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**[MALARIA TREATMENT SEEKING BEHAVIOUR AND ACCESS TO
ARTEMISININ COMBINATION THERAPY]**

A case of Mushin, Lagos, Nigeria

Mini-dissertation

BY

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PROTOCOL

1. Introduction

Malaria remains a major cause of morbidity and mortality, especially among children and pregnant women in Africa (Snow et al. 2005). In Nigeria, at least 300,000 children die of malaria annually. Malaria is responsible for 60% of outpatients' visits, 30% of childhood mortality, 25% of infant mortality and 11% of maternal deaths in Nigeria (Federal Ministry 2005). According to the World Health Organization (WHO), Nigeria accounts for a quarter of all malaria cases in the African Region and that, there is no evidence of any systematic decline in the malaria burden (WHO 2008). This is despite a progressive increase in the amount of funding that has gone into the control of malaria in the country. It has been estimated that between 3-11% of annual household income in Nigeria could be lost due to malaria (Leighton & Foster 1993).

Early diagnosis and prompt treatment of malaria with effective medications reduces morbidity and prevents death from the disease. Various studies have shown that the affordable and widely available antimalaria – chloroquine (CQ) – which was the major first-line drug has lost its efficacy due to the emergence of CQ-resistant strains of *Plasmodium falciparum* (WHO 2008). For example In Nigeria, a nationwide study showed that CQ and sulphadoxine-pyrimethamine (SP) are no longer effective treatment options for malaria (Federal Ministry of Health 2005a). Artemisinin based combination therapies (ACTs)¹ have been shown to be highly effective at treating *P. falciparum* in most places where they have been studied (Sinclair et al. 2009). The WHO in April 2001 recommended the use of ACTs in countries where *Plasmodium falciparum* malaria is resistant to CQ, SP and amodiaquine (WHO 2006a).

In 2004, the Federal Government of Nigeria in compliance with the WHO recommendation banned the use of CQ and SP as first-line drugs in the treatment of malaria. ACTs became the recommended first-line drugs for the treatment of uncomplicated malaria in Nigeria (Federal Ministry of Health 2005b). The policy change from CQ and SP to ACT in Nigeria is expected to change malaria treatment and drug consumption patterns from the use of cheaper but ineffective drugs to the use of ACTs. More than 6 years after the change in treatment policy, it is not certain if the policy is being adhered to and the proportion of people that use the recommended ACT in Nigeria is not known (WHO 2009).

¹ An ACT is a combination of Artemisinin (or one of its derivatives) with another antimalarial (or antimalarials) (WHO, 2006b).

Despite ACTs being WHO preferred treatment for malaria since 2001, few people in developing countries can afford them (AMFm 2008). However, the global community is considering the setting up of a global subsidy mechanism in order to make ACTs accessible and affordable. With funding from the Global Fund, the U.S. President's Malaria Initiative, the World Bank, and others, many of these countries have made substantial progress in delivering ACTs to patients through public health systems (UNICEF 2009).

2. Research Problem

The Roll Back Malaria Partnership (RBM) has set the target for 2010 of “80% of malaria patients are diagnosed and treated with effective anti-malarial medicines e.g. ACTs within one day of the onset of illness” (RBM 2005). Because prompt and effective treatment was proposed as a malaria control strategy by the WHO, various 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 and interventions aimed at the purchasing and adherence practices of anti-malarial users and their caretakers (Smith et al. 2009).

Even though many countries have adopted ACTs as the medication for the treatment of uncomplicated malaria, only a fraction, probably < 10% of malaria patients, are able to access these medicines, especially in high burden countries in Africa (Bosman & Mendis, 2007). The mean proportion of children under five years of age with a fever that were treated with an anti-malarial drug in sub-Saharan Africa between 2006 and 2007 was 38%, although this varied across countries from 10% to 63%. While anti-malarial treatment in children with fever is moderately high across Africa, many febrile children are still treated at home and with less effective medicines (UNICEF, 2009). Only about 3% of these children were given an ACT (WHO, 2008). Of the approximately 550 million anti-malarial treatments administered per year globally, only 110 million or 20% are ACTs – and these are provided almost entirely by the public sector. Currently ACTs make up approximately 5% of total anti-malarial treatments provided by the private sector where 60-80% of patients purchase drugs (AMFm, 2008).

In most countries, ACTs are currently the most expensive drugs for treating malaria. In Nigeria for instance, it averages 504 Naira (US\$ 4) per course of treatment, up to 10 times more expensive than CQ. Because of their considerably higher cost, few who seek treatment

in the private sector are accessing ACTs, but are instead continuing to purchase suboptimal therapies such as SP and CQ or antipyretics (Laxminarayan et al. 2006).

Most people do not obtain appropriate treatment for malaria, and depend on informal private providers for anti-malarial drugs, mainly through patent medicine vendors (PMVs). These medicine sellers are a widely used source of drugs for fever in sub-Saharan Africa (Goodman et al. 2007). In this era of ACT, there is concern that medicine sellers may continue to sell artemisinin monotherapies, potentially jeopardizing ACT efficacy in the long-term (Kachur et al. 2006). The use of Artemisinin monotherapies could lead to the development of parasite resistance to Artemisinin.

A lot of effort has gone into determining which anti-malarials are efficacious, however far less effort has gone into determining how to deliver them effectively. A drug which is 90% efficacious but delivered to only 20% of those who need it has limited effectiveness (Whitty et al. 2008).

3. Aim and Objectives:

3.1. **Aim:** The aim of this study is to explore how demographic and socioeconomic factors influence malaria treatment seeking behaviour and anti-malarial drug use patterns of individuals with malaria symptoms in Lagos, Nigeria.

3.2. Objectives:

- To determine where target population seek treatment for malaria.
- To determine the proportion of target populations who used a formal malaria diagnostic test to confirm symptoms of malaria.
- To assess the level of awareness of the ACTs for malaria treatment.
- To determine the proportion of the target population with fever in the last 4 weeks who received effective malaria treatment (ACT).
- To assess the factors that affects the malaria treatment seeking behaviour and use of ACTs.

4. Justification of study

Health care seeking is a central issue in all kinds of morbidity including malaria. The duration of symptoms increases the probability of severe morbidity and harmful consequences. Also, the quality and type of drug used would determine treatment outcomes. Initiatives such as the RBM have emphasized the importance of social science inputs to malaria research and control (Williams & Jones 2004). Also, exploring socio-cultural factors which influence antimalarial drug use has been recognized as a priority (Gardella et al. 2008). Information on treatment seeking behaviour and drug use patterns has important policy implications in health systems development. Strategic policy formation in all health care systems should be based on information relating to health promotion, seeking and utilization behaviour and the factors determining these behaviours (Shaikh & Hatcher, 2005). Such information is pertinent to help the government in the promotion of equitable access to quality health services and access to effective medications.

Many studies have been carried out on treatment seeking patterns for malaria particularly among children under 5 years of age in sub-Saharan Africa; however, most of these studies were done before the adoption of ACTs as first-line drugs for malaria (Tanner & Vlassoff, 1998). Earlier studies conducted in Nigeria did not assess household awareness about ACTs and did not provide information on the proportion of people that currently use ACTs for treating malaria (Uzochukwu & Onwujekwe, 2004, Okeke & Okafor 2008). Other studies in Nigeria assessed drug prescription and consumption patterns at formal health facilities (Meremikwu et al., 2007, Oreagba et al. 2008). However, it is well known that most treatment of malaria occurs at household level either by self treatment or by purchasing of drugs from PMVs (Oladepo et al. 2007). Anti-malarial drug consumption patterns at hospital and clinics did not capture the drug use behaviour of the millions of people in Nigeria who do not access treatment from formal health facilities. Therefore, currently there is limited information on treatment seeking behaviour for malaria and antimalarial drug use patterns since the ACTs policy.

About six years down the line, after the adoption of the ACT policy, household awareness of the policy, malaria treatment seeking behaviour and anti-malarial drug consumption patterns need to be explored. The findings of this study would add to the current literature on the malaria treatment seeking behaviour and drug use patterns following the national policy change to ACTs for malaria treatment and access to effective malaria medicines. It will also provide relevant information on variables that have to be considered when planning malaria treatment and drug distribution programmes.

5. Literature Review

Human health seeking behaviour, which is the action people take when dealing with an illness, is influenced by a multiple of factors apart from knowledge and awareness (Jain et al. 2006). Some of these factors are predisposing characteristics such as age, gender, occupation, education and other enabling factors such as proximity to the health facility, health insurance, income and existence of social networks (Law et al. 2005). Several theoretical models have been used to explain the determinants of health seeking behaviour. One of these is the model developed by Andersen which includes 3 groups of factors, namely; predisposing factors, enabling factors and health services system (Andersen 1995). Multiple barriers to accessing effective treatment for malaria have been identified. These barriers include: perceived quality of care, lack of knowledge, distance from health services, transport costs, treatment costs, and opportunity costs (Whitty et al. 2008, Noor et al. 2003).

5.1 Treatment seeking Behaviour

Early diagnosis and prompt treatment with effective medications has been a cornerstone of malaria control (Snow et al. 2005). The use of ineffective drugs in Sub Saharan Africa, in recent years has led to treatment failures and elevated rates of mortality, particularly among young children (Björkman 2002). Previous studies indicate that most people do not use laboratory services for the diagnosis of malaria. Self diagnosis and treatment was noted to be rampant in malaria endemic countries (McCombie 2002). Foster estimated that more than half of the world's anti-malarials are consumed outside the public health sector (Foster 1995). A survey of 21 African countries revealed that of those who treated febrile illness with anti-malarials, 46% obtained treatment at a health facility, 44% at home and 10% at both home and health facility (UNICEF & WHO 2003). A household survey in central Ethiopia revealed that 33% of people with self-diagnosed malaria sought treatment from community based health facility workers, 23% attended public health facility and 17% sought help from private clinic (Deressa et al. 2007). In a similar study in Sudan, it was found that people usually start care at home, and then shift to health workers if there was no response (Malik et al. 2006). The findings were similar in Guatemala, Ethiopia and Kenya, where more than 60% of the individuals self treated usually with anti-malarials and did not seek medical attention (Ruebush et al. 1992, Snow et al. 1992, Yeneneh et al. 1993). According to studies conducted in Ghana, Mali, Nigeria and Zambia, as many as 90% of children with fever are treated at home (Salako et al. 2001).

