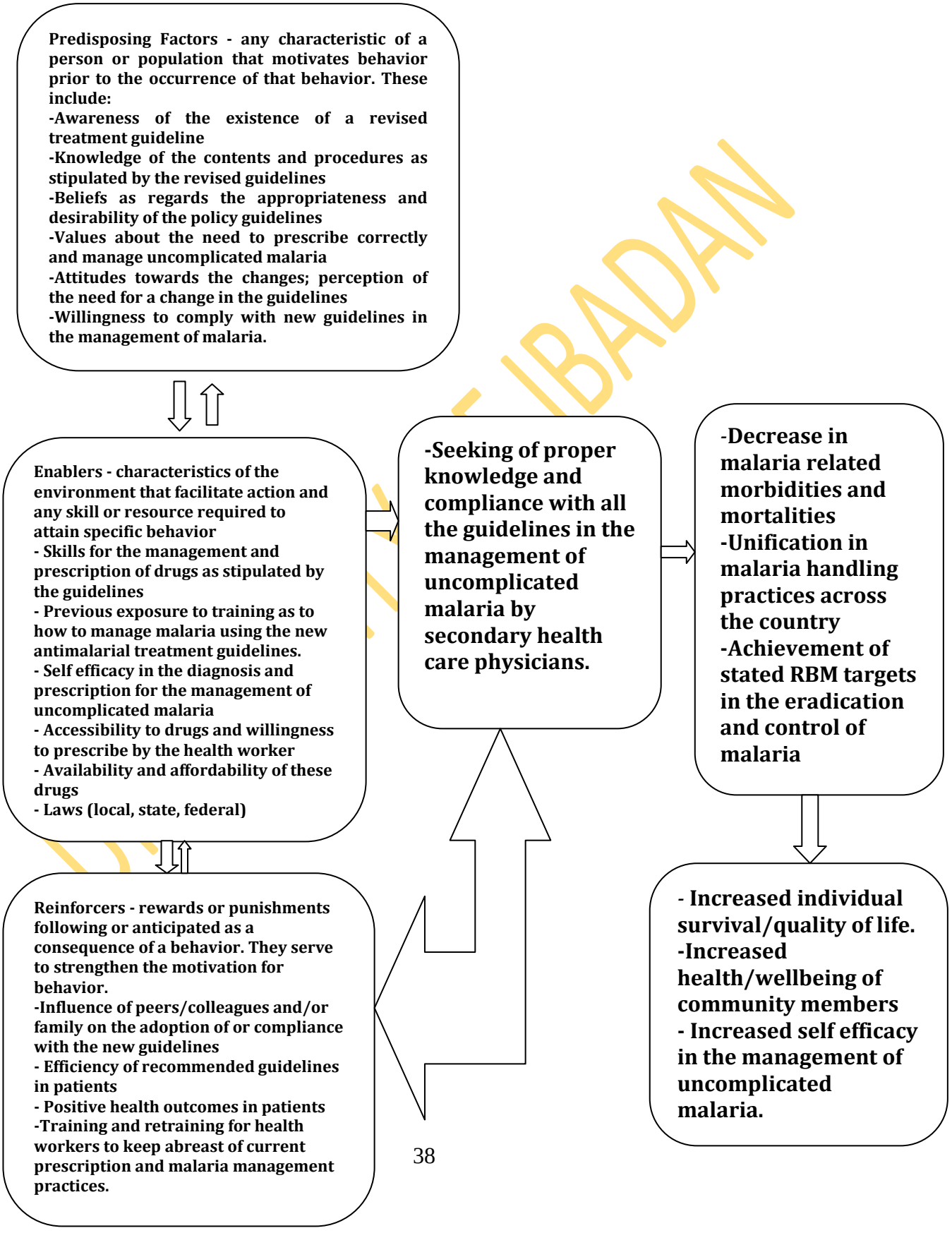
or enable a motivation to be realized. Questions derived from the enabling factors included those related to physicians' exposure to trainings and skill acquisition on the use of the revised guidelines, self efficacy/level of confidence in managing uncomplicated malaria using the revised national antimalarial treatment guidelines, accessibility, availability and affordability of the newer recommended drugs for the management of uncomplicated malaria.

- The **Reinforcing factors:** The reinforcing factors are factors, which are due to the influence of significance others. These include influence of peers/colleagues, health authorities and other significant others.

For the purpose of this research, the framework was adopted to identify factors that facilitate, promote and reinforce the behaviour to seek knowledge about and comply with the revised antimalarial treatment policy among facility based secondary health care physicians in Oyo state.

The details of the application of the PRECEDE model are highlighted in figure 2.4:

Figure 2.4- PRECEDE framework applied to the diagnosis of physicians' behavioral antecedents related to compliance with the National Antimalarial Treatment Guidelines in the management of uncomplicated malaria.



CHAPTER THREE

3.0. METHODOLOGY

3.1 Study design

The study was a descriptive cross-sectional design. The scope of the research was limited to gathering data among facility based secondary health care physicians in Oyo state on their level of awareness, knowledge of the contents, extent of compliance and challenges faced when complying with the national antimalarial treatment guidelines.

3.2 Description of study area

The study was carried out in Oyo State alias 'pacesetter state'; an inland state in south-western Nigeria, with its capital at Ibadan; the most populous city in black Africa with about two and a half million people. Oyo State covers approximately an area of 35,742 square kilometers and is ranked 14th by size and a population of 6,617,720 (National Population Census, 2006). It was formed in 1976 from the former Western State, and originally included Ọsun State, which was split off in 1991. Oyo State is homogenous, mainly inhabited by the Yoruba ethnic group who are primarily agrarian but have a predilection for living in high density urban centers. The indigenes mainly comprise the Oyos, the Oke-Oguns, the Ibadans and the Ibarapas, all belonging to the Yoruba family. The Climate is equatorial, notably with dry and wet seasons with relatively high humidity. The climate in the state favours the cultivation of crops like maize, yam, cassava, millet, rice, plantain, cocoa tree, palm tree and cashew.

The state has thirty three (33) Local Government Areas (LGAs), 1,703 public schools, 971 private nursery/primary schools, 335 public secondary schools including 7 schools of Science and 57 private secondary schools, 15 special primary schools and 8 special units in secondary schools catering for handicapped children and 15 Nomadic schools. Also in the State, there are five government technical colleges at Oyo, Ogbomoso, Ibadan, Saki and Igbo-Ora. It's also home to Africa's leading fountain of knowledge, the iconic University of Ibadan (The University was originally instituted as an independent external college of the University of London, then it was called the University College, Ibadan. A

college of education; Oyo State College of Education, the Polytechnic, Ibadan, with 2 satellite campuses at Eruwa and Saki, and a State-owned University, The Ladoke Akintola University of Technology (LAUTECH), Ogbomoso which is jointly owned by Oyo and Osun State Governments are also located in State. Oyo state has forty-three (43) secondary health care facilities spread across all thirty-three LGAs of the state (Appendix 1).

3.3 Study population

The study population consisted of physicians - doctors in charge of managing malaria patients in all 36 selected secondary health care facilities in Oyo state. Overall, there are 160 doctors – 143 full time and 17 youth corp. members employed by the state at the secondary health care facility level as at the time of this study, comprising of 118 males and 42 females (Oyo State Hospital Management Board, 2011).

3.4 Sample Size

The study enrolled all consenting doctors who manage malaria cases in adults, pregnant women and children less than five (5) years in all 36 selected secondary health care facilities in Oyo state. In all, ninety-four (94) doctors were interviewed using the semi-structured questionnaire.

3.5 Sampling procedure

The list of all secondary health care facilities in Oyo state constituted the sampling frame for this study. The steps involved in the selection were as follows:

(i) Categorization of the hospitals into those that offer malaria treatment services (n= 36) and those that offer other forms of specialized care (n=7). The latter group were excluded from the study.

(ii) The eligible facilities (n=36) were grouped into five zones based on location/nearness to facilitate a quick plan that enabled phased collection of data across the state.

The five zonal strata are named below:

Strata 1: Ibadan - twelve (12) hospitals.

Strata 2: Oyo/Ogbomoso - six (6) hospitals.

Strata 3: Ibarapa - four (4) hospitals.

Strata 4: Kajola/Iwajowa - six (6) hospitals

Strata 5: Igbetti - eight (8) hospitals (Appendix 2).

iii) In each facility, physicians in charge of managing malaria cases were identified and recruited into the study based on the inclusion criteria (see below) and their informed consent.

3.6 Inclusion and Exclusion Criteria

Inclusion criteria for selection of cases were:

I) Shall be a doctor - medical officer/general practitioner

II) Should be in charge of treatment of uncomplicated malaria at the facility.

III) Should have managed at least one case of malaria in a child under five, pregnant woman or adult in the last four weeks.

Respondents' Recruitment process

Using the above criteria, **94** doctors – thereafter referred to as "respondents" were recruited into this study. Thirty (30) doctors were excluded from the study for varying reasons, thus:

i. Sixteen (16) doctors holding administrative positions; Chief Medical Directors (CMDs) were excluded from the study, as they did not satisfy the third inclusion criterion; excluding them became very necessary, as records of patients seen by them needed for the completion of the checklist – part of the instrument for data collection were inaccessible.

ii. Nine (9) specialist doctors excluded from the study as they did not satisfy criterion number two

iii. As at the time of this study, 5 doctors were recorded to be on leave – 3 of them on annual leave and 2 on sabbatical leave and where thus not available to partake in the study.

iv. Four (4) doctors refused giving their consents to the study despite giving them all information citing time and volume of work to do as excuses and thus were excluded.

v. One doctor opted out half way into the questionnaire administration following a phone call requesting his presence at an emergency.

3.7 Instrument for Data Collection

The instrument for data collection was an interviewer administered semi-structured questionnaire. The choice of administering the questionnaire via an interview rather than self administration stemmed out of the need to assess the "on-the-spot" knowledge of respondents on their diagnostic and prescription roles in the management of malaria cases as stipulated by the National Malarial Treatment Guidelines adopted in 2005. It was logically reasoned that since the questionnaire was derived, in part, from the guidelines, a respondent could complete the answers from the document (if he had access to one), if it were dropped for self-administration and collected later.

The 10-page questionnaire consisted of five sections. Section I focused on socio-demographic information, section II- contained questions relating to awareness of the existence of the policy document/guidelines and questions to document the perception of respondents on the need for the policy as well as involvement in the policy development processes. Section III was developed from the content of pages 1-5 of the 2005 National Anti-malarial Treatment Guidelines. It contains questions on knowledge of the doctors of their diagnostic and prescriptive roles as stipulated by the guidelines using the 60-point knowledge scale. Section IV contained questions on challenges faced by doctors in the implantation of the guidelines. Lastly, section V focused on extent of compliance of doctors to these guidelines in the management of malaria cases.

3.71 Case note Review

In assessing the compliance of the physicians with the national anti-malarial treatment guidelines, a checklist was used to compile information from case notes retrieved from the respondent's table. At least one, and at most, three case notes of malaria patients were randomly selected per respondent and information checked against the list of options provided in the "checklist" – basic demographic characteristic of patient, details of diagnostic indicators, diagnosis, treatment regimen and follow up notes written (Appendix 3). The checklist included 11-point compliance scale with a point plotted for completing each section of the checklist.

3.72 Validity and reliability of instrument

Validity: In order to ensure the validity of the instrument for data collection; the semi-structured questionnaire was

i) Reviewed by experienced researchers in the Faculty of Public Health, University of Ibadan. The experienced researchers consisted of specialists in Health Promotion, Education, Population, and Reproductive Health.

ii) Pretest on 9-10 June 2010 using a study population carefully selected based on similarities in characteristic with the study population. Two secondary health care facilities were selected for the pre-test in Osun State. Osun State was strategically selected as it shares similar socio-cultural characteristics as the study population; Oyo State and was indeed carved out of the latter in 1991. The sample population for the pre test was drawn these facilities:

   a. Comprehensive Health Centre, Akinremi, Ile-Ife
   b. State Hospital, Oke-Ogbo, Ile-Ife

Eleven (11) questionnaires were administered in both facilities. The completed questionnaires were edited and the responses coded and entered into a computer. The data were analyzed using descriptive and t-test statistics.

Based on the pre-test results, the following recommendations and changes to the main study were made:

i. The title of the study was modified to read "Compliance with the National Antimalarial Treatment Guidelines by Facility Based Secondary Health Care Physicians in Oyo state".

ii. Owing to the bulky nature of the 10-page questionnaire, average administration time per questionnaire was recorded as 25 minutes. Most respondents complained of the time needed to partake in the study. Thus, it was reasoned that since the questionnaire is to be interview administered, time could be saved if respondents could read the questions themselves while the interviewer ticked on his responses in the questionnaire. Thus, a 3-page questionnaire containing only questions teased from the full questionnaire was developed and printed on yellow colored A4 sheets for quick distinction. Thence for the main study, the yellow page questionnaires were handed out to respondents while the interviewer ticked responses to questions on the main

questionnaire. The yellow copies of questionnaires were retrieved from the respondent after the interview.

Reliability: The pre-test results were entered for reliability test. The responses coded, entered and analyzed with the SPSS software. The reliability of the questionnaire was assessed using the Cronbach's Alpha statistics. A coefficient of 0.8 was obtained, which indicated that the instrument was reliable. The outcome of the pre-test was used to correct and modify questions, which were not clear to respondents.