Home treatment is usually by purchasing medicines from medicines stores (PMV) or by using locally prepared concoction. Several studies in Nigeria have shown that PMVs are the most common source of malaria treatment for many households (Goodman et al. 2007, Salako et al. 2001). Evidence from 2 states in Nigeria shows that for both children and adults, about 75% of fever treatment takes place in the private sector. Within the private sector, about 40% of treatment seeking is from patent medicine dealers. A study on the role of PMV in three regions in Nigeria showed that PMVs still recommended and provided drugs whose efficacy is highly questionable: 92% of shops had SP in stock, 72% had CQ (both not recommended), whereas only 9% had ACTs (Oladejo et al. 2007). The PMVs have been observed to behave primarily as commercial salesmen, since around 75% simply sell what a customer requests, and on other rare occasions, fills a prescription (Brieger et al. 2004). There are concerns that the patent medicine vendors have little knowledge about new guidelines for malaria treatment and they still recommend that people use ineffective anti-malarials. There are also of concern about the quality of the drugs that are supplied by the PMV (Oladejo et al. 2007).

5.2. Determinants of Choice of Treatment

Various factors including the availability of health facilities, user fees, satisfaction with services, difficulty to reach the facilities and believe in traditional medicine have been found to influence the choice of treatment (Malik et al. 2006). In Nigeria, it has been shown that poorer people are more likely to resort to self diagnosis and also rely on a family member to diagnose their malaria. Also the poorer the respondents, the more likely they are to use traditional healers, patent medicine dealers and community health workers for the treatment of malaria while the rich households are more likely to use the services of private clinics that offer apparently better quality of services (Uzochukwu & Onwujekwe 2004).

5.3 Access to ACTs for malaria treatment

Access can be viewed as a multi dimensional concept. The three common dimensions of access include availability (sometimes referred to as physical or spatial access), affordability (sometimes referred to as financial access) and acceptability (sometimes referred to as cultural access) (McIntyre & Mooney 2007). Accessibility to effective treatment plays a significant part in health seeking behaviour. Differences in access between individuals would therefore provide a potential explanation for differences in health seeking behaviour. Prompt

access to treatment with effective anti-malarial drugs is essential to the control and elimination of malaria, and to reducing child and adult mortality (Hopkins et al. 2009). For example, the widespread use of ACTs in South Africa has reduced the burden of malaria significantly (Muheki et al. 2004).

Even though ACTs are currently a major tool to combat malaria, access to ACTs is still inadequate in many countries (WHO 2008). Various forms of ACT are 5–10-fold more costly compared with the previously recommended treatments, CQ or SP (Saulo et al. 2008). Efforts have been made to improve the availability of these medications and to encourage their correct use (Bate et al. 2008). The National Malaria Control Programme (NMCP) programme delivered 4.5 million courses of ACT in 2006 and 9 million in 2007, far below total requirements (Federal Ministry of Health 2005c). The cost of artemisinin derivatives is also a limiting factor for access and optimal use of ACT. According to the WHO, none of the populations of 18 African countries surveyed in 2006 and 2007 had adequate access to anti-malarial drugs (WHO 2008). Access to treatment was not up to the 80% target in any of the countries, with the average across the 18 countries being 38%. The overall proportion of children with fever receiving anti-malarial drugs for their fever was 31 % and the proportion of febrile children receiving anti-malarial drugs within 48 hours was 23.3%. In Nigeria only about 34% of children under five with malaria receive any anti-malarial, compared to 58% in Cameroon, Zambia and Tanzania (WHO 2008). Thus, despite the fact that ACTs are effective in the treatment of malaria, the cost of these drugs can be an obstacle to accessing these medications especially for the poor who are mostly affected by the disease.

6. Methodology

6.1. Study Area

Nigeria is located in West Africa and shares land borders with the Republic of Benin in the west, Chad and Cameroon in the east, and Niger in the north. Its coast lies on the Gulf of Guinea, a part of the Atlantic Ocean, in the south. The three largest and most influential ethnic groups in Nigeria are the Hausa, Igbo and Yoruba. The study will be carried out in Mushin LGA, Lagos state, which is one of the 36 states of the Federal Republic of Nigeria. In land mass, Lagos is the smallest state in Nigeria, with an area of 356,861 hectares of which 75,755 hectares are wetlands, yet it has the highest population, which is over five per cent of the national estimate (Lagosstateonline 2010). According to the results of the 2006 census, the total population of Lagos is about 9, 013,534 (National Bureau of Statistics 2006). The

rate of population growth is about 600,000 per annum with a population density of about 4,193 persons per sq. km.

Mushin is a local suburb of Lagos state and also one of the 20 LGAs with a population of 633,009. It is located 10 km north of the Lagos city core, and is a largely a congested residential area with inadequate sanitation and low-quality housing (Lagosstateonline 2010). The people are predominantly traders and artisans from various ethnic groups in Nigeria. The major ethnic groups are Yoruba and Igbo and the major religions are Islam and Christianity. This study area was purposively selected because of the author's familiarity with the area which will make it easy to have access to households for data collection.

The Local Government also runs health centers and provides health facilities for children within their schools. A clinic is also run within the headquarters to care for health requirement of council staff. Mushin is the home of Lagos University Teaching Hospital (LUTH) and also the Mushin General Hospital.

6.2. Study Design

This will be a cross sectional study of households in Mushin LGA, Lagos. Primary data will be collected using interviewer administered structured questionnaires to randomly selected households in the study areas.

6.3. Study Population#

All households in Mushin LGA will be eligible to be sampled for the study.

6.4. Sample Size#

One of the key indicators of malaria treatment seeking behaviour is the proportion of the population that use effective treatment options for malaria. The sample size of the for study is based on "*the proportion of the population with fever/malaria in the 4 weeks preceeding the survey who used any ACT for treatment within 24 and 48 hours of the onset of fever*" (Roll Back Malaria 2005) . This figure was not available for Nigeria at the time of this study (WHO 2009). Therefore we will assume it to be 50%.

$$n = \frac{p(1-p)z^2}{d^2}$$

Where:

n = desired sample size

p = anticipated proportion of people (all age groups) with fever in the past 2 weeks who receive effective treatment for malaria within 48 hours of the onset of fever.

d = the acceptable margin of error (the degree of acceptable difference between the estimated sample and the true population value. The level is set at 5% (0.05).

z = cut off value of the normal distribution (1.96 will be used).

$$\frac{0.5(1 - 0.5)(1.96)^2}{(0.05)^2}$$

$$n = \text{respondents} = 384$$

The estimated sample is 384 and 10% non-response rate is calculated to yield a total sample size of 422 respondents.

The household will be used as the unit of analysis in this study. A household is defined as a group of persons occupying the same housing unit, have direct access to the same cooking facility and eat from a common pot.

6.5. Sampling Strategy

The survey will take place in Mushin local government areas (LGA) in Lagos State. Systematic random sampling will be used to select households from the target population. In the LGA, 12 enumeration areas (based on descriptive information from the National Population Commission) will be randomly selected and all the households in the selected EAs will be listed. Thirty five households will be randomly selected from each EA by systematic random sampling. The field workers will use the following procedure in selecting the survey households as follows:

- a) Starting from any point, walk around each of the EA to identify and list the entire household resident there.
- b) Divide the number of households by 35 to obtain the sampling interval, *k*. If the number of households in the EA is 35 or fewer, then automatically select all the households;
- c) Randomly select a number (*r*) between 1 and *k*. The household corresponding to this number in the list of households will be the first household to be included in the sample.
- d) To determine subsequent households to be included in the sample, simply add *k* each time.

The field workers will visit each of the selected households and the household head/care giver will be interviewed. In the event that there is no one in the house/home visited the interviewer will repeat the visit. If there are more than one household in a building, one household will be selected randomly.

6.6. The Survey Instrument

Pre-tested structured questionnaires will be used to collect information from household primary care givers or household head on their socio-economic and demographic status and use of malaria diagnosis and treatment services for any member of the household who had fever/malaria in the last 4 weeks preceding the survey. No household head/care giver will be excluded on the basis of age or sex. A written consent will be obtained from the household head or his/her representative before administering the household questionnaire. In case the household head is illiterate, verbal consent will be obtained. All malaria/fever cases (involving children and adults) identified in each of the selected households within 4 weeks preceding the date of interview will be considered in the survey. Information will be collected on the type of treatment source and anti-malarial medication that was used. The questionnaire will also assess their level of awareness about ACTs. In cases where the respondents cannot remember the medication used, pictures/packing as well as tablets of the various anti-malarial medications available in the study setting will be used to help the respondents identify the medication that was used. The questionnaires will be translated into Yoruba, the indigenous language in Lagos. The average duration of each interview will be determined from the pilot study.

6.7. Training for Data Collection

Three data collector with a Health Science University degree will be recruited and trained by the Principal Investigator (PI). They will be trained for 2 days- a day before and another day after the pilot study. Data collectors will be trained on the following:

- a) Background and purpose of the study,
- b) Sampling technique and procedures to identify households within the local government area
- c) How to determine eligible respondents and which respondents
- d) Importance of consent, how to administer both the consent forms and ensure confidentiality of interviews,

- e) Administering the questionnaire (interview skills) and data collection.

6.8. Pilot Study

A field pre-test of the survey procedures will be conducted in one of the EAs in a neighbouring the Local Government Area. Twenty households will be randomly selected for the pilot study. The team will practice performing the household listing, conducting interviews and testing procedures. The pilot study will serve to pre-test the questionnaires, to check for comprehension of questions, ease or difficulty of statements, confidence in response, level of discomfort and social desirability. The pilot study will also help to identify the various anti-malarial drug types available in the study area. The questionnaire will be adapted based on the results from the pre-test.

6.9. Data management and quality checks

The PI will check the completed questionnaires for errors and inconsistencies. A data manager will develop the screens using Epidata 1 for data entry and enter the questionnaires. The data will be further cleaned by the PI by running frequencies and cross tabulations using STATA 10 statistical software to identify outliers and checking for consistency among variables.

6.10. Data Analysis

Two complementary methods will be used in the analysis using STATA 10 statistical software. The first is the analysis of survey outcomes by descriptive statistics using frequencies and proportions, and the second will use the multinomial logit model to explain the relationship between the factors identified and the sources of treatment. The multinomial logit model will also be used to assess the determinant various anti-malarial drug use patterns.

Descriptive analysis#

Descriptive analysis will be used to describe demographic and social-economic characteristics of households, malaria treatment seeking behaviour and anti-malarial drug patterns. The analyses will be presented as frequencies, means and percentages. Cross tabulations will also be carried out to determine whether there are differences in socio-

economic and demographic characteristics in the treatment seeking behaviour and anti-malarial drug use patterns.