3.8 Recruitment and training of Research Assistants (RAs) for the study

Considering the wide geographical coverage of this study; involving visits to 36 general and state hospitals spread across 33 LGAs of Oyo state, it became necessary to recruit and train RAs who would help in data collection. A 7-man team of researchers comprising of the principal investigator and six RAs was constituted. The following selection criteria was used to select the eight (8) initial RAs for training with the aim to select six thereafter.

(1) Holds at least a B.Sc in a health and/or science related field.
(2) Familiar with and had a good understanding of medical terms especially in the management of malaria.
(3) Good communication and report writing skills.
(4) Able to devote all hours to the research work while it lasts.
(5) Previous experience in similar research works.

RAs were assigned to different zones based on their familiarity of and previous work experience in these areas.

3.81 Training of RAs

Two day training held for the selected eight (8) research assistants on 24th - 25th May 2010. A training manual, plan and timetable were developed and approved by the project supervisor for the training (Appendix 4, 5). The appropriate training methods and materials for facilitation were selected. These methods included a combination of largely active training methods such as participatory discussions, demonstration and return demonstrations, role-play and lectures to make the training participatory. Recapitulatory

questions for monitoring and assessing trainees' comprehension was asked from time to time. The training programme lasted from 9.00 a.m. to 3.00 p.m. daily at the ARHEC conference room, department of health promotion and education, Faculty of public health, University College Hospital.

The trainees received training materials, sessions introduced them to the research study and methodology, role-plays on the data collection procedure (entry processes, seeking consent of potential cases for the study, signing of confidentiality assurance form and administration of questionnaire). Sample hypothetical case notes of malaria patients were used to demonstrate the use of the compliance checklist on section V of the questionnaire whilst a field manual designed to serve as a quick guide and reference material to RAs during the course of data collection on the field (see appendix 6) were introduced to and given to the RAs. Negotiations and logistic plans for data collection were discussed and stipends paid to RAs.

The researcher facilitated the training with supervision by staff members of the Department of Health Promotion and Education. This team helped to assess and score trainees and based on the assessment scores, the final six research assistants were selected for the study.

Each RA was assigned potential dates for data collection in phases and were directly supervised by the researcher. Each RA received a copy of the field manual, copies of the questionnaire, one copy of the 3-page yellow sheet questionnaire, a letter of introduction from the department, a copy of the ethical approval from the state ministry of health and writing materials all contained in a clear water proof bag. All RAs participated in the data collection for the pre-test of the questionnaire in Ile-Ife, Osun state.

3.9 Data Collection

Data collection took place from 1st - 30th September 2011 in all 36 secondary health care facilities in Oyo state. The huge time lag between initial training, pre-test administration of questionnaire and data collection necessitated a one-day refresher training for all six research assistants. This held on August 24, 2011.

In every facility visited, the entry process entailed the RAs first point of call as the Chief Medical Director (CMD)'s office to introduce selves, explain briefly the purpose of the study and the methodology of data collection and obtain his consent to administer questionnaires to eligible doctors. At the doctors' office, individual consents were sought and were enrolled based on their eligibility using the selection criteria. Following administration of the questionnaire, case notes of malaria patients seen by the respondent was stratified into three – child under five, pregnant woman and adult. For every respondent, at least one, and at most, three recent prescription records from each stratum were obtained and used to complete the checklist. These records could be the ones of malaria patients seen earlier on that day, or the previous day but still available at the doctor's table.

In cases where there was no medical doctor available in any of the facilities, we inquired about the doctor; if not available at the moment, we ask for a better time when we will most definitely meet him/her and return to administer the questionnaire. If temporarily absent for reasons like leave, we note the absence in that facility and move on to the next facility.

3.91 Data collection by zonal strata

Stratum 1 – Ibadan: 5th to 12th September, 2011. Twelve (12) facilities were covered to administer a total of forty two (42) questionnaires in this zone. Questionnaires were administered to doctors in the following facilities; General Hospital Lagun (2), General Hospital Kasumu Ajia (1), General Hospital Ikutayi (1), General Hospital Orile-odo (1), MCH Apata (2), Oni and Sons Memorial Hospital (8), Jericho Nursing Home (2), General Hospital, Moniya (6), Ring Road State Hospital (6) and General Hospital Jericho (2).

Stratum 2 – Oyo/Ogbomoso: 6th to 9th September 2011. Six (6) facilities were covered in this stratum and a total of sixteen (16) questionnaires were administered. Details of questionnaires administered by facility include General Hospital Fiditi (1), General Hospital, Ilora (2), General Hospital Oyo (5), General Hospital, Iresa Adu (1), General Hospital Ikoyi-Ile (1) and General Hospital Ogbomoso (6).

Stratum 3 – Ibarapa: 12th to 13th September 2011. Four (4) facilities were covered in this stratum. Nine (9) questionnaires were administered in this zone. Details of questionnaires administered by facility include: General Hospital Igbo-Ora (3), General Hospital Lanlate (2), General Hospital Eruwa (3) and General Hospital Ayete (1).

Stratum 4 – Kajola/Iwajowa: 15th to 22nd September 2011**.** Six (6) facilities were covered and a total of twelve (12) questionnaires were administered. Details of questionnaires administered by facility include General Hospital Iseyin (4), General Hospital Okeho (3), General Hospital Iganna (1), General Hospital Iwere-Ile (1), General Hospital Ado-Awaye (1) and General Hospital Okaka (1). This stratum has vast distances of the towns apart from each other, difficulty road terrains and warranted occasional returns made to one of the facilities (Ado-Awaye).

Stratum 5 – Igbetti: 22nd to 30th September 2011. Eight (8) facilities were grouped under these strata and fifteen (15) questionnaires were administered. General hospital Sepeteri (1), General Hospital Ago-Amodu (1), General Hospital Saki (4), General hospital Tede (1), General Hospital Igboho (3), General Hospital Igbetti (1), General Hospital Kishi (2), General Hospital Ago-Are (2).

3.10 Data analysis

The data collected were collated, cleaned, coded and entered into the computer using the Statistical Package for Social Science (SPSS) version 16. The knowledge section comprised of 21 questions with 137 items, were assigned a score of one point for every correct answer, and 0-point for every wrong answer, the correct answers made up a 60-point knowledge scale. Knowledge scores of 0-20, 21-40 and 41-60 were rated as poor, fair and good respectively. Two hundred and forty six case notes of malaria patients seen by respondents, which were randomly selected using stratified random sampling, were assessed for compliance on an 11-point scale. Compliance scores of 0-3, 4-7 and 8-11 were rated poor, fair and good respectively. The open-ended sections of the questionnaire were coded accordingly. Data were analyzed using t-test, ANOVA and chi-square statistics. The P-value was set at 0.05.

3.11 Ethical consideration

Ethical approval to carry out this study was sought and received from the Oyo State Ministry of Health (SMoH), consent and approval was gotten from all Chief Medical Officers of all thirty six (36) secondary health care facilities. The doctors enrolled for the study also did so following a full disclosure of the nature, purpose, time and benefits of the proposed study. The doctors were informed they could withdraw from the study without any sanctions. Only respondents who provided consent to be involved in the study were enrolled. The doctors were given assurance of confidentiality and the liberty to voluntarily participate in the study. This study followed the four ethical principles guiding the use of human respondents in research.

The study imbibed the core tenets of ethics in respect of research using human subject. These are **respect for persons**, **non maleifiscience**; no harm came to any of the respondents in this study, **justice**; equal preference and treatment was given to all respondents found eligible for this study and **beneficence;** a copy of the results of this study will be published, disseminated to the Oyo State Ministry of Health (one of their requests on approval was to gain access to the findings of the study) and other appropriate authorities.

3.12 Limitation of Study

The study was delayed because of a prolonged strike of Oyo state employed health workers – doctors and nurses in all government owned health facilities in the state which lasted for eleven months with bouts of irregular warning strikes and ‘faceless’ non-working periods disrupted all data collection plans. Also, because of the wide geographic scope of the study, data collection lasted one month as logistics to reach all facilities in the state; rural and urban inclusive was enormous. In some facilities especially the rural areas, doctors were not immediately available for questionnaire administration for a variety of reasons thus the need to re-visit such facilities on a scheduled appointment. The study however, enjoyed grant sponsorship totaling N250,000 from Future Health Systems (FHS), Nigeria and this aided greatly payments of research assistant fees, transport and other logistics for the study.

CHAPTER FOUR

RESULTS

4.1. Socio-demographic characteristics:

The socio-demographic characteristics of the respondents are presented in table 4.1. Majority (70.2%) of respondents were males. The ages of the respondents ranged from 24 to 58 years with a mean age of 40.1 ± 8.6 years. Most of respondents (84.0%) were married and Christians (78.7%).

Majority (98.3%) had MBBS degrees and 1.7% had add-on Masters' degrees. Respondents' years of experience of working in the secondary health care sector ranged from 0 – 34 years with a mean of 9.4 ± 3.4 years. (See table 4.1 for details).

All (100%) of respondents had managed malaria cases in the week preceding the study. Majority (84%) had ever received training on malaria management and 55.4% of these trainings were conducted by the Oyo state Ministry of Health.

Respondents' history of previous trainings on malaria management especially using the National Antimalarial Treatment Guidelines is presented in Figure 4.1.

Table 4.1- Socio-demographic characteristics of respondents

N=94

Characteristics	Number	%
Sex of respondent		
Male	66	70.2
Female	28	29.8
Age in years		
24 – 34	30	31.9
35 - 45	36	38.3
46 +	28	29.8
Religion		
Christian	74	78.7
Islam	19	20.2
Marital Status		
Single	14	14.9
Married	79	84.0
Divorced	1	1.1
Years of experience		
< 5	34	36.1
5-10	31	33.0
> 10	29	30.9

+Respondents older than 46 years of age

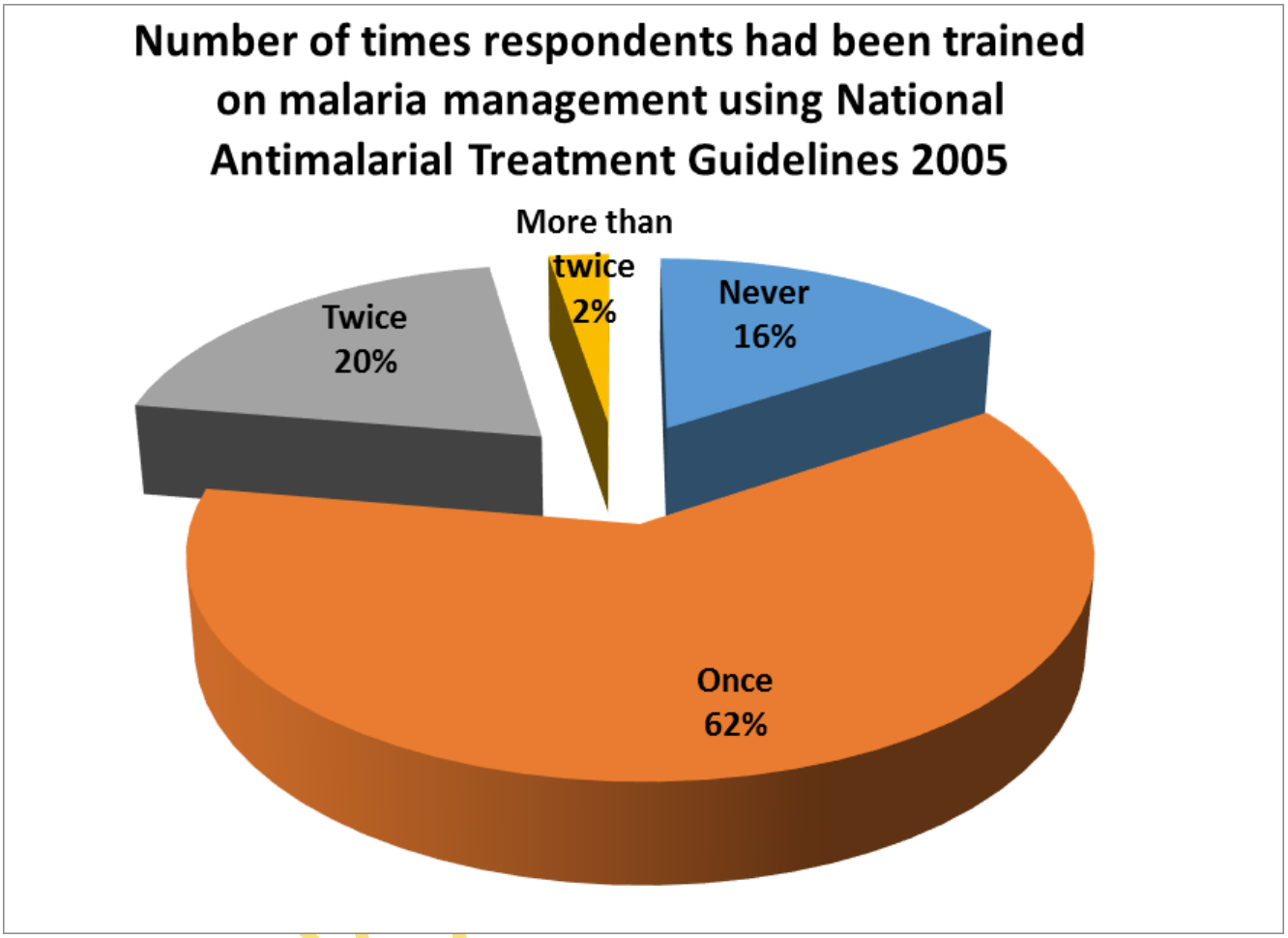


Figure 4.1: Respondents' history of training on the National Antimalarial Treatment Guidelines 2005

4.2 Awareness of the National Antimalarial Treatment Guidelines (NATG)

Majority (91.5%) of the respondents had heard about the NATG. Medical conferences constituted the major source of information for most respondents (29.8%). 48.9% of the respondents had seen a copy of the NATG, 37.2% of respondents had read the guidelines and 11.7% of respondents have personal copies of the NATG. Table 4.2 highlights depth of awareness of respondents of the NATG.

Table 4.3 shows respondents' depth of awareness by selected socio-demographic characteristics. The selected characteristics were age, sex, years of experience and location of facility. The distribution of respondents who had read the NATG among those aged 24 – 34, 35 – 45 and 46^{+} years were 8.5%, 16.0% and 12.6% respectively. Overall, there was no significant relationship between reading the NATG and age of respondents.

The proportion of respondents who had read the NATG decreased with increasing years of experience. For instance, 22.9% of those with <5 years experience had read the NATG. The proportion of respondents with 5-10 and >10 years of experience who had read the NATG were 34.2%, and 42.9% respectively. Overall, there was no significant relationship between years of experience and haven read the NATG (see table 4.3).

The proportion of respondents who had read the NATG was higher amongst respondents working in urban facilities (38%) than those working in rural facilities (34.8%). Overall, there was no significant relationship between depth of awareness of NATG and location of facility (see table 4.3).

Table 4.2 Respondents' level of awareness of the NATG

N = 94

Characteristics	Number	%
Ever heard of NATG		
Yes	86	91.5
No	8	8.5
First source of information on NATG		
News	10	10.6
Medical conference	28	29.8
Friends/colleagues	15	16.0
Others	33	35.1
Ever seen the NATG		
Yes	46	48.9
No	48	51.1
Ever read the NATG		
Yes	35	37.2
No	59	62.8
Respondents with personal copy		
Yes	11	11.7
No	83	88.3

Table 4.3 Respondents who had read NATG by selected demographic characteristics

N = 94

Variables	**Ever read NATG**			**P value**
	Yes N (%)	No N (%)	Total N (%)	
Sex				
Male	26 (27.7)	40(42.6)	66 (70.2)	X^2= 0.011
Female	9 (9.6)	19 (20.2)	28(29.8)	P>0.05
Age of respondent				
24-34	8 (8.50)	22 (23.4)	30 (31.9)	
35-45	15 (15.95)	21 (22.34)	36 (38.3)	X^2= 0.207
46^+	12 (12.77)	16 (17.02)	28 (29.8)	P>0.05
Location of facility				
Urban	25 (26.6)	34 (36.2)	59 (62.8)	
Semi-rural	5 (5.3)	15 (15.95)	20 (21.3)	X^2= 1.058
Rural	5 (5.3)	10 (10.6)	15 (15.9)	P>0.05
Years of Experience				
< 5	8 (8.5)	26 (27.7)	34 (36.2)	X^2 = 5.367
5-10	12 (12.8)	19 (20.2)	31 (32.9)	P>0.05
> 10	15 (15.9)	14 (14.9)	29 (30.9)	

4.3 Perception of respondents on the rationale behind the change of the National Antimalarial Treatment Guidelines

Table 4.4 shows respondents' perception of the rationale behind the change in the National Antimalarial Treatment Guidelines. Majority (84.0%) agreed that it was because "government wanted to scale up effective case management of malaria". Other reasons perceived by respondents as being the rationale behind the change in NATG included "P. Falciparum malaria had grown resistant to chloroquine and Fansidar (77.7%)", "ACTs had been proven to be more effective for the cure of malaria" (75.5%), "Chloroquine and Fansidar were no longer effective for the cure of malaria" (55.3%) and "government wanted to comply with WHO recommendations (55.3%). See details in table 4.4

Table 4.4 Respondents' perception of the rationale behind the change in the NATG

N = 94

Variables	Number	%
Chloroquine and Fansidar are no longer effective in the cure of malaria		
True	52	55.3
False	32	34.0
Unsure	10	10.6
***P. Falciparum* malaria has grown resistant to chloroquine and Fansidar**		
True	73	77.7
False	7	7.4
Unsure	14	14.9
Government wants to scale up effective case management of malaria		
True	79	84.0
False	7	7.4
Unsure	8	8.5
ACTs are more effective for the cure of malaria		
True	71	75.5
False	12	12.8
Unsure	11	11.7
Government wants to comply with WHO recommendations		
True	52	55.3
False	26	27.7
Unsure	16	17.1

4.4 Knowledge of Respondents on the Diagnostic and Prescription Roles as Stipulated by the NATG

Respondents' knowledge relating to their diagnostic and prescription roles in the management of cases of malaria as stipulated by the NATG are as shown in table 4.5. Eighty nine percent (89.4%) of respondents mentioned 'uncomplicated malaria' and 72.3% mentioned 'severe malaria' as classes of malaria. In taking the history/assessment of cases with uncomplicated malaria, respondents mentioned age (77.7%), presence of fever (69.1%), headache (58.5%) as major variables of interest required for documentation. If patient/case were a child, additional variables of interest mentioned included diarrhea (46.8%), cough/respiratory distress (33.0%), convulsion (11.7%). See table 4.5 for details.

Commonly listed signs/symptoms of uncomplicated malaria by respondents' included increased body temperature - >37.5°C (73.4%), headache (73.4%), vomiting (59.6%), loss of appetite (52.1%) and chills (43.6%). Majority (73.4%) of respondents knew that the recommended laboratory tests for the diagnosis of malaria are the standard microscopy and rapid diagnostic tests. Sixty nine percent (69.1%) and sixty percent (60.6%) of respondents knew that clinical diagnosis is adequate for the treatment of malaria in children under five and pregnant women respectively without a laboratory diagnosis. See table 4.6 for details

Forty seven percent (47.9%) of respondents stated that the objective for the treatment of uncomplicated malaria was to "cure the infection" while 36.2% said it was to "prevent progression to severe disease". In defining the cure for malaria, 54.3% of respondents stated that it means "the eradication from the body of the infected patient that which caused the illness requiring treatment".

Majority (80.9%) of respondents knew that the drug of choice for the treatment of uncomplicated malaria is "Artemisinin based Combination Therapy (ACT)". Specific drugs listed include "Artemether-Lumefantrine (AL)" (79.4%), "Artesunate-Amodiaquine" (57.4%), and "Artesunate-Mefloquine" (22.3%). In dosage administration for patients, "weight" (83.0%) and age (80.9%) were listed as the key demographic

characteristics of importance. In the prescription of AL, 64.9% of respondents knew the right dosage for a child aged 6months to 3 years whilst 62.8%, 61.7% and 74.5% knew the right dosage for ages 4-8 years, 9-14 years and older than 14 years respectively. See figure 4.2 for graphical details. Sixty eight percent (68.1%) of respondents also knew that, regardless of age, six doses of AL were to be taken by the patient as a complete treatment regimen for uncomplicated malaria.

Majority (71.3%) of respondents knew that Artermisinin derivatives must be used in combination with another effective antimalarial drug in the treatment of uncomplicated malaria. Where patient shows evidence of inadequate clinical response, 60.6% of respondents will "seek a confirmatory test" while 24.5% of respondents will 'evaluate the patient and review diagnosis". In the use of anti-pyretics, where temperature is high and above 38C, 57.4% of respondents will "wipe body of patient with wet towel", 56.4% would give paracetamol while 36.2% of respondents will advise a cold bath especially in children. In a vomiting patient, 46.8% will give quinine injections while 16.0% would repeat full dose of treatment. If patient presented with febrile seizures, 74.5% knew to treat it as severe malaria. Where oral administration of drug is not possible, 72.3% of respondents would give parenteral (intramuscular) quinine.

In following up the patient, 90.4% of respondents knew to tell the patients to return if fever persists for two days after commencement of treatment, 78.7% knew to tell the patient to return immediately if condition gets worse or develops signs of severe disease. In the treatment of uncomplicated malaria in children less than 6 months (less than 5kg), 75.5% of respondents would use supportive therapy, 56.4% would treat with ACTs while 35.1% will use oral quinine. In the treatment of uncomplicated malaria in pregnant women, 46.8% will treat with quinine all through the three trimesters while 22.3% would use ACTs in all three trimesters.

The proportion of respondents with poor, fair and good knowledge scores relating to malaria diagnosis and prescription as stipulated by NATG are shown on figure 4.3. Only 1 (1.1%) of respondents had poor knowledge, majority (90.4%) had fair knowledge, and 8.5% had good knowledge of the diagnostic and prescriptive content for the management

of uncomplicated malaria as stipulated by the NATG. Respondents had a mean knowledge score of 32.4 ± 6.4.

Table 4.7 highlights the mean scores of respondents with poor, fair and good knowledge of the NATG by those who had ever read a copy of the NATG. There was no significant relationship between ever reading the NATG and level of knowledge of respondents on the diagnostic and prescriptive content of the NATG in the management of uncomplicated malaria (see table 4.7 for details).

Table 4.8 – 4.11 show mean scores of respondents with poor, fair and good knowledge of the NATG by selected socio-demographic characteristics. The selected characteristics were age, sex, years of experience and location of facility. There was no statistically significant relationship observed between knowledge scores and any of the listed socio-demographic characteristics.

Table 4.5 Respondents' knowledge of variables of interest in taking the history of malaria patients

Variables	*Frequency* N = 94	*%*
Variables of interest in documenting the history of patients		
	73	77.7
Age*	27	28.7
Place of residence *	12	12.8
Brief Family history	65	69.1
Presence of fever *	26	27.7
Paleness	18	19.1
Presence of rigors (shaking of the body) *	55	58.5
Headache *	10	10.6
Previous history of malaria treatment	22	23.4
Presence of chills (feeling cold) *	3	3.2
History of travel within/outside the country *	18	19.1
Joint weakness/tiredness *	21	22.3
Joint pain	40	42.3
Loss of appetite	58	61.7
Vomiting		
In cases where the patient is a child under 5, additional variables of interest include		
Cough or respiratory distress *	31	33.0
Diarrhea *	44	46.8
Recent episode of measles	5	5.3
Ear pain *	9	9.6
Skin rashes in the last three months *	5	5.3
Vomiting	46	48.9

***Correct responses**

Table 4.6 Respondents' knowledge of signs and symptoms of uncomplicated malaria, indications for laboratory diagnosis of malaria

Variables	*Frequency*	*%*
Signs and symptoms of uncomplicated malaria		
Increased body temperature > 37.5ºC *	69	73.4
Jaundice	3	3.2
Pallor (especially in children/pregnant women) *	20	21.3
Enlarged spleen or liver especially in children *	2	2.1
Prostration	4	4.3
Vomiting	56	59.6
Severe anemia	18	19.1
Chills	41	43.6
Loss of appetite	49	52.1
Malaise	26	27.7
Headache	69	73.4
Recommended laboratory tests are the standard microscopy and rapid diagnostic tests (RDT)		
True *	69	73.4
False	6	6.4
Unsure	19	20.2
Parasitological diagnosis must always be done before treatment		
True	35	37.2
False *	43	45.7
Unsure	16	19.0
Treatment can be given especially in children under five without a laboratory diagnosis.		
True *	65	69.1
False	16	17.0
Unsure	13	13.8
In children under 5, where treatment fails or is suspected to fail, laboratory diagnosis need be done to confirm initial diagnosis.		
True *	76	80.9
False	4	4.3
Unsure	14	14.9
Clinical diagnosis is adequate for the treatment of malaria in children and pregnant women		
True *	57	60.6
False	22	23.4
Unsure	15	15.9