Multinomial logit model

A multinomial logit model will be used to assess the determinant/predictors of malaria treatment seeking behaviour. This model will be used because the dependent variable (type of treatment that was sort) is a categorical variable with various unordered response categories (“public facility”, “private facility” and “did not seek care from any facility”). The outcome of interest (dependent variable) includes: Did not seek care at any health facility = 0, 1= Public health facility, 2= Private health facility and 3= self treated.

6.11. Model specification (Determinants of malaria treatment seeking behaviour)

A multinomial logit model will be used to assess the predictors of type of care that was sort, and the anti-malarial drug used. The Multinomial model is appropriate for this analysis as it uses the Maximum Likelihood Estimation (MLE) method to establish the likelihood that an individual utilized a particular type of health care provider when he/she had malaria.

The models is based on random utility theory, where individuals (i) who report in the questionnaire that a member of their household had malaria symptoms are assumed to choose the treatment alternative (j) with the highest utility. Individuals choose between four alternatives: self-care, hospital, health centre, and other provider (including PMV, pharmacy, or drug stores). The multinomial discrete choice model assumes that the unobserved factors that influence the decision are the same across all alternatives and do not depend on the alternatives. In this model, the probability (p) of an individual i to choose an outcome j (e.g. self treatment over public health facility or private health facility/provider) is given below.

The multinomial logit model in which the probability of an individual i to choose an outcome j is given by:

$$P_{ij} = \exp(x_i\beta_j + z_{ij}\gamma) / \sum_k \exp(x_i\beta_k + z_{ik}\gamma)$$

The coefficients (β_j) on the independent variables that vary across individuals (x_i) are allowed to vary across the choices, j .

The coefficients (γ) on the variables that vary across the choices and perhaps across individuals (z_{ij}) are constant.

The type of anti-malarial drug used will be classified into: ACT, AMT, CQ, SP, & Herbal medications. In the analysis these will be categorized as ACTs, artesunate monotherapies and non ACTs. A multinomial logit model as described above will also be used to determine the probability of using any of the anti-malarial drugs for the treatment of malaria.

6.12. Explanatory variables/Independent variables#

The explanatory variables that will be identified from the literature review will be used. These could include: Asset index, ownership of medical insurance, household head level of education, Tribe, employment status, Gender, Age, Marital status, Gender of Household Head, Household Size, & Religion.

7. Ethical Consideration#

The protocol will be submitted to the Research Ethics Committee at the University of Cape Town for review and approval before commencement of the study. Consent will be sought at three levels – the local government, community and the household level. The purpose of the study, procedures that will be involved, the risks and benefits of participation and the right to withdraw from the study at any point in time will be explained to all the participants. A potential risk in the study is the disclosure of information on household assets and possessions. People may feel uneasy or may not be willing to reveal their assets. In order to ensure anonymity and to avoid violations of the participants' privacy, the questionnaire will not contain names of the respondents. Also, the participants will be assured that they will not be identified in any report or publication on the study.

The consent forms will be translated into Yoruba- the indigenous language in Lagos State. Verbal consent will be received from those who are not able to read or write. The consent will be explicit on the purpose of the study, the harms and the benefits of the study and the voluntary nature of the study so that the participants can make an informed decision.

8. Dissemination#

The findings of the study will be made available to the Swedish International Development Agency and the Health Economics Unit of the University of Cape Town. Also, the researcher intends publish the study in any relevant academic journals and present at relevant conferences and academic workshops. The findings will also be presented to the Mushin Local Government Area Council, Lagos.

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Literature Review

Summary

Successful malaria control depends greatly on prompt treatment with efficacious anti-malarial drugs. Artemisinin-based combination therapies (ACTs), considered the best current treatment for malaria are now the officially recommended treatment for *malaria* in most malaria-endemic countries. However, there are challenges in the implementation of this change in anti-malarial drug policy. This literature review aims to provide information on treatment seeking patterns for malaria and also provide information on access to ACTs for treating malaria.

A search of Medline was conducted to identify relevant studies that evaluated malaria treatment seeking patterns and also studies that provided information on access to ACTs for treating uncomplicated malaria. The included studies varied in terms of the study design, method of sampling, sample sizes, etc. Some of the studies used qualitative or quantitative methods while others used a combination of qualitative and quantitative methods. Also, the findings varied across studies, even from studies conducted in the same country.

Various treatment options for malaria were identified: No treatment, use of traditional forms of treatment, self treatment at home, treatment from formal health facilities (private or public clinics/hospitals) and treatment by purchasing anti-malarial from drug stores. About 4% to 31% of people did not seek any form of treatment. In some of the studies, self treatment at home was found to be very common. Up to 80% of people self-treated at home using available medications found at home or bought from drug stores without prescription in some settings. Traditional treatments were an important source of treatment only in few of the studies from Bangladesh, Burundi, and India where up to 30% of people used traditional forms of treatment. Use of formal sources of treatment varied across location and studies. Some of the factors influencing the choice of treatment were: perceived severity of illness, socioeconomic status, cost of treatment, distance to health facility, level of education, and the perceived quality of treatment. Some studies also provided information on the proportion of people who sought treatment within 24hours or within 48hours of the onset of symptoms. The proportion of people that sought treatment within 24hours ranged from about 9% to 61%, while the proportion that sought treatment within 48hours ranged from 12% to 81%.

Many of the studies were conducted before the change in treatment policy to ACTs and very few of those conducted after the change provided information on anti-malarial drug use patterns or the proportion of people that use ACT for treating malaria.

There is limited information on household/individual level of awareness and adherence to the current ACT policy. Because most treatments for malaria occur at the household level, it will be important to explore the household level of awareness of the current policy and also determine the proportion of people that currently use ACTs for treating malaria. In addition to providing information on how socioeconomic and demographic factors influence treatment seeking patterns for malaria, this review has identified that there is limited information on household awareness of the current treatment policy and also limited information on the proportion of people that use ACTs for the treatment of malaria.

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Introduction

Malaria is a major cause of morbidity and mortality, especially among children and pregnant women in Africa (Snow et al. 2005). In Nigeria, at least 300,000 children die of malaria annually. Malaria is responsible for 60% of outpatients' visits, 30% of childhood mortality, 25% of infant mortality and 11 per cent of maternal deaths in Nigeria (Federal Ministry of Health 2005). According to the World Health Organization (WHO), Nigeria accounts for a quarter of all malaria cases in the African Region and there is no evidence of any systematic decline in the burden (WHO 2008). This is despite a progressive increase in funds that has gone into the control of malaria in the country. It has been estimated that between 3-11% of annual household income could be lost due to malaria from both lost workdays and treatment and control expenditures (Leighton & Foster 1993).

Evidence has shown that the affordable and widely available anti-malarial – chloroquine (CQ) – which was the major first line drug has lost its efficacy due to the emergence of CQ-resistant strains of *Plasmodium falciparum*. Artemisinin based combination therapies (ACTs)² have been shown to be highly effective at treating *P. falciparum* in most places where they have been studied. The WHO in April 2001 recommended the use of ACTs as first-line anti-malarial in countries where *Plasmodium falciparum* malaria is resistant to CQ, SP and amodiaquine (WHO 2006, Sinclair et al. 2009). In Nigeria, a nationwide surveillance data on efficacy showed that CQ and SP are no longer effective treatment options for malaria (Federal Ministry of Health 2005).

In 2004, the federal government of Nigeria in compliance with the WHO recommendation banned the use of CQ and SP as first line drugs in the treatment of malaria. ACTs became the recommended first-line drugs for the treatment of uncomplicated malaria in Nigeria (Federal Ministry of Health 2005).

The anti-malarial treatment policy change to ACT in Nigeria is expected to change malaria treatment and drug consumption patterns from the use of cheaper but ineffective drugs such

² An ACTs is a combination of artemisinin (or one of its derivatives) with another anti-malarial (or anti-malarials) (WHO 2006).

as CQ and SPs to the use of ACTs. However, in Nigeria, the proportion of people that have access to effective malaria medications and that use the recommended ACTs is not known (World Health Organization 2009).

In order to make ACTs accessible and affordable, the global community is considering the setting up of a global subsidy mechanism with funding from the Global Fund, the U.S. President's Malaria Initiative, the World Bank, and others. This is reflected in substantial progress many countries have made in delivering ACTs to patients through public health systems (UNICEF 2009). Studies on treatment seeking behaviour and anti-malarial drug use patterns are needed to guide strategies to ensure access to effective malaria treatments for all. Access can be viewed as a multi dimensional concept. The three common dimensions of access include availability (sometimes referred to as physical or spatial access), affordability (sometimes referred to as financial access) and acceptability (sometimes referred to as cultural access) (McIntyre & Mooney 2007, Andersen et al. 1983, Vollman 2002). Accessibility to effective treatment plays a significant part in health seeking behaviour. Differences in access between individuals may therefore provide a potential explanation for differences in health seeking behaviour. Prompt access to treatment with effective anti-malarial drugs is essential to the control and elimination of malaria, and to reducing child and adult mortality (Hopkins et al. 2009). ACTs have been shown to be effective both in sub-Saharan Africa and in areas with multi-drug resistant *P. falciparum* in South East Asia (Björkman 2002). Widespread use of ACTs in South Africa has reduced the burden of malaria significantly (Muheki et al. 2004). Even though the ACTs are currently a major tool to combat malaria, access to ACTs is still low in many countries (WHO 2008). Access to ACTs is critical for optimal compliance to the new treatment strategy and efforts have been made to improve the availability of these medications and to encourage their correct use (Bate et al. 2008).

In Nigeria, the National Malaria Control Programme (NMCP) delivered 4.5 million courses of ACT in 2006 and 9 million in 2007 and this was far below total requirements (WHO 2008). The cost of artemisinin derivatives is also a limiting factor for access and optimal use of ACT. Various forms of ACT are 5–10 folds more costly compared with the previously recommended treatments, CQ or SP (Saulo et al. 2008, ACTwatch 2008). Thus the cost of these drugs can be an obstacle to accessing these medications especially for the poor who are mostly affected by the disease. This may adversely affect scaling up of the WHO new treatment policy on malaria. However, a global subsidy mechanism is contemplated in order to make ACTs accessible and affordable (AMFm 2008).

Review objectives

The aim of this review is to use published studies to answer the following questions about malaria treatment seeking behaviour patterns and access to artemisinin combination therapies

- a. Where do people seek treatment for malaria?
- b. What proportion of people seek treatment within 28 or 48 hours of the onset of fever/malaria?
- c. What proportion of people use ACTs for treating malaria?
- d. What are the determinants of the choice of treatment for malaria?