***Correct responses**

N=246

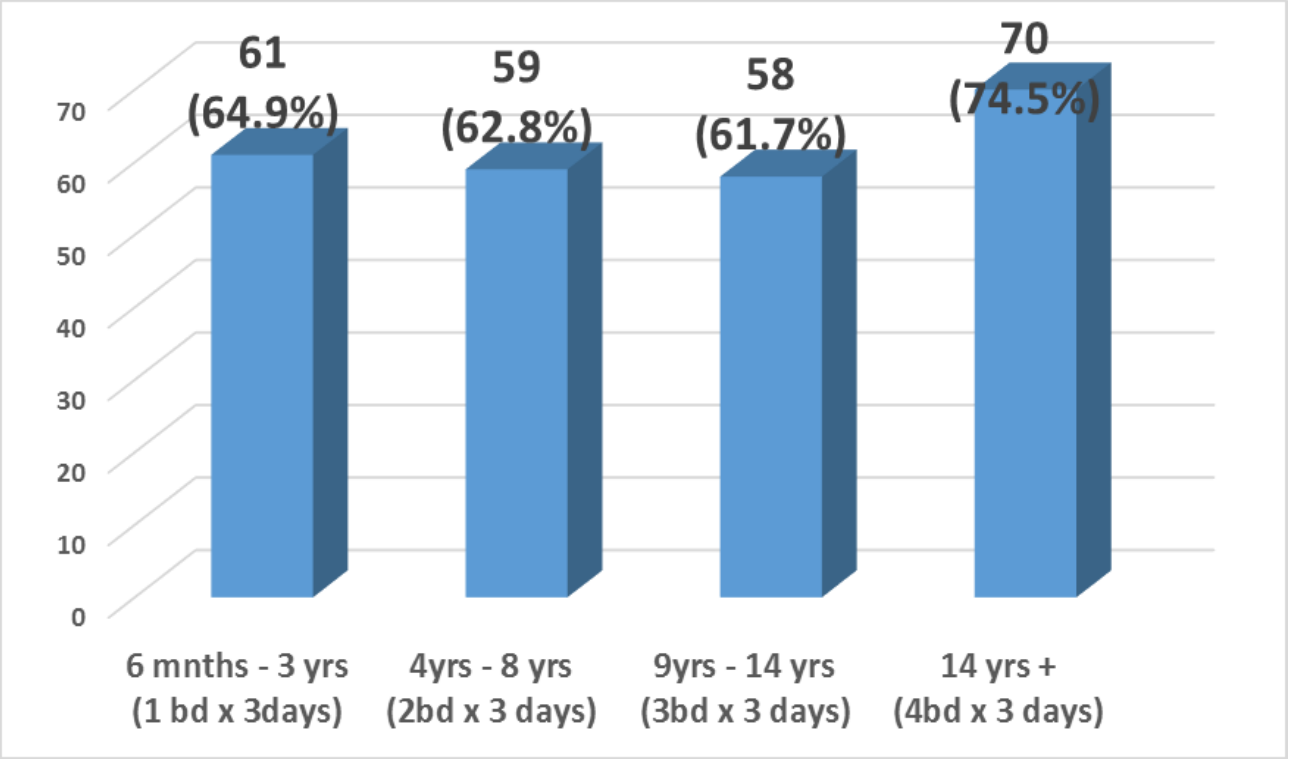


Figure 4.2 **Number of Respondents with knowledge of correct dosage for Artemether-Lumefantrine (Coartem) by age as derived from the questionnaire**

Keys

1 bd x 3days = 1 tablet twice daily x 3 days

2 bd x 3days = 2 tablets twice daily x 3 days

3 bd x 3days = 3 tablets twice daily x 3 days

4 bd x 3days = 4 tablet twice daily x 3 days

Table 4.7 Mean knowledge scores by respondents who had ever read the NATG

Independent samples T-test

N=94

Ever read a copy of the 2005 Antimalarial Treatment Guidelines?	N	Mean	Std. Deviation	T	P value
Yes	35	2.14	.355	1.581	.120
No	59	2.03	.260		

Table 4.7 highlights the mean knowledge scores of respondents who had ever read a copy of the National Antimalarial Treatment Guidelines (NATG). There is no statistically significant relationship between ever reading the NATG and level of knowledge of respondents on the content of the NATG. T value = 1.581, P > 0.05

Table 4.8 Mean knowledge score by sex of respondents

Independent samples T-test

N=94

Sex of respondents	N	Mean	Std. Deviation	T	P value
Male	66	2.09	.339	1.006	.318
Female	28	2.04	.189		

Table 4.8 highlights the mean knowledge scores of respondents by their sex. There is no statistically significant relationship between sex of respondents and their level of knowledge on the content of the National Antimalarial Treatment Guidelines (NATG). T value = 1.006, P > 0.05

Table 4.9 Mean knowledge score of respondents by age

One-way ANOVA test

N=94

Age of respondents	N	Mean	Std. Deviation	F	P value
24-34	30	34.43	7.074	2.425	.094
35-45	36	31.08	5.315		
46^{+}	28	31.89	6.646		
TOTAL	**94**	**32.39**	**6.414**		

Table 4.9 highlights the mean knowledge scores of respondents by age. There is no statistically significant relationship between age of respondents and their level of knowledge on the content of the National Antimalarial Treatment Guidelines (NATG).

F value = 2.425, P > 0.05

Table 4.10 Mean knowledge score of respondents by years of experience

One-way ANOVA test

N=94

Years of experience of respondents	N	Mean	Std. Deviation	F	P value
<5 years of experience	34	33.41	6.026	0.668	.515
5-10 years of experience	31	31.77	6.597		
>10 years of experience	29	31.86	6.728		
TOTAL	**94**	**32.39**	**6.414**		

Table 4.10 highlights the mean knowledge scores of respondents by years of experience. There is no statistically significant relationship between years of experience of respondents and their knowledge on the content of the National Antimalarial Treatment Guidelines (NATG). F value = 0.668, P > 0.05

Table 4.11 Mean knowledge score of respondents by location of facility

One-way ANOVA Test

N = 94

Location of facility	N	Mean	Std. Deviation	F	P value
Urban	59	33.22	7.079	1.331	.269
Rural	20	31.10	4.855		
Semi urban	15	30.87	5.097		
Total	**94**	**32.39**	**6.414**		

Table 4.11 highlights the mean knowledge scores of respondents by the location of their facility. There is no statistically significant relationship between the location of the facilities of respondents and their knowledge on the content of the National Antimalarial Treatment Guidelines (NATG). F value = 1.331, P > 0.05

4.5 Perceived appropriateness, desirability and utility of the NATG

Nearly half (45.7%) and 46.8% of respondents' thought the treatment guidelines was an "adequate" diagnostic and prescription tool for uncomplicated malaria respectively. Nearly half (48.9%) of respondents thought that the dosages as prescribed by the guidelines were "adequate" and appropriate for the ages and for curing malaria infection in cases. Majority; 70.2% of respondents agreed that ACTs give a better outcome than the previous first-line drug; Chloroquine. As regards utility of the policy guidelines in comparison to the former, 51.1% of respondents agreed that the policy document/guidelines was easier to understand whilst 40.4% of respondents agreed that the "policy document/guidelines" were not accessible. See table 4.12 for details.

Table 4.12 Respondents' perception of the appropriateness of the antimalarial treatment guidelines for the diagnosis and treatment of uncomplicated malaria.

N=94

Statements	Number	%
The NATG is an adequate diagnostic tool for uncomplicated malaria.		
Very Adequate	12	12.8
Adequate	43	45.7
Fairly Adequate	26	27.7
Not Adequate	0	0
Unsure	13	13.8
The Antimalarial Treatment Guidelines is an adequate prescription tool in the treatment of uncomplicated malaria.		
Very Adequate	18	19.1
Adequate	44	46.8
Fairly Adequate	22	23.4
Not Adequate	0	0
Unsure	10	10.5
Dosages prescribed by the guidelines are appropriate for the ages and adequate for curing malaria infection		
Very Adequate	23	24.5
Adequate	46	48.9
Fairly Adequate	15	16.0
Not Adequate	0	0
Unsure	10	10.6
ACTs give a better outcome than the previous choice drug; Chloroquine		
Agree	66	70.2
Disagree	9	9.6
Unsure	19	20.2
ACTs present lesser side effects than Chloroquine.		
Agree	64	68.1
Disagree	4	4.3
Unsure	26	27.7

4.6 Extent of compliance with the New Policy Guidelines

A total of 246 case notes were analyzed. Of this, 44 (17.9%) belonged to pregnant women, 74 (30.1%) to children under five, 128 (51.2%) to adults respectively. Also, 111 (45.1%) were males while 134 (54.5%) were female. Majority 230 (93.5%) of cases were uncomplicated malaria, 4 (1.6%) were diagnosed of severe malaria while other case notes 12 (4.9%) had no records in the case notes of their diagnosis. See table 4.13.

History taken from patients and documented by respondents

Analysis of case notes showed that the following variables were documented; age (86.8%) fever (62.0%), headache (56.8%) and addresses/place of residence of patients (44.0%). Of the 74 case, notes belonging to children under five, additional variables documented included diarrhea (40.0%) and cough/respiratory distress (25.7%). See table 4.14 for details.

According to the NATG, documenting eight variables make a complete history. All except one case note had documentations of variables. Of these, 87 (35.4%) case notes had at least one of eight variables documented, 147 (59.8%) of case notes had at least three of eight variables of documented whilst only 12 (4.9%) had at least six of eight variables of documented.

Signs and symptoms, drugs prescribed and documented in case notes

Most frequently documented signs and symptoms in the diagnosis of uncomplicated malaria by respondents included temperature (48.8%), pallor (12.4%). Of the 128 case notes who were adults, only 31 (24.2%) of cases had laboratory diagnosis done before receiving treatment. This implies that in 75.8% of cases involving adults, clinical diagnosis was the only basis for prescription and treatment.

Most commonly prescribed drugs for malaria treatment was ACT (54.0%). Recommended dosage of ACT was used by 26% and 47.8% of doctors in treating children and adults respectively. Most commonly prescribed ACT was “Artemether-Lumefantrine (AL) - (29.4%), Artesunate-Amodiaquine (17.3%), and Artesunate-Mefloquine (7.3%). Frequency of the prescription of Chloroquine amongst children and SP variants amongst

pregnant women was 71.8% and 35.1% respectively. Only 19 (5.7%) of case notes had follow up notes.

Table 4.15 shows respondents' compliance to prescribing ACT by age, sex and years of experience. The distribution of respondents who had prescribed ACTs among those aged 24 – 34, 35 – 45 and 46^{+} years were 20.7%, 20.3% and 13.8% respectively. A significant relationship was observed between prescription of ACT and age of respondents.

The proportion of respondents who had complied with prescribing ACTs decreased with increasing years of experience. For instance, 22.8% of those with <5 year experience had prescribed ACT. The proportion of respondents with 5-10 and >10 years of experience who had prescribed ACT to patients were 18.7%, and 16.9% respectively. A significant relationship was observed between prescription of ACT and years of experience of respondents (see table 4.15).

The proportion of respondents who had complied with prescribing ACTs was higher amongst respondents with fair knowledge of the NATG (50.0%) than those with poor knowledge (0.0%) or good knowledge (4.9%). No significant relationship was observed between level of knowledge of the NATG and compliance with prescribing ACTs (see table 4.15).

Mean compliance score was 4.2±1.6. The proportion of respondents with poor, fair and good compliance scores are shown on figure 4.5. Seventy nine (32.1%) of case notes showed poor compliance, majority (63.4%) indicated fair compliance, and only 4.5% case notes showed good compliance to the diagnostic and prescriptive content of the NATG for the management of uncomplicated malaria.

Table 4.16 highlights the compliance level of respondent by knowledge scores - poor, fair and good. A statistically significant relationship was observed between having good knowledge of NATG and level of compliance with the diagnostic and prescriptive content of the NATG (see table 4.16 for details).

Table 4.17 shows compliance level by years of experience of respondents. No statistically significant relationship was observed between compliance with NATG and years of experience of respondents.

Mean compliance score amongst respondents never trained is 3.7±1.3 whilst mean compliance score amongst respondents ever trained is 4.4±1.7. Table 4.18 reveals a statistically significant relationship between receiving previous training on the NATG and good compliance with same.

Table 4.13 Socio-demographic characteristics of case notes

N=246

Variables	Number	%
Sex		
Male	111	45.1
Female	134	54.5
Not indicated	1	0.4
Category of patient		
Pregnant woman	44	17.9
Child under 5	74	30.1
Adult	128	52.0
Class of malaria diagnosed		
Uncomplicated	230	93.5
Severe	4	1.6
Not indicated	12	4.9