Methods

Search Strategy

The literature search was done to identify studies that provided information on treatment seeking patterns for malaria and also studies that provided information on and access to ACTs. The main source of studies included in this review is PubMed³. To identify potentially relevant studies, an electronic search of PubMed was conducted from 1966 to July 2010. The search strategy consisted of two parts. The first part identified malaria treatment seeking behaviour, while the second part focused on access to ACTs. For relevant unpublished data and reports, a google⁴ search was conducted. Also, a scan of the reference lists from identified studies, abstracts and previous reviews was done to identify any other relevant studies. All the studies included in this review reported information on malaria treatment seeking behavior or access to ACTs or both.

Studies on malaria treatment seeking behaviour were identified using the search terms: Malaria treatment OR Treatment seeking behavior OR behaviour Treatment seeking patterns, Health seeking behavior OR behaviour Home management of malaria Self-treatment, OR no treatment for malaria , anti-malarial drug use OR Access to anti-malarial/malaria drugs OR medicines OR medications. The search terms used to identify studies on access to ACTs were: access, affordability, availability, acceptability, artemisinin combination therapy, ACTs

³ PubMed is a free database accessing the [MEDLINE database](#) of citations, abstracts and some full text articles on life sciences and biomedical topics

⁴ Google Search or Google Web Search is a web search engine owned by Google Inc. and is the most-used search engine on the Web

and malaria. The 'AND' and 'OR' command were used to combine the words appropriately. All the terms were searched in PubMed as word in text, title and abstract and as MESH terms.

Selection of studies & criteria for including studies in this review

The studies identified for inclusion had to meet the following criteria:

- the study is about malaria treatment seeking behaviour or access to ACTs or both
- the study describes original data
- the study is published in English

All studies that meet the above criteria were included irrespective of the country where they were conducted. The abstracts were assessed for eligibility by using these set criteria.

Initial scan of the titles and abstracts of the search output from Pubmed was done to identify studies that met the above criteria. Full text articles of potentially eligible studies were retrieved for further assessment.

Data Extraction

The following data were extracted from the identified studies: setting (country) where the study was conducted, date of data collection and year of publication, study design (data collection method), sample size (if applicable), characteristics of study participants, key findings in relation to treatment seeking behaviour and access to ACTs.

Treatment seeking behaviour although frequently used was never clearly defined in the included studies. From the results sections of the reviewed articles, all items that were related to the concept of malaria treatment seeking behaviour were identified. To prevent loss of information from any of the studies, themes that did not fall under any of these items, but are relevant, were reported separately. All the articles included in the review reported a wide variety of themes that were considered to be various forms of treatment seeking behaviour.

The different themes were classified as follows:

- No treatment
- Self Treatment/Home treatment or home management of malaria
- Use of herbal medications or traditional medications
- Use of formal health care facilities (private and government clinics/hospitals)
- Use of drug shops or patent medicine vendors

For the purpose of this review, the formal sources refer to both private and public health facilities (hospitals, clinics & community health centres). Informal sources of treatment refer to self treatment at home, purchasing medications from drug stores or patent medicine vendors (PMVs) without prescription, and the use of traditional forms of treatment.

In general, treatment-seeking patterns were different across the included studies and across settings.

Description of studies

The included studies varied in terms of the methodologies and study findings. They used either quantitative cross-sectional (analytic or descriptive), qualitative studies (focus group discussions and in-depth interviews) or a combination of both. Most of the studies used collected primary data using interviewer administered structured questionnaires. A few studies used retrospective data from national demographic and health surveys (Kazembe et al. 2007, Frankel & Lalou 2009).

In keeping with the inclusion criteria, studies conducted in various parts of the world, including Africa, South America and Asia were included. Most of the studies provided some information on treatment seeking behaviour for malaria. Only a few studies provided information on access to ACTs and reported the proportion of people who used any form of ACT for the treatment of malaria (Gitonga et al. 2008, Adjei et al. 2009, Tipke et al. 2009, Ajayi et al. 2008, Yeung et al. 2008). None of the studies conducted before change in the first-line anti-malarial to ACTs provided any information on access to ACTs or the use of ACTs for treating malaria.

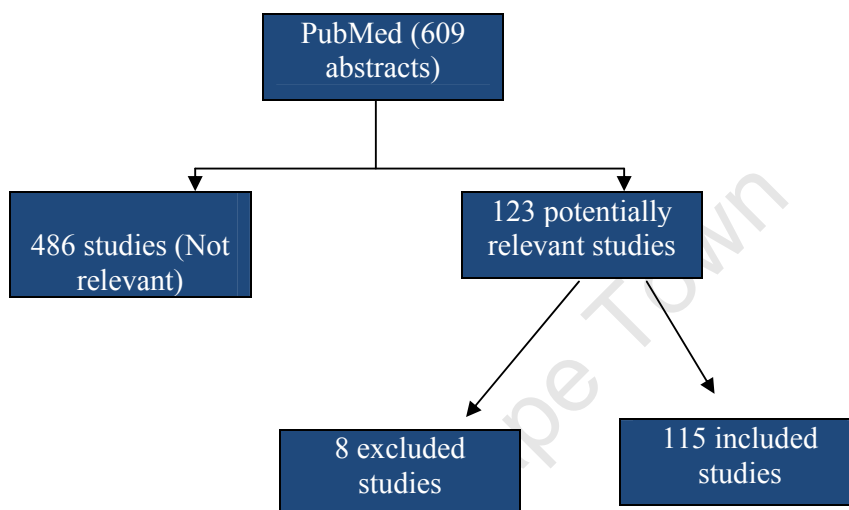
The recall period for the treatment option taken varied across various studies and it ranged from two weeks for most of the studies to 6 months (Sumba et al. 2008) preceding the date of the interview of participants.

Results

Search results

A total of 609 studies were identified from the search, and 466 did not meet the inclusion criteria. A total of 123 full texts were further assessed for relevance to be included in this review. From these, 115 studies reported information on malaria treatment seeking behaviour, access to ACTs or both. All the studies identified from Google were also found in the Pubmed search. The included studies were conducted in different countries across Africa, Asia and South America.

Figure 1: Flow diagram of search process



Treatment seeking Behaviour

Early diagnosis and prompt treatment has been a cornerstone of malaria control (Snow et al. 2005). Various patterns of malaria treatment-seeking were documented in the included studies. These included both the formal and the informal sectors, with self treatment at home in some cases. The various forms of treatment seeking patterns identified were: no treatment, self-treatment at home with any available medication, purchasing medications from drug stores or PMVs, use of private or public health facilities, and use of traditional forms of treatment.

Most of the studies reviewed indicate that most people do not use laboratory services for the diagnosis of malaria. Self diagnosis and self treatment at home have been noted to be common (McCombie 2002). Also, the use of ineffective drugs in Sub Saharan Africa, in recent years has led to treatment failures and elevated rates of mortality, particularly among young children (Björkman 2002).

No Treatment

Few of the studies provided information on the proportion of people with malaria who did not seek any form of treatment (see Table 1 below). The proportion varied across studies ranging from 3.6% (Salako et al. 2001) to 31% (Ahmed et al. 2009).

Table 1: Proportion of cases who did not seek any form of treatment

Country	% with no treatment	Comment	Sample size	Year & type of study	Author & year of publication
Bangladesh	31%		9750 individuals	July-Nov 2007 Quantitative C-survey	(Ahmed et al. 2009)
Ethiopia	5.5%		2087 rural women with children less than five years	Oct-Nov 2003, Quantitative C-survey	(Deressa & Ali 2009)
Gambia	19.31%	Self care & no treatment were combined	1700 households	2003, Quantitative C-Survey	(Wiseman et al. 2008)
Kenya	9%		883 mothers		(Mwenesi 1995b)
Kenya	28.1%	Overall from 4 districts	A total of 6287 mothers	December 2001, Quantitative C-survey	(Amin et al. 2003)
Kenya	25%		670 households	July 1996, Quantitative C-survey	(Hamel et al. 2001b)
Kenya	21%		138 cases of febrile illness,	1991, Quantitative C-survey	(Ruebush et al. 1995)
Nigeria	3.6%		3117 parents of children	Quantitative C-survey	(Salako et al. 2001)

C-survey: cross-sectional survey

Self treatment or Home Treatment

Self or home treatment is defined as involving the use of any medication before or in the absence of a visit to a health facility and without prescription (Deressa 2003, McCombie 2002). Self-treatment with anti-malarial is rampant in malaria endemic countries. A survey (not listed in the table) of 21 African countries revealed that of those who treated febrile illness with anti-malarial, 46% obtained treatment at a health facility, 44% at home and 10% at both home and health facilities (UNICEF & WHO 2003).

Table 2: Proportion of people who used self- or home- treatment

Country	% self/home treatment	Comment	Sample size	Year & type of study	Author & year of publication
Bangladesh	40%		9750 individuals	July-Nov 2007	(Ahmed et al. 2009)
Burkina Faso	41% to 46%	Two localities	1052 households	Feb/March 2006	(Tipke et al. 2009)
Burkina Faso	69%	Treated with drugs or traditional remedies	709 children	Data set from RCT, 1999	(Müller et al. 2003)
Ethiopia	17.8%		630 households	C-survey, January and September 1999	(Deressa & Ali. 2003)
Gambia	19.3%	Self care & no treatment were combined	1700 households	2003, C-survey	(Wiseman et al. 2008)
Guyana	15%		256 individuals	May 10 through June 6 1999, C-survey	(Booth 2001)
Indonesia	18%		1000 households	May to July 2001, C-survey	(Sanjana et al. 2006)
India	17.8%		sample of 1,989 households	Quantitative C-survey	(Chaturvedi et al. 2009)
India *	32.6%		205 Individuals	Quantitative C-survey	(Unnikrishnan et al. 2008)
India, Rajasthan	77.3%	Self treatment with herbal medications	573 malaria patients	Quantitative C-survey	(Yadav et al. 2007b)
India, Assam, Northeastern India	0.8%	Treatment was free at government hospitals	869 householders	2002–2003, Quantitative C-survey	(Dev et al. 2006a)
Kenya	47%		670 households	July 1996, Quantitative C-survey	(Hamel et al. 2001b)
Kenya	12%	Comparison between an urban and rural area	248 lifelong rural and 284 urban resident mothers	Quantitative C-survey	(Molyneux et al. 1999)
Kenya	60%		138 cases of febrile illness,	1991, Quantitative C-survey	(Ruebush et al. 1995)
Malawi	27%	Data from DHS	4,245 care-givers	Data from the 2000 Malawi demographic and health survey, Quantitative C-survey	(Kazembe et al. 2007)
Malawi	72.0%	a 2-stage cluster-sample survey	1080 households	February 2000, Quantitative C-survey	(Holtz et al. 2003)