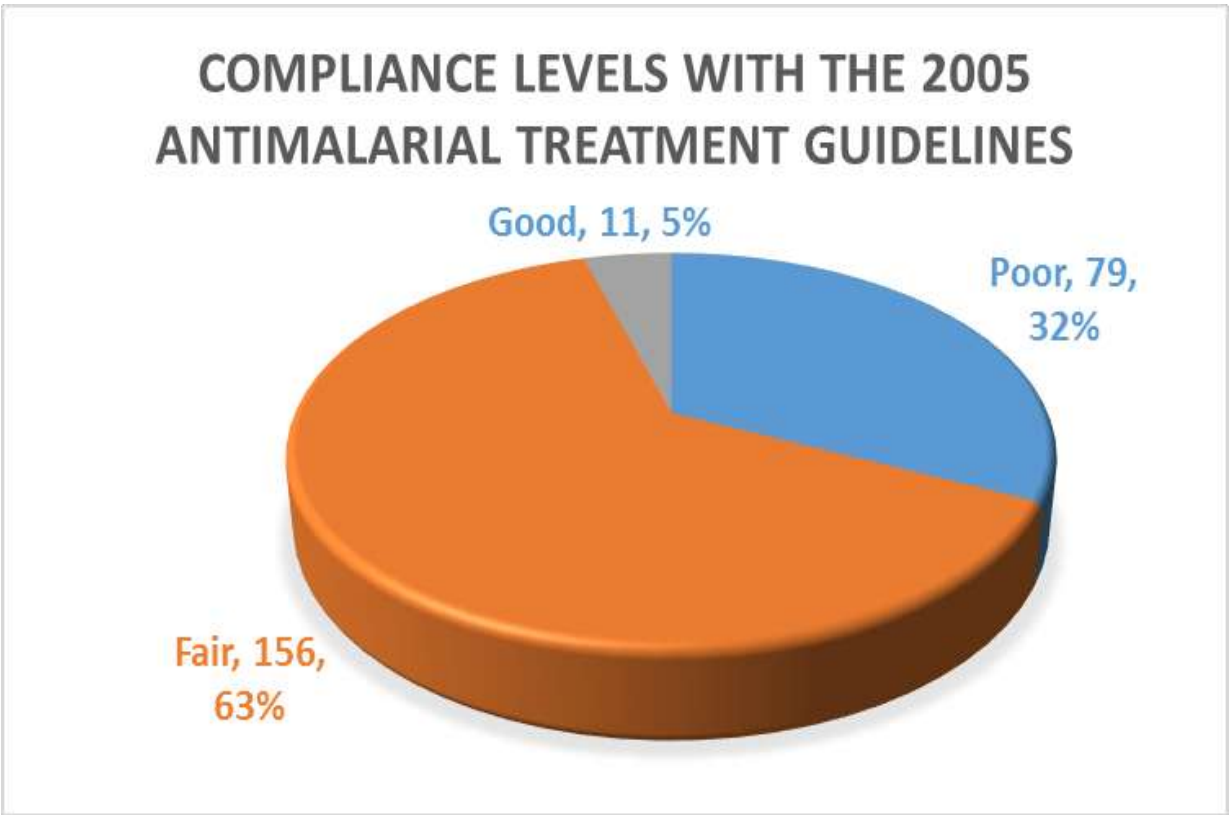
Table 4.14 History of patients taken and documented on case notes

N=246

Variables documented on case notes	Number	%
Age		
Yes	218	88.6
No	28	11.4
Place of residence		
Yes	109	44.3
No	137	55.7
History of travel		
Yes	7	2.8
No	239	97.2
Presence of fever		
Yes	156	63.4
No	90	36.6
Presence of chills		
Yes	44	17.9
No	202	82.1
Presence of rigors		
Yes	33	13.4
No	213	86.6
Presence of headache		
Yes	140	56.9
No	106	43.1
Joint tiredness/weakness		
Yes	40	16.3
No	206	83.7

Table 4.15 Compliance with prescribing ACTs by socio demographic characteristics

Variables	Drug prescribed			**Total**	P value
	ACT N (%)	Chloroquine N (%)	Sulphadoxine Pyrimethamine (SP) N (%)	N (%)	
Sex					
Male	75(30.5)	37(15.0)	24(9.8)	140(56.9)	X^2= 3.735
Female	60 (24.4)	18 (7.7)	23(9.3)	106(43.1)	P>0.05
Age of respondent					
24-34	51(20.7)	9 (3.7)	18(7.7)	83 (33.7)	X^2= 20.79
35-45	50 (20.3)	19 (7.7)	22(8.9)	93 (37.8)	P<0.05
46^+	34 (13.8)	27(10.9)	7(2.8)	70 (28.5)	
Level of knowledge					
Poor knowledge (1-20)	0 (0.0)	1 (0.4)	2 (0.8)	3 (1.2)	X^2= 13.31
Fair knowledge (21-40)	123 (50.0)	50 (20.3)	42 (17.1)	215 (87.4)	P>0.05
Good knowledge (41-60)	12 (4.9)	4 (1.6)	3 (1.2)	17 (6.9)	
Years of Experience					
< 5	56 (22.8)	15 (6.09)	16 (6.5)	87 (35.4)	X^2 = 12.68
5-10	46 (18.7)	15 (6.09)	23 (9.3)	84 (34.1)	P < 0.05
> 10	42 (16.9)	25 (10.2)	8 (3.3)	75 (30.5)	
Patient category					
Pregnant women	6 (2.4)	5 (2.0)	28 (11.4)	39 (15.9)	X^2= 13.31
Child under 5	39 (15.9)	26 (10.6)	7 (2.8)	74 (30.1)	P<0.05
Adults	90 (36.6)	22 (8.9)	12 (4.9)	128 (52.0)	



Mean compliance score: 4.3 ± 1.9

Figure 4.4: Compliance levels from all 246 case notes reviewed.

Table 4.16 Level of compliance with NATG by respondents' knowledge scores of same

One-way ANOVA Test

N=246

Compliance scores

	N	Mean	Std. Deviation	F	P value
1 - 20 = poor knowledge	3	2.00	.000	9.671	.000
> 20 – 40 = fair knowledge	223	1.68	.514		
> 40 – 60 = good knowledge	20	2.20	.616		
Total	**246**	**1.72**	**.539**		

Table 4.16 highlights the compliance level of respondent by knowledge scores - poor, fair and good. A statistically significant relationship was observed between having good knowledge of NATG and level of compliance with the diagnostic and prescriptive content of the NATG. F value = 9.67, P < 0.05

Table 4.17 Compliance levels by years of experience

One-way ANOVA Test

N= 246

Compliance scores	N	Mean	Std. Deviation	F	P value
<5 years of experience	87	1.62	.575	2.581	.078
5-10 years of experience	84	1.80	.485		
>10 years of experience	75	1.76	.541		
Total	**246**	**1.72**	**.539**		

Table 4.17 shows compliance level by years of experience of respondents. No statistically significant relationship was observed between compliance with National Antimalarial Treatment Guidelines (NATG) and years of experience of respondents. F value = 2.58, P > 0.05

Table 4.18 Compliance levels by respondents' exposure to training on 2005 NATG

Independent sample T- Test

N= 94

	Ever trained on NATG?	N	Mean	Std. Deviation	F	P value
Compliance score	Yes	76	1.76	.486		
	No	17	1.41	.507	3.600	.031
	Total	**93**	**1.72**	**.539**		

Table 4.18 shows the mean compliance score amongst respondents never trained is 3.7±1.3 whilst mean compliance score amongst respondents ever trained is 4.4±1.7. It reveals a statistically significant relationship between exposure to previous training on the National Antimalarial Treatment Guidelines (NATG) and good compliance with same.

F value = 3.60, P > 0.31

4.8 Factors influencing compliance with the NATG

Challenges listed by respondents as hindrances/obstacles to successful implementation/use of the NATG included “High cost of ACT” (31.4%), “scarcity/unavailability of ACTs” (14.9%), “Treatment failure/inefficacy of ACTs” (9.1%), “ACTs longer duration of use” (6.6%), “ACTs dosaging is cumbersome” (5.8%). Figure 4.4 shows respondents challenges in the implementation of the antimalarial treatment guidelines.

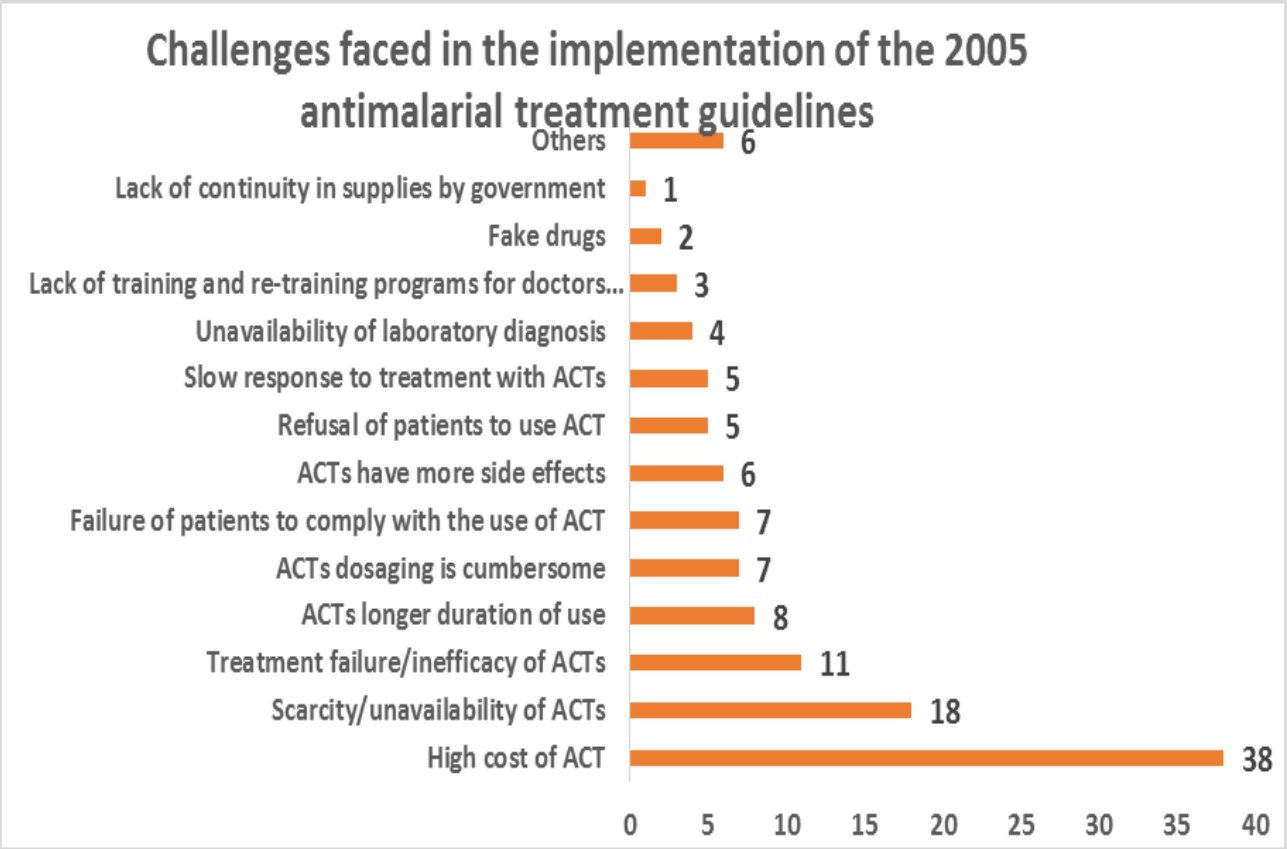


Figure 4.3 Respondents' list of challenges facing the implementation of the NATG

CHAPTER FIVE

5.0. DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1. Socio-demographic characteristics and related information

A large proportion of the respondents were males. This reflects the observation that the medical profession remains predominantly a male dominated profession. A previous survey carried out to document the attitude and practices in the treatment of malaria among doctors practicing in Enugu urban, Nigeria by Harrison et al (2004), showed a similar trend with this study as there were more males than females. The age range (24-58) of the respondents reflects an adult population. This may be due to the 6 year duration of running medical school in Nigeria intercepted by incessant strike action and delays, and immediately followed with one year house job and one year National Youth Service Corp. Average age of graduation is put at 26 years (Nwomeh 2012), thus the mean age of respondents (40.1) and the modal range for years of experience (5-9 years) are explainable. In addition, the choice of interviewer administration of the questionnaire also suited the adult population.

About half the number of respondents had been trained once on the National antimalarial Treatment Guidelines (NATG) and the trainings were conducted by the Ministry of Health, this validates the Nigerian Governments' commitment to improving case management of malaria (Malaria Action Programme for states, 2012). However, the numbers also indicates room and need to reach more doctors with training, re-training and on-the-job facilitation efforts. All respondents had managed a case of malaria in the week penultimate to the study and cases managed included pregnant women, children under 5 and adults in most cases. This confirms the endemic nature of malaria in Nigeria with the disease condition accounting for over 60% of outpatient visits to Nigerian hospitals and 30% inpatient admissions. In Oyo state alone, malaria prevalence amongst under 5 children is 50.3% (Nigeria Malaria Fact Sheet, 2011).

The study found that the proportion of respondents who complied with prescribing ACTs decreased with increasing years of experience. A statistically significant relationship was observed between prescription of ACT and years of experience of respondents. This aligns with findings from Onyeaso 2007 which concluded that respondents' practice of anti-malarial chemoprophylaxis was influenced by the cadre of the health care provider and level of practice.

5.2. Awareness of the National Antimalarial Treatment Guidelines

Almost all (91.5%) of respondents had heard of the National Antimalarial Treatment Guidelines (NATG), they listed sources of first time information to include medical conferences, colleagues and the news. Onyeaso, 2007 in a study to assess the knowledge and practice of health care providers on current concepts on malaria prophylaxis in pregnancy in two local governments in Ibadan, Oyo state revealed that 77.7% of respondents were aware of intermittent preventive treatment (IPT) for Malaria in Pregnancy (MIP). Whilst this study aligns with Onyeaso's results, it also reveals that only a handful of respondents had read copies of the NATG. This low level of awareness amongst physicians may be a reflection of the level of awareness about the malarial treatment guidelines amongst other cadres of health providers as many studies have also documented this.

One of such studies ascribed the major obstacles to changing practice to "lack of awareness" of treatment guidelines (Fawole, 2004). Some researchers have also ascribed the low level of awareness amongst health workers to a break in communication between health regulating (policy formulators) and end users (health workers) and have thus advocated the creation of an organization to promote consultation and communication between health care authorities and workers (Nahum et al, 2000). It is recommended that measures should be put in place to raise the level of awareness among practitioners on the current National policy on malaria treatment through seminars and workshops.

This study also revealed that most respondents' perceived the rationale behind the change in the National Antimalarial Treatment Guidelines as government's commitment to scaling up effective case management of malaria to reduce resultant deaths in Nigeria.

Respondents also agreed that growing evidence of parasite resistance to previous first line drugs; chloroquine and fansidar as well as evidence driven indications that ACTs had been proven to be more effective for the cure of malaria may have driven the change. For some respondents, the Nigerian government simply wanted to comply with WHO recommendations; which is that antimalarial treatment policy should be changed when first-line treatment total failure proportion exceeds 25% (WHO World Malaria Report, 2009).

5.3 Knowledge of the National Antimalarial Treatment Guidelines

This study revealed a largely fair knowledge of the prescriptive and diagnostic contents of the National Antimalarial Treatment Guidelines amongst secondary health care facility based physicians in Oyo state. Previous studies assessing knowledge and practice of health care providers on current concepts on malaria prophylaxis in selected local government areas in Ibadan, Oyo state documented similar trends. Results of one of such revealed that only 11.5% health worker respondents were knowledgeable about current WHO strategies for malaria prevention in pregnancy (Onyeaso, 2007).

Respondents in this study knew that ACTs were the recommended first line drugs for treatment of uncomplicated malaria and stated that the most commonly known/used is Artemether-Lumefantrine (AL) or Coartem, Artesunate-Amodiaquine and Artesunate-Mefloquine. Many studies affirm the popularity and preference of health workers for these antimalarial drugs especially the former in Nigeria. According to the study by Ogungbamide et al, 2005 in Osogbo, Osun state, commonly prescribed ACTs included lumefantrine (53.6%), amodiaquine (51.1%), and mefloquine (20.6%). Most respondents also knew the correct dosage for ages/weight specifications as outlined in the NATG. Essentially all respondents would prescribe based on provisional/clinical assessments and diagnosis rather than following laboratory tests/diagnosis. This aligns with findings from Oshikoya, 2007 where majority of malaria drugs were prescribed based on provisional diagnosis rather than on diagnostic investigations.

This study also revealed a statistically significant relationship between respondent's knowledge of the prescriptive and diagnostic contents of the NATG and compliance with

same. It is therefore imperative that multiple strategies be adopted to improve physicians' knowledge and in turn, practice of appropriate current malaria treatment strategies primarily to cure the infection, prevent progression to severe disease, reduce risk of emergence of drug resistance and ultimately, reduce possible resultant morbidity and mortality rates from malaria.

5.4 Compliance with the National Antimalarial Treatment Guidelines

This study reveals that a quarter of cases of malaria seen during the course of this study, belonged to children under five whilst over one-tenth of cases were pregnant women. Both categories of patients accounting for over half of total case notes reviewed. This is in line with sentinel survey findings that malaria is responsible for over 25% children outpatient visit and over 11% maternal deaths (NMCP, 2000). This finding also aligns with findings from a retrospective analysis of data of all malaria cases treated at Obisesan Naval Medical Centre (ONMC) between January and December 2006 where over a quarter (27%) of the total cases were under-5 years of age, 47.2% were less than 15 years while 3.4% were pregnant women (Hassan, Echoga, Iwarere, 2009).

Findings from this study show that less than quarter of cases were diagnosed based on both clinical assessment and laboratory test. Two-thirds received diagnosis based on syndromic clinic assessments only. These results tally with findings from a recent study that assessed physicians' prescribing patterns of antimalarial drugs during pregnancy at the obstetrics and gynaecology department of the University of Maiduguri Teaching Hospital which showed that 80% of the diagnoses were based on clinical signs and symptoms while only 20% were based on laboratory investigations (Okoro, Nwambu, 2012). These findings are an improvement on Hassan et al, 2009 findings which revealed that in spite of the availability of a functional laboratory, over 80% cases were diagnosed on clinical assessment only while 5.5% were based on both clinical assessment and laboratory tests.

This study found that most commonly prescribed drugs for malaria treatment was ACT with a little over half case notes bearing prescription for same. Other study findings buttress this - slightly more than half of the total cases were prescribed ACT while the rest were prescribed monotherapy anti-malarial drugs (Hassan et al, 2009).

Recommended dosage of ACT was used by over a quarter and almost half of respondents in treating children and adults respectively. A survey of the attitude and practices in the treatment of malaria among doctors practicing in Enugu urban, Nigeria validates this finding as it found that for quinine, recommended dosage was used by 41.8% of the doctors in treating children, and 50% of doctors in treating adults. (Harrison et al, 2004). One other finding from this study is that the most commonly prescribed ACTs are "Artemether-Lumefantrine (AL), Artesunate-Amodiaquine and Artesunate-Mefloquine.
In this study, majority of pregnant women received prescription for SP variants whilst over a quarter of children received prescriptions for chloroquine. Findings from Okoro et al, 2012 buttresses this as it found that over seventy percent of pregnant women received prescriptions for Sulphadoxine-Pyrimethamine. Other prescriptions included Artemisinin alone/combinations and quinine. In same stead, Ukwe et al, 2008 and Orimadegun et al, 2008 also affirm that chloroquine was mostly used for treating malaria in children less than 5 years and antemisinin-based drug was prescribed either as a first or second line treatment in less than a quarter of the cases.

This study found that compliance levels with the NATG was generally low; a finding which is in line with results from a Nigerian survey of malaria control practices which showed that less than a fifth of the primary and secondary health facilities studied used the recommended malaria treatment guidelines (FMOH, 2000).

5.5 Factors influencing compliance with the National Antimalarial Treatment Guidelines

This study reveals factors influencing compliance with the NATG such as high cost of ACT, scarcity/unavailability of ACTs, treatment failure/inefficacy of ACTs, cumbersome dosage regimen for ACTs, failure of patients to comply with/refusal to use ACTs, unavailability of laboratory diagnosis amongst others. Several studies affirm these challenges and single out cost and frequent stock outs as major challenges to the implementation of/compliance with the NATG. According to a study by Melansa et al, 2005, the primary problem with using ACTs in Africa is cost, with the least expensive treatment course costing roughly 10 times more that of monotherapy with Chloroquine and 5–10 times the cost of SP variants. This cost, mostly borne by households becomes a

huge burden with the frequency of malaria episodes each year. The study advocates for an increase in the supply of artemisinins (alleviating a current global shortage) and to provide drugs to governments at well below their market price.

Specifically for Artemether-Lumefantrine (AL), a study identified impediments to adherence to antimalarial treatment guidelines to include insufficient supply of AL and hence fears of stock outs and concern about AL costs as an impediment to AL prescription (Harrison et al, 2004). Other findings included training messages that contradicted the recommended guidelines compounded by a lack of follow-up supervision, availability of non-recommended antimalarials such as amodiaquine caused prescription confusion as well as shortage of staff which resulted in increased patient caseload affecting the delivery of the desirable quality of care and adherence to guidelines.

One interesting finding from this study is the proportion (almost one-tenth) of respondents who insist that treatment failure/inefficacy of ACTs was a factor that impeded compliance with the treatment guidelines. This cohort of providers assert that, based on personal experiences, previous drugs; Chloroquine and SP variants were still as effective as were and even more than ACTs. This finding tallies with findings from a study by Lawrence et al, 2008 where 71% of study respondents exclusively used chloroquine as first line therapeutic agents in treatment of malaria in pregnancy with a larger proportion (>90%) of their patients exhibiting moderate to very rapid response, to their first and second line agents respectively. Reasons for this included efficacy, safety and cost. This cohort wondered the basis on which the WHO and Federal Ministry of Health's guidelines and policies were enunciated. This observation clearly shows that policy pronouncements are in some instances not matched with actual implementation.

5.6 Conclusion

The research explored the awareness level, knowledge, challenges faced and compliance with National Anti-malarial Treatment Guidelines (NATG) amongst facility based secondary health care physicians in Oyo state. Many physicians had heard of the NATG with medical conferences being the major sources of information. Depth of awareness, however, was generally low amongst physicians, many of whom perceived the rationale

for change as simply government's commitment to scaling up effective case management of malaria. Though most respondents had been trained at least once, on the NATG mostly by the Oyo state Ministry of Health (OsMoH), level of knowledge on the diagnostic and prescriptive contents of the NATG was also generally low amongst physicians a situation which implies high incidence of inappropriate case management and which can increase the economic burden of malaria.

A low level of compliance to NATG was also observed amongst facility based secondary health care physicians in Oyo state. Physicians with more knowledge of the NATG were found to be more likely to document history/physical examination of patients and generally comply with treatment guidelines outlined in the NATG. Physicians were more likely to base diagnosis on clinical assessments than the recommended combination of clinical symptomatic and laboratory assessments especially in adults. Physicians were also found to be more likely to prescribe ACTs in adults, SP variants in pregnant women and Chloroquine in children. The tendency to prescribe sub-therapeutic doses was also found to be higher. High cost, unavailability and treatment inefficacy of ACTs were listed as major challenges to the successful implementation of the NATG. Generally, compliance with the NATG in the management of uncomplicated malaria by facility based secondary health care physicians was found to be low.

5.7 Recommendations

5.7.1 To Oyo state government

1. Develop an effective plan to disseminate copies of the policy guidelines, including through online forum such as websites, as a strategy for improving compliance and prescription practices especially in Oyo state government owned public health care facilities.
2. Use the information in the policy to develop, print and disseminate simple illustrative clinical job aids highlighting sequential and essential diagnostic and prescription steps in the management of uncomplicated malaria for physicians working in secondary health care settings in Oyo state. These aids will serve as brief reminders and checks in the absence of policy documents/immediate supervision.

3. Oyo state government should invest in high quality refresher training program specific on the policy recommendations for malaria management by physicians.
4. Medical student's curriculum should be revised to incorporate current approaches to malaria management as recommended by the National Antimalarial Treatment Guidelines (NATG)
5. The Oyo state government should set up working mechanisms for wide-scale monitoring of doctors antimalarial prescription practices, withdraw chloroquine from circulation in the state and intensify efforts at promoting prompt treatment with ACT.

5.8 Suggestions for further study

It is suggested that further studies be carried out to throw more light on some aspects, which were not covered in this study. These include:

1. To conduct a similar study among private sector based physicians in Oyo state in order to compare data and proffer effective solutions that would be more generalized. One consideration in conducting this research would be engaging the informal private health sector where a significant number of malaria treatment occurs, often by shopkeepers and Patent Medicine Vendors. An audit of case management practices in this sector will enrich study and make results more encompassing.
2. There is a need for in-depth study of factors including socio-politico-economic that affect the dissemination and use of treatment guidelines in Oyo state and Nigeria as a basis for recommending evidence based national strategies for promulgation of, revision of and adoption of treatment policy guidelines in the near future.

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APPENDIX 1

LIST OF SECONDARY HEALTH CARE FACILITIES, OYO STATE

S/NO	HOSPITALS	LOCAL GOVERNMENT AREA
1	Cholera Unit, Jericho	Ibadan N/W
2	Maxillofacial Unit	Ibadan S/W
3	Dugbe Dental Centre	Ibadan N/W
4	Dental Centre, Oyo	Oyo
5	Dental Centre, Eruwa	Ibarapa East
6	Dental Centre, Ogbomosho	Ogbomosho North
7	Govt Chest Hospital Jericho, Ibadan	Ibadan N/W
8	Adeoyo Maternity Hospital, Ibadan	Ibadan North
9	Ring Road State Hospital, Ibadan	Ibadan S/W
10	Jericho Nursing Home, Ibadan	Ibadan N/W
11	Oni Memorial Child Hospital, Ibadan	Ibadan S/W
12	State Hospital, Oyo	Oyo
13	State Hospital, Ogbomosho	Ogbomosho north
14	Gen Hospital Igbetti	Olorunsogo
15	Gen Hospital Eruwa	Ibarapa East
16	St. Peters Maternity Hospital Aremo Ibadan	Ibadan N/E
17	Gen. Hospital, Fiditi	Afijio
18	Gen. Hospital, Igboora	Ibarapa central
19	Gen. Hospital, Ilora	Afijio
20	Gen. Hospital, Okeho	Kajola
21	MCH Apata	Ibarapa S/W
22	Gen Hospital, Kasumu-Ajia	Egbeda
23	Gen. Hospital, Kutayi	Lagelu
24	Gen. Hospital, Iseyin	Iseyin
25	Gen. Hospital, Igboho	Orelope
26	State Hospital, Saki	Saki West

27	Gen. Hospital, Kishi	Irepo
28	Gen. Hospital, Tede	Atisbo
29	Gen. Hospital, Iresa-Adu	Suru lere
30	Gen. Hospital, Sepeteri	Saki east
31	Gen. Hospital, Jericho	Ibadan N/W
32	Gen. Hospital, Moniya	Akinyele
33	Gen. Hospital, Ado-Awaye	Iseyin
34	Gen. Hospital, Ikoyi Ile	Ogo-Oluwa
35	Gen. Hospital, Lagun	Lagelu
36	Gen. Hospital, Lanlate	Ibarapa East
37	Gen. Hospital, Okaka	Itesiwaju
38	Gen. Hospital, Ago Are	Atisbo
39	Gen. Hospital, Orile-odo	Oluyole
40	Gen. Hospital, Ayete	Ibarapa North
41	Gen. Hospital, Iganna	Iwajowa
42	Gen. Hospital, Ago-Amodu	Saki East
43	Gen. Hospital, Iwere ile	Iwajowa

The first seven facilities are excluded from this study as they do not offer malaria treatment services.