Mali	87%		952 children	Quantitative C-survey	(Diallo et al. 2006)
Mali	75.8%		399 mothers	Quantitative C-survey	(Diallo et al. 2006)
Myanmar	79.5%		700 individuals	Quantitative C-survey	(Kyawt-Kyawt-Swe. 2004)
Nigeria	19.3%		300 care givers	November 2001 and April 2002, Quantitative C-survey	(Okeke & Okafor 2008)
Nigeria	6.3%, 9.6%, 6.2%, 5.2%	From 4 different communities	370 households per community		(Onwujekwe et al. 2008b)
Nigeria	60.2%		186 mothers	May-September) of 1999, both Quantitative and Quantitative C-survey	(Akogun & John 2005)
Nigeria	79%	Urban community	408 individuals	2006, Quantitative C-survey	(Oguonu et al. 2005b)
Nigeria	3.4%		1594 female household primary care givers or household head	Quantitative C-survey	(Uzochukwu & Onwujekwe 2004)
Nigeria	13.6%		250 households	Quantitative C-survey	(Agu & Nwojiji 2005)
Pakistan	11%		552 farmer households	October to December, 1995, Quantitative C-survey	(Donnelly et al. 1997)
Senegal	15%		902 children with malaria-related fever	retrospective Quantitative C-survey	(Frankel & Lalou 2009)
Tanzania	37%		100 randomly selected farming households	January to July 2005, Quantitative C-survey	(Hetzel et al. 2008a)

C-survey: cross-sectional survey

The included studies had varying findings on the proportion of people who treated themselves at home without any visit to health facilities. The summary of the various findings are shown in table 2 above. A household survey in central Ethiopia revealed that about 18% of people suffering from malaria self-treated at home (Deressa & Ali 2003). In similar studies in Sudan and Burkina Faso, it was found that people usually start care at home and then shift to health workers if there was no response (Malik et al. 2006, Pfeiffer et al. 2008). The findings were similar in Guatemala, Malawi, Mali, and Kenya, where more than 60% of the individuals self treated usually with anti-malarial and did not seek medical attention. Other

studies conducted in Burkina Faso, Mali, Nigeria and India, show that more than 70% of children with fever were treated at home (Diallo et al. 2006, Muller et al. 2003, Oguonu et al. 2005b Yadav et al. 2007). It is important to note that some of that some people self treated at home by purchasing drugs from drug stores and retailers.

Table 3: Proportion of people who used Traditional treatments

Country	% with traditional treatment	Comment	Sample size	Year & type of study	Author & year of publication
Bangladesh	31%		9750 individuals	July-Nov 2007, Quantitative C-survey	(Ahmed et al. 2009)
Burkina Faso	18%		1,052 households	February/March 2006 , Quantitative C-survey	(Tipke et al. 2009)
Burundi	39.9%	Traditional or no treatment	526 children	July-August 2004, C-survey	(Gerstl et al. 2007)
Ethiopia	8%		630 households	January and September 1999, C-survey	(Deressa & et al. 2003)
India	39.2%		sample of 1,989 households	Quantitative C-survey	(Chaturvedi et al. 2009)
Kenya	7%		883 mothers	Quantitative C-survey	(Mwenesi et al. 1995b)
Kenya	3%		670 households	July 1996, Quantitative C-survey	(Hamel et al. 2001b)
Mali	27%		952 children	Quantitative C-survey	(Diallo et al. 2006)
Nigeria	11.7%		1594 female household primary care givers or household	Quantitative C-survey	(Uzochukwu & Onwujekwe 2004)
Nepal	16%		1330 households conducted during	December 2004 to April 2005, Quantitative C-survey	(Joshi & Banjara 2008)
Pakistan	23%		552 farmer households	October to December, 1995, Quantitative C-survey	(Donnelly et al.1997)
Tanzania	14.7%		Information not provided	Quantitative C-survey	(Mnyika et al. 1995).

The use of traditional sources of treatment or herbal medications at home ranged from 3% (Mwenesi et al. 1995b) to 39.9% of cases (Chaturvedi et al. 2009). Traditional treatments

were an important source of treatment only in few of the studies from Bangladesh, Burundi, India, Mali and Pakistan, where more than 20% of cases used traditional sources of treatment. One of the studies from India showed that traditional healers were the second most important source of treatment after self medication at home (Chaturvedi et al. 2009). In Mali more than 30% of children were treated at home with a mixture of modern and traditional medicines (Diallo et al. 2006). Similarly a qualitative study in Uganda showed that people usually mentioned the use of herbs as the first treatment action, followed by the purchase of tablets from shops, with the final recourse being the formal health sector if the previous actions had not effected a cure (Kengeya-Kayondo et al. 1994).

A small proportion (less than 10%) of people with fever/malaria resorted to traditional forms of treatment in Kenya (Hamel et al. 2001, Mwenesi et al. 1995), Ethiopia (Deressa et al. 2003) and Sudan (Malik et al. 2006).

Treatment by purchasing drug from informal drug stores or PMV

A considerable number of the studies found that self treated at home usually by purchasing medicines from private medicines stores and vendors (PMV) or by using locally prepared concoction. Several studies in Nigeria found that PMVs are the most common source of malaria treatment for many households (Salako et al. 2001, Uzochukwu & Onwujekwe 2004, Agu & Nwojiji 2005, Oguonu et al. 2005b, Onwujekwe et al. 2008, Enato & Okhamafe 2006, Onwujekwe et al. 2006). The findings were similar in studies from Uganda, Malawi, Kenya and Bangladesh (Kazembe et al. 2007, Oryema-Lalobo 2009, Tumwesigire & Watson 2002). Also, studies from Ghana and Cambodia found that more than 60% of cases purchased medications from drug stores without prescriptions (Yeung et al. 2008, Ahorlu et al. 2006a). Surveys from Kenya showed that the most common actions were the purchasing of over the counter drugs at retail outlets (Mwenesi et al. 1995, Molyneux et al. 1999, Snow et al. 1992). In Malawi it was found that up to 35% of care-givers of children with fever obtained drugs over the counter (Kazembe et al. 2007). A study from Lao People's Democratic Republic (not listed in the table) found that only a small proportion of people used informal retailers and herb/herbalists (Nonaka et al. 2009).

Table 4: Proportion of people who used purchased drug from informal drug stores

Country	% with no treatment	Comment	Sample size	Year study was conducted	Author & year of publication
Bangladesh	12%		9750 individuals	July-Nov 2007, Quantitative C-survey	(Ahmed et al. 2009)
Cambodia	63%		1491 households in 23 settlements	2002, Quantitative C-survey	(Yeung et al. 2008b)
Gambia	1.44%	Self care & no treatment were combined	1700 households	2003, Quantitative C-Survey	(Wiseman et al. 2008)
Ghana	67%		100 caretakers of children up to 5 years of age	October 2002 to April 2004, both Quantitative C-survey	(Ahorlu et al. 2006b)
India, Assam, Northeastern India	3.4%	Treatment was free in government hospitals	869 householders	2002–2003, Quantitative C-survey	(Dev et al. 2006a)
Kenya	19.0% of adults and 30.3% of children	Adults vs. children	120 households	August-September, 2002, Quantitative C-survey	(Sumba et al. 2008b)
Kenya	26.1%	From four communities	A total of 6287 mothers	December 2001, Quantitative C-survey	(Amin et al. 2003)
Kenya	47%	Comparison between an urban and rural area	248 lifelong rural and 284 urban resident mothers	Quantitative C-survey	(Molyneux et al. 1999)
Kenya	72%		388 mothers	Quantitative C-survey	(Snow et al. 1992)
Malawi	35%	Data from DHS	4,245 care-givers	based on the 2000 Malawi demographic and health survey, Quantitative C-survey	(Kazembe et al. 2007)
Nigeria	48.4%, 38.7%, 46.9%, 44.8%	From 4 different communities	370 households per community	Quantitative C-survey	(Onwujekwe et al. 2008)
Nigeria	46%	Rural community	408 individuals	2006, Quantitative C-survey	(Oguonu et al. 2005b)
Nigeria	36%		1594 female household primary care givers or household head	Quantitative C-survey	(Uzochukwu & Onwujekwe 2004)
Nigeria	13.6%		250 households	Quantitative C-survey	(Agu & Nwojiji 2005)
Nigeria	49.6%		3117 parents of children	Quantitative C-survey	(Salako et al. 2001)
Uganda	48.1%		451 heads of	Quantitative C-	(Oryema-Lalobo

Uganda	53%	households 209 rural peasant families	survey Quantitative C- survey	2009) (Tumwesigire & Watson 2002)
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C-survey: cross-sectional survey

A study on the role of PMVs in three regions in Nigeria showed that PMVs still provided medications that are no longer recommended: 92% (72%) of shops had SP and CQ in stock. The PMVs have been observed to behave primarily as commercial salesmen, since around 75% simply sell what a customer requests, and on other rare occasions, fills a prescription (Brieger et al. 2004). There are concerns that the PMVs have little knowledge about new guidelines for malaria treatment and they still recommend that people use ineffective anti-malarial. There are also concerns about the quality of the drugs that are supplied by the PMVs (Oladepo et al. 2007).

Formal sources of treatments

Formal health facilities refer the use of government or private hospitals and clinics, and community health centre or trained village health workers. The proportion of people that used formal health facilities as initial or secondary source of care varied in the different studies. The studies differed in the way the findings were presented. In some, the authors did not differentiate the type of formal health facility (public versus private) that was used. In these studies, all the people that sought care from any hospital, clinic or health facility were grouped under the same category. Also some of the studies compared the proportion of people that sought care from the various sources across different communities, age groups (children versus adults), or urban versus rural areas. Table 5 shows the proportion of people that used public, private clinics/hospitals and community health centres. Many of the included studies showed that patients resort to external care from public or private facilities only after home remedies have failed. Some of the studies conducted in Kenya, Philippines, Tanzania, and Zimbabwe revealed that public health facilities were usually the first choice when people sought external care (see table 5). Also, findings from Ethiopia and Uganda showed more than 60% of cases received initial treatment from formal health facilities (Paulander et al. 2009, Lindblade et al. 2000). In Pakistan it was found that a great proportion of people exclusively used private hospitals because private care providers were perceived to be rendering better quality particularly (Donnelly et al. 1997) . In areas where treatment was provided free at public health facilities, a greater number of people consulted public health facilities for the treatment of malaria. This was the finding from two studies conducted in Nepal and India.