APPENDIX 2

FACILITIES BY ZONAL STRATA

STRATA 1 - IBADAN

1.	St. Peters Maternity Hospital Aremo Ibadan	Ibadan N/E
2	Adeoyo Maternity Hospital, Ibadan	Ibadan North
3	Ring Road State Hospital, Ibadan	Ibadan S/W
4	Jericho Nursing Home, Ibadan	Ibadan N/W
5	Oni Memorial Child Hospital, Ibadan	Ibadan S/W
6	Gen. Hospital, Jericho	Ibadan N/W
7	Gen. Hospital, Moniya	Akinyele
8	Gen. Hospital, Lagun	Lagelu
9	Gen Hospital, Kasumu-Ajia	Egbeda
10	Gen. Hospital, Kutayi	Lagelu
11	Gen. Hospital, Orile-odo	Oluyole
12	MCH Apata	Ibarapa S/W

STRATA 2 – OYO/OGBOMOSO

1	State Hospital, Oyo	Oyo
2	State Hospital, Ogbomosho	Ogbomosho north
3	Gen. Hospital, Fiditi	Afijio
4	Gen. Hospital, Ilora	Afijio
5	Gen. Hospital, Iresa-Adu	Suru lere
6	Gen. Hospital, Ikoyi Ile	Ogo-Oluwa

STRATA 3 - IBARAPA

1	Gen. Hospital, Ayete	Ibarapa North
2	Gen. Hospital, Lanlate	Ibarapa East
4	Gen. Hospital, Igboora	Ibarapa central
5	Gen Hospital Eruwa	Ibarapa East

STRATA 4 – KAJOLA/IWAJOWA

1	Gen. Hospital, Iganna	Iwajowa
2	Gen. Hospital, Iwere ile	Iwajowa
3	Gen. Hospital, Iseyin	Iseyin
4	Gen. Hospital, Ado-Awaye	Iseyin
5	Gen. Hospital, Okeho	Kajola
6	Gen. Hospital, Okaka	Itesiwaju

STRATA 5 - IGBETTI

1	Gen Hospital Igbetti	Olorunsogo
2	Gen. Hospital, Ago-Amodu	Saki East
3	Gen. Hospital, Igboho	Orelope
4	State Hospital, Saki	Saki West
5	Gen. Hospital, Kishi	Irepo
6	Gen. Hospital, Tede	Atisbo
7	Gen. Hospital, Sepeteri	Saki east
8	Gen. Hospital, Ago Are	Atisbo

APPENDIX 3

QUESTIONNAIRE AND CHCKLIST

COMPLIANCE WITH THE NATIONAL ANTIMALARIAL TREATMENT GUIDELINES BY FACILITY BASED SECONDARY HEALTH CARE PHYSICIANS IN OYO STATE.

Dear Respondent,

This research is to generate information about the compliance of Facility Based Secondary Health Care Physicians with the National Antimalarial Treatment Guidelines. Thus, it intends to capture systemic hindrances to the implementation of the policy guidelines.

All information obtained will be treated as strictly confidential. I wish to kindly request your voluntary participation. Please kindly ensure that you answer to all questions honestly and correctly as this would increase the quality of the findings.

Thanks for your cooperation.

NAME OF FACILITY: ……

DATE:…….. SERIAL NUMBER: ……

SECTION I: Socio-demographic characteristics of respondent

Please mark (√) in boxes provided (as appropriate)

1. Sex: 1. Male ☐ 2. Female ☐
2. Age of respondent: _____
3. Marital status: 1. Marr☐ 2. Single ☐ 3. Divorced ☐ 4. Separated ☐ 5. Widowed ☐
4. Religion: 1. Islam ☐ 2.Christianity ☐ 3.Traditional ☐
   4.Others(specify)…….
5. Highest educational qualification attained: 1. University Degree (MBBS/MbCH) ☐
   2. Master degree ☐ 3.Others (specify)…….....
6. Salary Grade level? ……..
7. How many different facilities have you worked in the last five years? ……
8. How many of these are Secondary Health facilities? …….
9. For how many years have you been practicing in the secondary health care sector?

.....

10. Have you received any training on malaria management? 1. YES ☐ 2. NO ☐
11. How many times have you received training on malaria management? .....
12. How many times have you received training on malaria management using the National Antimalarial Treatment Guidelines? ……
13. Who provided the training? 1. Yakubu Gowon ☐ 2. Federal Ministry of Health ☐ 3.Others……..
14. Have you managed malaria in the last one week? 1. YES ☐ 2. NO ☐
15. If yes, who was your patient? 1. A pregnant woman ☐ 2. A child (under 5) ☐ 3. An adult ☐

SECTION II: Awareness of the National Antimalarial Treatment Guidelines

Please tick (√) as appropriate

Awareness of the National Antimalarial Treatment Guidelines	1.1. YES	2.2. NO
16. Have you heard about the "national antimalarial treatment guidelines"? (If no, skip to 22)		

17. If yes to 16, where did you first hear of the revised antimalarial treatment guidelines?
    1. News ☐ 2. Friends/Colleagues ☐ 3. Medical conference ☐
    4. Others (please specify) _____

	1.1.YES	2 .2.NO
18. Have you ever seen a copy of the antimalarial treatment guidelines?		
19. If yes to 18, have you read a copy of the antimalarial treatment guidelines?		
20. If yes to 19, do you have a personal copy of the antimalarial treatment guidelines?		

21. If you were to consult the treatment guidelines for any reason, whose copy will it be?
1. Personal Copy ☐ 2. Colleague's copy ☐ 3. Hospital (records/CMD's) copy ☐

Understanding the rationale behind the change in treatment guidelines
Here are some of the reasons some health workers think the policy document was changed. Please indicate if you think these statements are true

	1.1.TRUE	2.2.FALSE	3.3.UNSURE
22. The Government simply wanted a policy review			
23. Chloroquine and Fansidar (Sulphadoxine-Pyrimethamine) were no longer effective for the cure of malaria			
24. P. Falciparum malaria had grown resistant to Chloroquine and Fansidar			
25. WHO recommended a change in antimalarial policies for all countries and Nigeria wanted to comply.			
26. ACTs had been proven to be more effective in the cure of malaria			
27. Government wanted to scale up effective case management of malaria in the country.			
28. ACTs are cheaper and more accessible than Chloroquine and Fansidar			
29. Chloroquine was increasingly beginning to present more side effects in patients			

30. Please state other reasons why the malaria treatment guidelines may have been revised that are not listed above

I.……

II.……

SECTION III: Knowledge of the Secondary Health Care Physician on the Diagnostic and Prescription Roles as Stipulated by the New Treatment Guidelines

Please tick (√) as appropriate.

According to the National Antimalarial treatment guidelines:

31. What are the classes of malaria?

	1.1.Mentioned	2.2.Not mentioned
A. Uncomplicated/acute malaria		
B. Life threatening malaria		
C. Severe/chronic malaria		
D. Asymptomatic malaria		
E. Cerebral malaria		
F. Enteric malaria		

32. In taking the history of patients with malaria, what are the variables of interest?

	1.1.Mentioned	2.2.Not mentioned
A. Age		
B. Place of residence		
C. Brief Family History		
D. Presence of fever		
E. Paleness		
F. Presence of rigors (shaking of the body)		
G. Headache		
H. Previous history of malaria treatment		
I. Presence of chills (feeling cold)		
J. History of travel within/outside the country		
K. Joint weakness or tiredness		
L. Joint pain		
M. Loss of appetite		
N. Vomiting		

Others (specify)……

33. In children, which other additional variables are inclusive for history?

	1.1.Mentioned	2.2.Not mentioned
A. Cough or respiratory distress		
B. Diarrhea		
C. Recent episode of measles		
D. Ear pain		
E. Skin rashes in the last three months		
F. Vomiting		

Others (specify)……..

34. What are the signs of uncomplicated malaria?

	1.1.Mentioned	2.2.Not mentioned
A. Increased body temperature > 37.5ºC		
B. Jaundice		
C. Pallor (especially in children/pregnant women)		
D. Enlarged spleen or liver especially in children		
E. Prostration		
F. Vomiting		
G. Severe anemia		
H. Chills		
I. Loss of appetite		

J. Malaise		
K. Headache		

35. For laboratory diagnosis of malaria, the following are true

	1.1.TRUE	2.2.FALSE	3.3.UNSURE
A. Recommended laboratory tests are the standard microscopy and the rapid diagnostic tests (RDT)			
B. Parasitological diagnosis must always be done before treatment			
C. Treatment can be given especially in children under five without a laboratory diagnosis.			
D. In children under 5, where treatment fails or is suspected to fail, laboratory diagnosis need be done to confirm initial diagnosis.			
E. Clinical diagnosis is adequate for the treatment of malaria in children and pregnant women			

36. What are the objectives for treating uncomplicated malaria?

	1.1.Mentioned	2.2.Not mentioned
A. Cure the infection		
B. Get rid of all signs and symptoms		
C. Prevent progression to severe disease		
D. Avoid treatment failure		
E. Prevent additional morbidity associated with treatment failure		
F. Prevent the infection from being transmitted to other persons		
G. Prevent resistance to antimalarial drugs		

37. Cure can be defined as

	1.1.Mentioned	2.2.Not mentioned
A. Recovery of the patients from the symptoms earlier diagnosed		
B. Eradication from the body of the infected patient that which caused the illness requiring treatment		
C. Preventing progression of the illness to severe disease		

Others (specify)……

38. What is the drug of choice for treatment of uncomplicated malaria?

	1.1.Mentioned	2.2.Not mentioned
A) Sulfadoxine–Pyrimethamine (SP)		
B) Artemisinin Based Combination Therapy (ACT)		
C) Chloroquine		

Others (specify)……

39. What are the recommended ACTs for the management of uncomplicated malaria?

	1.1.Mentioned	2.2.Not mentioned
A. Artesunate-mefloquine		
B. Artesunate- pyronalidine		
C. Artesunate- amodiaquine		
D. Artemether- lumefantrine		
E. Dihydroartemisinin- piperaquine/trimethroprim		
F. Dihydroartemisinin- naphathoquine/trimethroprim		
G. Atoraquine- proguanil		

Others (specify)…… ……

40. In dosage administration for the patients, what demographic characteristics are important? A. Weight ☐ B. Sex ☐ C. Age ☐ D. History of infection ☐

41. In prescribing Artemether- Lumefantrine, what is the correct dosage for a child,

AGE	NUMBER OF TABLETS/DOSE
I) 6months- 3yrs	1 tab twice daily x 3 days (Θ 2 x 3days) ☐ Others (specify)…….....
II) 4- 8 yrs	2 tabs twice daily x 3days(ΘΘ 2 x 3days) ☐ Others (specify)……
III)9- 14 yrs	3tabs twice daily x 3days (ΘΘΘ3x3days) ☐ Others (specify)……
IV) ≥ 14yrs	4tabs twice daily x 3days(ΘΘΘΘ2x3days) ☐ Others (specify)……

42. How many doses of Artemether- Lumefantrine are to be taken by the patient?

A) 4 doses ☐ B) 6 doses ☐ C) 8 doses ☐

D) Others (specify)……

43. Where a patient shows evidence of inadequate clinical response, what should be done?

	1.1.Mentioned	2.2.Not mentioned
A) Give another dose of the same antimalarial drugs		
B) Evaluate the patient and review diagnosis		
C) Exclude suboptimal dosing or inadequate intake		
D) Seek confirmatory test		
E) In the rare case of all the above being normal and malaria is unresponsive, administer oral quinine.		
F) Administer another antimalarial drug		

44. Which of the following statements are true?

A) Artemisinin derivatives must be used in combination with another effective antimalarial drug in the treatment of uncomplicated malaria

1. True ☐ 2. False ☐ 3. Don't know ☐

B) Monotherapy with dihydroartemisinin is recommended

1. True ☐ 2. False ☐ 3.Don't know ☐

45. In the use of antipyretics, if temperature is high temperature >38.5 ° C, what do you do?

	1.1.Mentioned	2.2.Not mentioned
A. Wipe body with wet towel		
B. Advise a cold bath		
C. Avoid over clothing		
D. Give phenegal especially in children		
E. Give Paracetamol 10mg/kg in children or 500-1000mg in adults 4times daily		

Others (specify)……..

46. If patient vomits, what is recommended?

	1.1.Mentioned	2.2.Not mentioned
A. Repeat full dose		
B. If vomiting persists, treat as severe malaria		
C. Give quinine injections		
D. Refer		

Others (specify)……..

47. If patient presents with febrile seizures, do you treat as severe malaria?

1. YES ☐ 2. NO ☐ 3. DON'T KNOW ☐

48. Where oral administration of drug is not possible, what should be done?

	1.1.Mentioned	2.2.Not mentioned
A. Use rectal Artesunate		
B. Use intravenous quinine		
C. Use parenteral (intramuscular) quinine		
D. Sublingual administering of the drug		

Others (specify)……..