One of the studies from Ethiopia showed that up to 98% of cases used public health facilities because treatment standards were perceived to be very high (Paulander et al. 2009). This results contrast findings from other studies in Ethiopia (Deressa 2007) and other African countries (Müller et al. 2003, Molyneux et al. 1999, Gerstl et al. 2007, Onwujekwe et al. 2008). Evidence from various studies in Nigeria shows that for both children and adults, the use of public or private hospitals for the treatment of malaria is low. Also, most of the treatments occur in the private sector by purchasing drugs from patent medicine vendors (Oladepo et al. 2007). However, in one of the studies from Nigeria, the health centre was the most preferred choice (21%) where treatment was first sought (Agu & Nwojiji 2005). This was because of close proximity to the health centre. In Burkina Faso only about 1% of people reporting malaria sought care from a hospital.

Table 5: Proportion of people who used Formal/Orthodox facilities

Country	% treated in Public hospitals	Private	Community health centres/workers	Comment	Sample size	Year & type of study	Author & year of publication
Burkina Faso	1%		16%		1,052 households	Data set from RCT, 1999, Quantitative C-survey	(Müller et al. 2003)
Burundi	23.2%	14.1%			526 children	July-August 2004, Quantitative C-survey	(Gerstl et al. 2007)
Cote d'Ivoire	33%				232 households	1999 to 2003, Quantitative C-survey	(Esse et al. 2008)
Ethiopia	<40%	21%			2087 rural women with children less than five years	Oct-Nov 2003, both qualitative and Quantitative C-survey	(Deressa & Ali 2009)
Ethiopia	23%	17%	33%		2,253 households	2003, Quantitative C-survey	(Deressa 2007)
Ethiopia	98.1%				840 households	April-May 2007, Quantitative C-survey	(Paulander et al. 2009)
Gambia	49%	5%	22%	These were separated into: Hospital, health centre	1700 households	2003, Quantitative C-survey	(Wiseman et al. 2008)

& clinic

Guyana	96%			256 individuals	May 10 through June 6 1999, Quantitative C-survey	(Booth 2001)
Indonesia	30%	20		1,000 households in 50 villages	May to July 2001, Quantitative C-survey	(Sanjana et al. 2006)
India	29.3%	13.7%		sample of 1,989 households	Quantitative C-survey	(Chaturvedi et al. 2009)
India	23.4%	9%		205	Quantitative C-survey	(Unnikrishnan et al. 2008)
India, Assam, Northeastern India	88.9%	6.7%		Treatment was free in government hospitals 869 householder	2002–2003, Quantitative C-survey	(Dev et al. 2006)
Kenya	66.0% and children (66.7%)		Adults vs. children	120 households	August-September, 2002, Quantitative C-survey	(Sumba et al. 2008)
Kenya	47%				Quantitative C-survey	(Guyatt & Snow 2004)
Kenya	29.5%		From four communities	A total of 6287 mothers	December 2001, Quantitative C-survey	(Amin et al. 2003)
Kenya	43%	6%		670 households	July 1996, Quantitative C-survey	(Hamel et al. 2001)
Kenya	10%	20%	Comparison between an urban and rural area	248 lifelong rural and 284 urban resident mothers	Quantitative C-survey	(Molyneux et al. 1999)
Malawi	28%		Data from DHS	4,245 care-givers	based on the 2000 Malawi demographic and health survey, Quantitative C-survey	(Kazembe et al. 2007)
Nigeria	8.4%, 18.3%, 4.9%, 2.6%	18.4%, 19.4%, 16.0%, 15.8%	From 4 different communities	370 households per community	Quantitative C-survey	(Onwujekwe et al. 2008)
Nigeria	27.1%	2.3%	17.6%	1594 female household primary care givers or household head	Quantitative C-survey	(Uzochukwu & Onwujekwe 2004)
Nigeria	15.9%	10.2%	21%	250 households	Quantitative C-survey	(Agu & Nwojiji 2005)
Pakistan	17%	87%		552 farmer households	October to December, 1995, Quantitative	(Donnelly et al. 1997)

					C-survey	
Philippines	43.3%		43.3% first sought treatment at the rural health unit or hospital.	23 households in Morong	Qualitative and Quantitative C-survey	(Espino & Manderson 2000)
Sudan	66.0% and 66.7%		Adult vs. Children	120 households	August-September, 2002, Quantitative C-survey	(Malik et al. 2006b)
Tanzania	55.8% (37.9–72.8)			100 randomly selected farming households	January to July 2005, Quantitative C-survey	(Hetzel et al. 2008a)
Tanzania	84%			729 households	Quantitative C-survey	(Eriksen et al. 2005)
Tanzania	62.5% vs. 33.3%		Children vs. adults	318 households	May- August 2004, Quantitative C-survey	(Hetzel et al. 2008b)
Turkey	53.5%			318 individuals	October 2002, Quantitative C-survey	(Simsek & Kurcer 2005)
Uganda	31%			209 rural peasant families	May 2001, Quantitative C-survey	(Tumwesigire & Watson 2002)
Uganda	65%			300 households	Qualitative C-survey	Lindblade et al. 2000

C-survey: cross-sectional survey

Treatment within 24 or 48 hours of onset of fever

As part of the Roll Back Malaria initiative, African heads of state have pledged that by 2005, 60% of children will receive an effective anti-malarial drug within 24 hours of developing fever. Some of the studies reported the proportion of cases seeking treatment within 24 hours of onset of fever. The proportions for each of these studies are summarized in table 6. It varies from 8.6% (Dev et al. 2006) to 68% (Hamel et al. 2001). A study in Guyana found that 80% of individuals waited for longer than 1 day before seeking any form of treatment. The reasons for the delay varied from lack of transportation to health facilities, to perceived severity of symptoms (Booth 2001). The findings were similar with that from another study in Nepal where many people delay treatment to know if it is severe or not before seeking care (Budhathoki 2008).

Table 6: Proportion of people who sought treatment within 24hours or 48 hours

Country	% with treatment within 24hrs	% with treatment within 48hrs	Comment	Sample size	Year & type of study	Author & year of publication
Bangladesh		12%		9750 individuals	July-Nov 2007, Quantitative C-survey	(Ahmed et al, 2009)
Burkina Faso	61%	81%		1,052 households	Quantitative C-survey	(Tipke et al, 2009)
Ethiopia	13%			2,253 households	Quantitative C-survey	(Deressa 2007)
Ghana	11%	33%		100 caretakers of children up to 5 years of age	October 2002 to April 2004, both qualitative and Quantitative C-survey	(Ahorlu et al. 2006)
Guyana	20%			256 individuals	May 10 through June 6 1999, Quantitative C-survey	(Booth 2001)
India, Assam, Northeastern India	8.6%	30.7%		869 householders	2002–2003, Quantitative C-survey	(Dev et al 2006)
Kenya	68.0% v. 48.5%		Adults vs. Children	120 households	August-September, 2002, Quantitative C-survey	(Sumba et al. 2008)
Kenya	60%	>80%		695 children were identified in 328 homesteads	August 2006 and June 2007, Quantitative C-survey	(Gitonga et al. 2008)
Kenya	63%	91%		670 households	July 1996 C-survey , Quantitative C-survey	(Hamel et al. 2001)
Sudan	14 to 48%			1000 households	Quantitative C-survey	(Mustafa et al. 2009)
Tanzania	35.0% vs. 42.1%		children vs. adults	318 households	May- August 2004	(Hetzal et al. 2008b)

Uganda		65% vs. 72%	Child – headed vs. adult-headed household	300 households (150 child- and 150 adult-headed households)	Quantitative C-survey	(Amuge et al. 2004)
Uganda	30%			1898 individuals	Dec 2001 to March 2003, Quantitative C-survey	(Ndyomugenyi et al. 2007)
Uganda	59%			209 rural peasant families	May 2001	(Tumwesigire & Watson 2002)

C-survey: cross-sectional survey

Access to and Use of the recommended ACT

Findings across Africa suggest that the majority of those with malaria do not get anti-malarials, including ACTs (Whitty et al. 2008). According to the WHO, none of the populations of 18 African countries surveyed in 2006 and 2007 had adequate access to anti-malarial drugs (WHO 2008). Access to treatment was not up to the 80% target in any of the countries, with the average across the 18 countries being 38%. The overall proportion of children with fever receiving anti-malarial drugs was 31% and the proportion of febrile children receiving anti-malarial drugs within 48 hours was 23.3% (WHO 2008).

A study in Cambodia found that coverage of ACTs was low and that there was widespread use of artemisinin monotherapy (Yeung et al. 2008a). Similarly in Kenya, about one year into the change in treatment policy to ACT, it was found that a small proportion (about 10%) of children received the recommended first line ACT (Gitonga et al. 2008a). In Burkina Faso a study found that less than 1% of households stocked effective combination therapies for malaria, while about 86% of anti-malarial stocked was CQ (Tipke et al. 2009).

Table 7: Proportion of people who used ACT for treating malaria fever

Country	% Use of ACTs	Comment	Sample size	Year study was conducted	Author & year of publication
Cambodia	11%	Study conducted in three different areas	1491 households in 23 settlements	2002, Quantitative C-survey	(Yeung et al, 2008)

Kenya	10.2%	Proportion of children who received AL (less than a year into the new policy implementation).	695 children were identified in 328 homesteads	August 2006 and June 2007, Quantitative C-survey	(Gitonga et al, 2008)
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In Ghana it was shown that parents of children treated with ACTs were more willing to pay for the treatment, or adhere to the full treatment course (Adjei et al. 2009). In another study in Tanzania, only 50% of mothers and household heads were willing to pay for a child's dose of ACT (Saulo et al. 2008b). A qualitative study using focus group discussions (FGD) in Nigeria found that caregivers and other members of the communities in which this study was conducted were very receptive to the new drug (Arthemether Lumefantrine) (Ajayi et al. 2008b). The community members perceived artemether-lumefantrine (an ACT) to be effective. A facility based study in Surulere, Lagos, found a high acceptance for ACT products (Joda & Fanimokun 2008). These findings suggest that the use of ACTs is acceptable to people in various communities where it has been studied. The current problems with access to ACTs and use of ACTs for the treatment of malaria have to do with availability and affordability of the medications.

Determinants of Treatment seeking Behaviour

Human health care seeking behaviour, which is the action people take when dealing with an illness, is influenced by a multiple of factors apart from knowledge and awareness (Jain et al. 2006). Some of these factors are predisposing characteristics such as age, gender, occupation, education and others enabling factors such as proximity to the health facility, health insurance, income and existence of social networks (Law et al. 2005). Several theoretical models have been used to explain the determinants of health seeking behaviour. One of these is the model, often called the Anderson model. It includes 3 groups of factors, namely; predisposing factors, enabling factors and health services system (Andersen et al. 1995).