49. In following up the patient, the following are true?

A) Tell the patient to return if fever persists for two days after commencement of treatment 1. TRUE ☐ 2. FALSE ☐ 3. DON'T KNOW ☐

B) Tell patient to return immediately if condition gets worse or develops signs of severe disease 1. TRUE ☐ 2. FALSE ☐ 3. DON'T KNOW ☐

C) Appoint a nurse or another health worker to follow up the patient at the house address given by him/her 1. TRUE ☐ 2. FALSE ☐ 3. DON'T KNOW ☐

D) When patient returns, check that they have complied with the treatment as advised 1. TRUE ☐ 2. FALSE ☐ 3. DON'T KNOW ☐

E) Repeat or do blood smear for malaria parasites 1. TRUE ☐ 2. FALSE ☐ 3. DON'T KNOW ☐

50. In treatment of uncomplicated malaria in children less than three months i.e. <5kg, which of the following statements are true?

A) Oral quinine should be used for treatment

1. TRUE ☐ 2. FALSE ☐ 3. DON'T KNOW ☐

B) ACTs should be used for treatment

1.TRUE ☐ 2. FALSE ☐ 3. DON'T NOW ☐

C) Other supportive therapy could be used in treatment

1. TRUE ☐ 2. FALSE ☐ 3. DON'T KNOW ☐

51. In the treatment of uncomplicated malaria in pregnant women, which of the following are true?

A) Quinine can be used for treatment in all three trimesters

1. TRUE ☐ 2. FALSE ☐ 3. DON'T KNOW ☐

B) ACTs can be used for treatment in all three trimesters

1. TRUE ☐ 2. FALSE ☐ 3. DON'T KNOW ☐

C) There's need for proper monitoring and adequate documentation of treatment responses 1. TRUE ☐ 2. FALSE ☐ 3. DON'T KNOW ☐

SECTION IV: CHALLENGES FACED IN THE IMPLEMENTATION OF THE POLICY DOCUMENT GUIDELINES

Appropriateness

52. What is your assessment of the following in respect of the National Antimalarial Treatment Guidelines?

	1.1.Very Adequate	2.2. Adequate	3. 3. Fairly Adequate	4. 4. Not Adequate	5 5. Unsure
A. The Antimalarial Treatment Guideline is an adequate diagnostic tool for uncomplicated malaria.					
B. The Antimalarial Treatment Guidelines is an adequate prescription tool in the treatment of uncomplicated malaria.					
C. Dosages prescribed by the guidelines are appropriate for the ages and adequate for curing malaria infection					

53. If answer is "Not Adequate" to any of the above options in question 52, please give reasons why?

1. ……

2. ……

Desirability

54. Please indicate if you agree with these statements about ACTs; the choice drug for treatment of uncomplicated malaria recommended by the National Antimalarial Treatment Policy

	11.AGREE	2.2.DISAGREE	3.3.UNSURE
A. ACTs give a better outcome than the previous choicedrug; Chloroquine.			
B. ACTs present lesser side effects than Chloroquine.			

55. If answer is "DISAGREE" to any of the options in question 54, please give reasons why?

I. ……

2. ……

Utility

56. How would you assess the use of the new treatment guidelines compared to the former?

	11.AGREE	2.2.DISAGREE	3.3.UNSURE
A. The policy document is easier to understand			
B. The policy document is easier to interpret			
C. The policy document is more accessible			
D. The policy document is more available			
E. The policy dictates the use of expensive drugs			

57.If answer is "NO" to any of the above questions, please give reasons why?

1. ……

2. ……

58. Please state any challenges you have faced while complying with the new antimalarial treatment guidelines

1. ……

2. ……..……..

3. ……..……..

THANK YOU FOR YOUR AUDIENCE, CO-OPERATION AND IMMENSE CONTRIBUTION TO THE DEVELOPMENT OF RESEARCH SCIENCE.

Name of Research Assistant……

Signature…….

SECTION V: EXTENT OF COMPLIANCE WITH THE NEW POLICY GUIDELINES

A review of the personnel's most recent prescription records shall be done using the checklist below.

59. When was the patient attended to? 1. within that week ☐ 2. The previous week ☐
3. 2-3 weeks ago ☐ 4. A month ago ☐ 5. Others (specify)……

60. Please tick which category the patient treated falls 1. Pregnant woma☐
2. Child (under 5 ☐ 3. Adult ☐ 4. Others (specify) ……..

61. Indicate the sex of the patient 1. Male ☐ 2. Female ☐

62. Type of malaria diagnosed 1. Uncomplicated malaria ☐ 2. Severe malaria ☐
3.Others (specify) ……..

Please complete the CHECKLIST below

If uncomplicated,	1.YES	2.NO
63. Complete history taken		
A) Age		
B) Place of residence		
C) History of travel within/outside the country		
D) Presence of fever		
E) Presence of chills (feeling cold)		
F) Presence of rigors (shaking of the body)		
G) Headache		
H) Joint weakness or tiredness		
64. If patient is a child, check for the following history records		
A. Cough or respiratory distress		
B. Diarrhoea		

C. Ear pain in the last three months		
D. Skin rashes in the last three months		
65. Appropriate diagnosis of signs and symptoms		
A. Increased body temperature > 37.5ºC		
B. Pallor (especially in children/pregnant women)		
C. Enlarged spleen or liver especially in children		
66. Laboratory diagnosis done (if adult)		
67. Compliance with dosage chart		
A. 6mnths- 3yrs; 1 tab twice daily x 3 days		
B. 4- 8 yrs; 2 tabs twice daily x 3days		
C. 9- 14 yrs; 3 tabs twice daily x 3days		
D. ≥ 14yrs; 4 tabs twice daily x 3days		
E. Chloroquine		
F. Sulphadoxine-Pyrimethamine (SP) derivatives		
68. Any follow up notes		

69. Please indicate any additional notes taken:

1. ……

APPENDIX 4

TRAINING MANUAL FOR RESEARCH ASSISTANTS

Introduction

Evidence clearly shows that the development of drug resistance is linked to inadequate and inappropriate use of antimalarials at various levels thus leading to exposure of the parasite to less than therapeutic drug levels. This may result from poor prescription from the health worker, non compliance to prescription and availability of fake and substandard drugs (National Antimalarial Treatment Guidelines, 2005).
Compliance with treatment regimens in terms of prescription of the choice efficacious drugs on the part of the health care provider obviously has implications for the control of malaria.

This manual is designed to train research assistants to collect data that will discern the compliance of secondary health care workers with the National Antimalarial Treatment Guidelines in Oyo State, Nigeria.

TRAINING GOAL

- To equip research assistants with adequate functional knowledge with which to collect necessary data for the conduct of the research into the compliance of Secondary Health Care workers in Oyo state with the National Antimalarial Treatment Guidelines.

TRAINING OBJECTIVES

- To introduce to the research assistant the concept and purpose of the research.
- To explain in details to the research assistant, the methodology of data collection for the research.
- To get the research assistants familiar with the instrument for data collection; the semi structured Health Personnel questionnaire.
- To get the research assistant to become familiar with the training and/or field manual.

CONTENT

SESSION ONE: Introduction to Research scope and methodology

Session Objectives

In the course of this session, participants/research assistants will be introduced to

1) The concept of the research topic
2) The purpose (goals and objectives) of the research
3) The research questions and
4) The hypotheses to be tested
5) The sample population and size
6) The sampling technique
7) Data collection procedures
8) Concept of instrument validation (test retest)

Learner's Objectives

At the end of this session, participants/research assistants will

1) List the goals and objectives of the research
2) Understand and interpret the research questions and
3) Understand and explain the sampling technique
4) Understand and explain the data collection procedures
5) Understand the test retest instrument validation procedures

Duration: 3 hours.

Methodology:

Lecture, Demonstration and return demonstration, Participatory discussion

Content:

- Brief introduction to the study
- Statement of the problem
- Justification for the study
- Research Questions
- Research Hypothesis
- Study Design and scope
- Study sites and Population
- Sample size
- Instruments for data collection
- Validation and reliability of instruments
- Data collection procedures

Evaluation method:

Question and answer session.

SESSION TWO

Session Objectives

In the course of this session, participants/research assistants will be introduced to the instrument for data collection;

1) The Health Personnel Questionnaire
2) The compliance check list
3) The consent form
4) The entry process

Learner's Objectives

At the end of this session, participants/research assistants will

1) Understand and be able to administer correctly the health personnel questionnaire

Duration: 2 hours.

Methodology:

Demonstration and return demonstration

Role Play

Content:

- Introduction to all sections of the Health Personnel questionnaire
- Demonstration of administration session

Evaluation method:

SESSION THREE

Session Objectives

In the course of this session, participants/research assistants will be given room to show acquired proficiency in the administration of:

1. The Health Personnel Questionnaire
2. The compliance check list
3. The consent form

Learner's Objectives

At the end of this session, participants/research assistants will

1. Understand and be able to administer correctly the

- health personnel questionnaire
- The compliance checklist
- The consent form

Duration: 3 hours.

Methodology:

Demonstration and return demonstration

Role Play

Content:

- Role Plays

Evaluation method:

Return Demonstration

SESSION FOUR

Session Objectives

In the course of this session, participants/research assistants will be introduced to

1) The field manual for the research

Learner's Objectives

At the end of this session, participants/research assistants will be able to

1) Understand and interpret correctly all sections of the field manual for the research

Duration: 1 hour.

Methodology:

Participatory discussion

Content:

- Introduction to all sections of the field manual for the research

Evaluation method:

Question and answer session.

APPENDIX 5

TRAINING PLAN AND TIME TABLE FOR RESEARCH ASSISTANTS

TRAINING PLAN

DAY/ DATE	SESSION	TOPIC AND/OR CONTENTS	OBJECTIVES	TRAINING METHODS	TRAINING AIDS	EVALUATION	PERSON RESPONSIBLE	TIME ALLOTED
DAY 1	ONE	- Introduction to Research • Brief introduction to the study • Statement of the problem • Justification for the study • Research Questions • Research Hypotheses	○ Appreciate and understand the concept of the research topic ○ List the goals and objectives of the research ○ Understand and interpret the research questions and ○ Understand the research	Participatory discussion	Power point presentation Projector Laptop	Question and Answer session Pre and Post-test		3hours

			hypothesis					
	TWO	- Introduction to research methodology ○ Study Design and scope ○ Study sites and Population ○ Sample size ○ Instrument for data collection ○ Validation and reliability of instruments ○ Data collection procedures	○ State the sample population and size ○ Understand and explain the sampling technique ○ Understand and explain the data collection procedures ○ Understand the test retest instrument validation procedures	Lecture Demonstration and return demonstration	Power point presentation Projector Laptop	Question and Answer session Pre and Post-test		2 hours

DAY 2	ONE	- Introduction to data collection instruments ○ Introduction to all sections of the Health Personnel questionnaire ○ Demonstration of administration session	○ Understand and be able to administer correctly the health personnel questionnaire	○ Demonstration and return demonstration ○ Role Play	Power point presentation Projector Laptop	Return Demonstration		3 hours
	TWO	○ Introduction to all sections of the field manual for the research	○ Understand and interpret correctly all sections of the field manual for the research	○ Participatory discussion	Power point presentation Projector Laptop	Question and Answer session		1 hour

TRAINING TIME TABLE

DAY/DATE	TIME 9.30 - 10.00 AM 10.00 AM – 12.00 PM 12.00 – 1.00 PM 1 PM–3.00 PM			
DAY 1	ARRIVAL AND REGISTRATION	SESSION 1 – INTRODUCTION TO THE RESEARCH STUDY AND METHODOLOGY	LUNCH BREAK	SESSION 2 – DATA COLLECTION PROCEDURE – ROLE PLAY SIGNING OF CONFIDENTIALITY ASSURANCE FORM
DAY 2	RECAP OF DAY 1 ACTIVITIES	SESSION 1 – INTRODUCTION TO THE FIELD MANUAL FOR THE STUDY.		SESSION 2 – 1.00 – 2.00pm NEGOTIATIONS AND PRE-TEST ARRANGEMENTS

APPENDIX 6

TELEGRAMS..... TELEPHONE.....

MINISTRY OF HEALTH

DEPARTMENT OF PLANNING, RESEARCH & STATISTICS DIVISION

PRIVATE MAIL BAG NO. 5027, OYO STATE OF NIGERIA

Your Ref. No. .....
All communications should be addressed to
the Honourable Commissioner quoting
Our Ref. No. AD 13/479/114

Date: 5th May 2010

The Principal Investigator
Department of Health promotion and Education
University of Ibadan

Attention: Oyedokun Foyeke. I.

Re: Oyo State Research Ethical Review Committee -OYSRERC)

This acknowledges the receipt of the corrected version of your Research Proposal titled: *Compliance with the National Anti-malarial treatment guidelines by facility based secondary health care workers in Oyo State*

The Committee has noted your compliance with all the ethical concerns raised in the initial review of the proposal. In the light of this, I am pleased to convey, to you, the approval of the committee for the implementation of the Research Proposal in Oyo State, Nigeria.

Please, note that the committee will monitor, closely, and follow up the implementation of the research study. However, the Ministry of Health would like to have a copy of the results and conclusions of the findings as this will help in policy making in the health sector

Yours Sincerely,

Mrs V.A. Adepoju
Director, Planning, Research & Statistics
Secretary, Oyo State, Research Ethical Review