Multiple barriers to accessing effective treatment for malaria have been identified. These barriers include perceived quality of care, lack of knowledge, distance from health services, transport costs, treatment costs, opportunity costs (Whitty et al. 2008, Noor et al. 2003).

Education

In some of the studies, the education level of the household head was found to influence treatment seeking behaviour, medication compliance and delay in seeking treatment within

24 hours of onset of illness (Paulander et al. 2009, Hossain et al. 2001, Simsek & Kurcer 2005). Also, educational level has been found to be associated with malaria treatment seeking behaviour. A study from Ghana revealed that more literate households were more likely to seek care from private hospitals (Dzator & Asafu-Adjaye 2004). Various studies showed that higher levels of education were associated with promptness in seeking care from a health care provider (Tarimo et al. 1998, Tarimo et al. 2001, Slutsker et al. 1994).

Socioeconomic status

Socioeconomic status is another factor that has been found to affect health seeking behaviour. In some of the included studies it was found that those likely to delay treatment come from the lowest socio-economic quintile while the wealthy were more likely to seek treatment within one day of symptom onset, both for themselves and for their children (Sumba et al. 2008, Rutebemberwa et al. 2009, Dev et al. 2006). In Nigeria, studies have shown that poorer people are more likely to resort to self diagnosis and treatment. Also the poorer the respondents, the more likely they are to use traditional healers, patent medicine dealers and community health workers for treatment of malaria while rich households are more likely to use the services of private clinics perceived to offer better quality services (Onwujekwe et al. 2008, Uzochukwu & Onwujekwe 2004, Onwujekwe 2005). The findings are similar in Ghana where the proportion of caregivers who purchased drugs without prescription or used left-over drugs to treat clinical malaria in the children was higher (82%) in the poorer community compared to the richer (53%). Also, children from the poorer communities were less likely to have been taken to a clinic or hospital to be treated for malaria than children from the better-off communities (27% v. 42%) (Biritwum et al. 2000). In Tanzania, Njau et al found that the coverage of appropriate malaria treatment was low in all socio-economic groups, but the two poorer groups were particularly disadvantaged (Njau et al. 2006).

Cost of treatment and medical insurance

The cost of treatment and time costs have also been shown to influence the choice of health care providers (Dzator & Asafu-Adjaye 2004). For example a study in Nigeria found that low cost of care was associated with choosing traditional healers and home treatment (Agu & Nwojiji 2005). Similarly, in Sudan the choice between the available options for treatment was found to be determined by user fees (Malik et al. 2006). Financial constraints to buy anti-malarial drugs were some of the main reasons given for failing to provide an effective anti-malarial treatment within the home in Malawi (Chibwana et al. 2009). Another study in India showed that people who are economically poor and living in remote areas mainly visit the government health service providers for seeking treatment, possibly due to the more expensive treatment in private health centers. (Chaturvedi et al. 2009). Further, people who have health micro-insurance were more likely to go for care earlier once they realized they were ill, compared to those without insurance (Blanchard-Horan 2007).

Distance to health facilities

Health facilities far away from home was one of the factors associated with delay in seeking care within 24 hours or not seeking care from health facilities. Many cases of fever were treated at home because health facilities were located far from home (Frankel & Lalou 2009, Malik et al. 2006, Onwujekwe et al. 2008, Paulander et al. 2009, Hossain et al. 2001, Dev et al. 2006, Chibwana et al. 2009). A study conducted in Nigeria, found that proximity was the major factor (92.3%) that made most people seek care from the community health workers (Agu & Nwojiji 2005) that are closest to them.

Perception of illness

Findings from various studies show how local concepts of illness strongly influence treatment and choice of provider. Care seeking behaviour is strongly influenced by perceptions and personal opinions of fever. In many places, malaria is considered as commonplace and not warranting care in a health centre (Tipke et al. 2009, Houeto et al. 2007, Beiersmann et al. 2007, Reilley et al. 2002). Some studies have found that mothers home treated or went to the village treatment centre, or both, if they judged it to be "natural" fever. Traditional treatment was thought to be best if the fever was thought to be "supernatural" or classified as "not-for-hospital" (Pilkington et al. 2004). Many care givers in some settings believe that convulsions are spiritual, not related to malaria and are best treated by traditional healers (Foster & Vilendrer 2009).

Quality of service provided at health facilities

The quality of services provided by a health facility has been found to be an important determinant of where people first sought treatment. Some studies in Nigeria showed that the factors that encouraged people to seek treatment at the health centres were the perceived good quality of services. This is because the centres were near the people and that the health workers were deemed to be polite (Onwujekwe et al. 2008, Uzochukwu & Onwujekwe 2004). Agu and Nwojiji found that low cost of care and good personal experience were the main reasons for the choice of traditional healers and home treatment respectively (Agu & Nwojiji 2005). In studies conducted in Nepal and Sri Lanka it was found that absence of health workers in the health facilities were the reasons given for not visiting health facilities for the treatment during fever with chills (Joshi & Banjara 2008, Reilley et al. 2002).

Location

Various studies have shown that self-medication and the use of traditional remedies are commoner in rural than in the urban population for the treatment of malaria (Chaturvedi et al. 2009, Abdel-Hameed 2001). Also, living in remote areas may be the main cause of delay in diagnosis and treatment of malaria (Chaturvedi et al. 2009, Singh et al 2003). A study in Ghana found that self treatment with drugs was more common in the urban areas (Agyepong & Manderson 1994).

Age

The age of the individual and that of the household head have also been found to influence the choice of seeking treatment. In Uganda, respondents in child-headed households were less likely to seek health care from health facilities (Amuge et al. 2004). In Burkina Faso it was found that older people were more likely to comply with treatment (Hossain et al. 2001).

Others

Other factors include ethnicity and occupation. In Malawi, ethnic differences were associated with the type of care chosen. For example, certain ethnic groups were less likely to choose home treatment (Kazembe et al. 2007) over formal treatment options. Also, mothers' occupation was found to influence the choice of treatment for malaria episodes (Olaogun et al. 2006).

Conclusion

It is difficult to combine and report the evidence from the included studies. The methodologies, sampling strategies, sample size, and methods of data collection were different across all the studies. Therefore we could not pool the findings together in a meta-analysis. The findings were, therefore, presented as a narrative summary. However, tables are presented to show the various proportions of people that used different treatment options in the various studies. We included more recent studies compared to a previous literature review on malaria treatment seeking behaviour by McCombie (McCombie 1996); however the findings are not very different from the previous review. Like in the review by McCombie, the findings from the individual studies were variable; however, self or home treatment still remains an important treatment option for most people with malaria fever in many endemic areas.

From this literature review, there is little information on the level of awareness and adherence to the new malaria treatment policy that recommends ACTs as first-line medication for treating malaria. Many of the studies including those studies from Nigeria were conducted before the change in treatment policy to ACT. More than 6 years after the change in treatment policy in Nigeria, it is not certain if this policy is being adhered to or not. Also the household level of awareness of the ACTs for treating malaria in Nigeria is not known. At the time of this literature review, the proportion of people who use the currently recommended ACT in Nigeria is not known (World Health Organization 2009, McCombie 1996).

Studies on treatment seeking behaviour and anti-malarial drug use patterns are needed to guide strategies to ensure access to effective malaria treatments for all. In addition to exploring patterns on treatment seeking behaviour for malaria, the review also aims to provide information on the proportion of people that use ACTs for treating malaria.

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Abstract

Background

ACTs have been shown to be effective in treating malaria and are currently recommended as first-line drugs for the treatment of uncomplicated malaria in Nigeria because of resistance of malaria to chloroquine (CQ) and sulphadoxine pyrimethamine (SP). However, very little is known about malaria and treatment-seeking patterns and the use of ACTs since the adoption of the treatment policy more than 6 years ago in Nigeria.

Methods

A cross-sectional survey of households was conducted in Mushin local government of Lagos State. Households where at least one individual had a history of fever/malaria in the last four weeks preceding the interview were eligible for inclusion in the study. Both descriptive measures and the multinomial logistic regression are used to analyze the data.

Results

Most treatments for malaria occurred at household level (35.11%) with the use of available medications or by the purchase of medicines from drug stores (25.42%). Most of the respondents (78.92%) did not know which drug was used for the treatment of malaria. The most commonly used anti-malarial were SP (34.23%) and CQ (11.01%). Only about 6.55% use an ACT. About 23% of the respondents had heard of ACTs and only 4% knew ACTs were the currently recommended drugs for treating malaria. Among the respondents that had heard about ACTs, most agreed they knew where to get ACTs and that they could afford ACTs even though they are more expensive than SPs and CQs. The factors that were found to influence the choice of treatment are wealth index, household head level of education, and household size.

Conclusion

Efforts should be made towards improving the awareness of the current malaria treatment policy. In addition, steps need to be taken to ensure that the policy is implemented and that effective medications for malaria treatment reach the people who need it.

Background

Malaria is a major cause of morbidity and mortality, especially among children and pregnant women in Africa [1]. In Nigeria, at least 300,000 children die of malaria annually [2]. According to statistics malaria is responsible for 60% of outpatients' visits, 30% of childhood mortality, 25% of infant mortality and 11% of maternal deaths in Nigeria [3]. The World Health Organization (WHO) suggests that Nigeria accounts for a quarter of all malaria cases in the African Region, and there is no evidence of any systematic decline in the burden despite a progressive increase in funding to control it [4]. It is estimated that between 3-11% of annual household income could be lost due to malaria from both lost workdays and treatment and control expenditures [5].

Evidence has shown that the affordable and widely available anti-malarial – chloroquine (CQ) – which was the major first line drug has lost its efficacy due to the emergence of CQ-resistant strains of *Plasmodium falciparum* [3]. Artemisinin based combination therapies (ACTs)⁵ have been found to be highly effective at treating *Plasmodium falciparum malaria* in most places where they have been studied. In April 2001, the WHO recommended the use of ACTs in countries where *P. falciparum* malaria is resistant to CQ, sulphadoxine - pyrimethamine (SP) and amodiaquine [6]. Although ACTs are more expensive than CQ and SP, they are currently the WHO recommended first-line drugs for treating uncomplicated malaria in areas of resistance to CQ and SP [7]. However, a global subsidy mechanism is contemplated in order to make ACTs accessible and affordable [8].

In 2004, the Federal Government of Nigeria in compliance with the WHO recommendation banned the use of CQ and SP as first-line drugs in the treatment of malaria [3]. ACTs became the recommended drugs for the treatment of uncomplicated malaria in Nigeria.

The Roll Back Malaria Partnership (RBM) set as target for 2010 that 80% of malaria patients are diagnosed and treated with effective anti-malarial medicines e.g. ACTs within one day of the onset of illness [9]. However, the proportion of people with fever/malaria that currently use the recommended ACTs is not known in many countries, including Nigeria [10]. Many studies on treatment-seeking behaviour for malaria were conducted before the adoption of ACTs for the treatment of malaria [11-13]. There is limited information on household awareness of the current treatment policy and the proportion of people that use ACTs for the treatment of malaria [10, 14,15]. More than 6 years after changing the treatment policy, it is

⁵ An ACTs is a combination of Artemisinin (or one of its derivatives) with another antimalarial (or antimalarials) [36].

unknown if this policy is being adhered to or not. Studies on treatment seeking behaviour and anti-malarial drug use patterns are needed to guide strategies for ensuring access to effective malaria treatments for all. Because of the limited information on the level of awareness and the proportion of people that use ACTs for treating malaria, our study, therefore, seeks to assess household treatment-seeking behaviour for malaria and also the drug use patterns in this era of ACTs for treating malaria.

This study seeks to answer the following questions:

1. Where do people from different socio-economic groups seek treatment for malaria?
2. What proportion of people used a formal malaria diagnostic test to confirm symptoms of malaria?
3. What is the level of awareness of the ACTs for malaria treatment?
4. What proportion of people use ACT for treating malaria/fever?
5. What factors affect malaria treatment seeking behaviour and use of ACTs?

Methods

Study setting and population

This study was carried out between November and December 2009 in Mushin Local Government Area (LGA) of Lagos State, South West Nigeria. According to the 2006 national census, Lagos State though small in land mass, is one of the most populous States in Nigeria with a population of over 9 million inhabitants. Lagos has 20 Local Governments Areas (LGAs) and 37 Local Council Development Areas created to bring governance, development and participatory democracy nearer to the people [2]. Mushin is a local suburb of Lagos State and also one of the 20 LGAs with a population of 633,009 [2]. It is located 10 km north of the Lagos city core, and is a largely a congested residential area with inadequate sanitation and low-quality housing. The people are predominantly traders and artisans from various ethnic groups in Nigeria. The major ethnic groups are Yoruba and Igbo and the major religions are Islam and Christianity. Mushin is the home of [Lagos University Teaching Hospital](#) (LUTH) and also the Mushin General Hospital. The study area was purposively selected based on the primary researcher's familiarity with the area. This allowed for easy access to households for data collection and improves understanding and interpretation of the results.

Study design

Interviewer administered structured questionnaires were used to collect data from household heads or caregivers by trained interviewers. The questionnaire was developed and piloted in 20 households in a neighboring LGA. The original questionnaire was reviewed and modified based on the findings from the pilot study. Only households that had at least one person with a history of fever in the previous 4 weeks were selected for the study.

Sampling and sample size

One of the key indicators of malaria treatment seeking behaviour is the proportion of the population that used effective treatment options for malaria. Therefore, the sample for this study was calculated based on “the proportion of fever/malaria episodes in the 4 weeks preceding the survey that used an ACT for treatment within 24 hours of the onset of fever” (as recommended by the RBM Partnership) At the time when this study was conducted there was no information on the proportion of people that use the recommended ACT for the treatment of malaria in Nigeria [10]. Therefore we assumed a proportion of 50% and calculated a sample size of 422 households. A total of 422 households were where at least one person (irrespective of age) had an episode of malaria 4 weeks preceding the date of interview.

Data collected include household demographic and socio-economic characteristics, level of respondent’s knowledge regarding the recommended anti-malarial, malaria treatment seeking behaviour, and anti-malarial drug use.

Data entry and analysis

Data was double entered into Epidata 2000, checked for inconsistencies, cleaned and analyzed using STATA[®] (Version 10). Two complementary methods are used in the analysis. The first was the analysis of survey outcomes by descriptive statistics using frequencies and proportions, while the second method was analytic, using the multinomial logit model. The descriptive analysis provides information on the proportion of people that used various treatment options, while the multinomial logit model provides information on the factors that influence the treatment choices. This multinomial logit model was used because the dependent variables (source of treatment and antimalarial drug used) are categorical variables, each with more than two unordered response categories. The sources of treatment

were classified into: informal sources (comprising self-medication, drug stores (PMVs) and use of traditional healers), government, and private facilities. The last antimalarial medication that was used for treating the fever was classified into: ACTs, artesunate monotherapy, and others (comprising chloroquine, sulphadoxine pyrimethamine, and quinine). From the literature review, the ‘determining’ variables that were identified include: household asset index (or wealth), ownership of medical insurance, level of education of household head, tribe (or ethnicity), employment status, gender, age, marital status, household size, and religion. Individuals suffering from malaria were used as the unit of analysis. An index of socio-economic status was constructed through the Principal Components Analysis (PCA) technique using ownership of household assets [16]. The assets used include motorcycle, car or truck, video or DVD player, refrigerator, cable or satellite TV, mobile phone, generator and nature of dwellings. The index was further categorised to generate five socio-economic groups or quintiles from the most poor to the least poor.

Ethical aspects

Ethical approval was obtained from the Mushin LGA and the University of Cape Town, South Africa. Informed consent was obtained from all respondents after explaining the purpose and objectives of the study. In order to ensure anonymity and to avoid violations of the participants’ privacy, the questionnaires did not contain names of the respondents. Also, the participants were assured that they will not be identified in any report or publication on the study.

Results

Descriptive summaries

Household demographic characteristics

A total of 408 questionnaires (97%) were successfully completed. The 408 households consisted of 1672 individuals, with an average household size of 4 persons. The general characteristics of household heads such as sex, education, occupation, tribe, religion, marital status, ownership of health insurance and wealth quintiles are presented in table 1 below.

Table 8: Demographic and socioeconomic characteristics of household heads

Variable	Category	Number	% of sample
Sex	Male	344	84.31
	Female	64	15.69
	Total	408	100
Age (years)	Mean 45, Range (20 to 80)		
Level of education	None	30	7.35
	Primary	92	22.55
	Secondary	216	52.94
	Tertiary	63	15.44
	Don't know	7	1.72
Occupation	Informal sector (self employed farmers, traders, artisans)	323	79.17
	Formal sector employee	58	14.22
	Unemployed	27	6.62
Marital	Married	332	81.37
	Divorced	2	0.49
	Separated	6	1.47
	Widowed	31	7.60
	Never married	37	9.07
Religion	Christian	226	55.39
	Muslim	182	44.61
Ethnic origin	Yoruba	322	78.92
	Igbo	70	17.16
	Hausa	2	0.49
	Others	13	3.43
Ownership of health insurance	Yes	8	1.96
	No	400	98.04

Most of the household heads were males (84.31%). Slightly over half (52.9%) of the household heads had completed secondary education and about 15.4% reported that they had tertiary education. About 55.4% of the study participants practise Christianity and 44.61% Islam. This is similar to the proportions reported in the general population of Lagos. Most of the respondents were from the Yoruba tribe (78.92%), about 17.2% are Igbo. Other tribes

included Hausa, Edo, and Calabar. Only about 1.96% of the household heads owned any form of health insurance.

Table 2 below shows some of the characteristics of the people that had a history of fever/malaria within the previous 4 weeks preceding the interview date.

Table 9 Demographic characteristics of individuals that had fever/malaria

Variable	Category	Number	% of sample
Sex	Male	188	45.52
	Female	225	54.48
	Total	413	100
Age	< 5 years	18	5%
	5 to 15 year	45	11%
	> 15 years	350	85%
Education level	None	45	10.90
	Primary	115	27.85
	Secondary	217	52.54
	Tertiary	35	8.47
Occupation	Don't know	1	0.24
	Informal sector (self employed farmers, traders, artisans)	258	6.47
	Formal sector employee	20	4.84
	Unemployed	135	32.69

Level of awareness of the ACTs for malaria treatment

Only about 24% of the respondents the 408 respondents had heard about any of the ACTs. When asked about what anti-malarial drug is currently recommended as first-line, 77% of the respondents did not know, 4% mentioned a brand of SP, about 3% mentioned ACTs and 3% CQ. See figures 1 and 2 below.

Figure 2 Respondents' awareness of artemisinin combination therapy

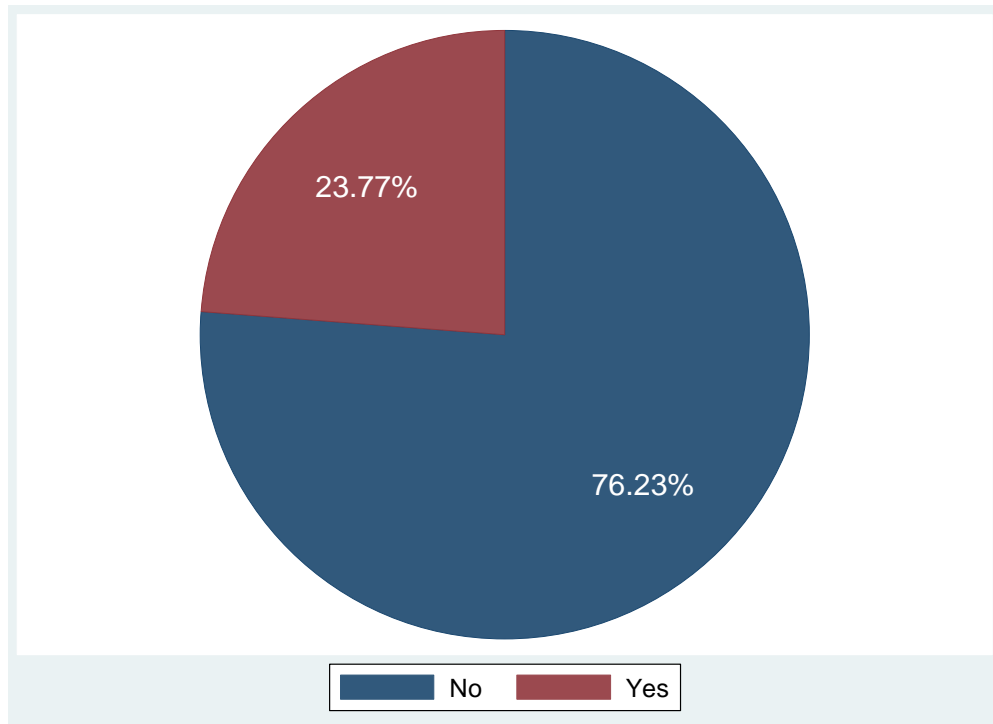
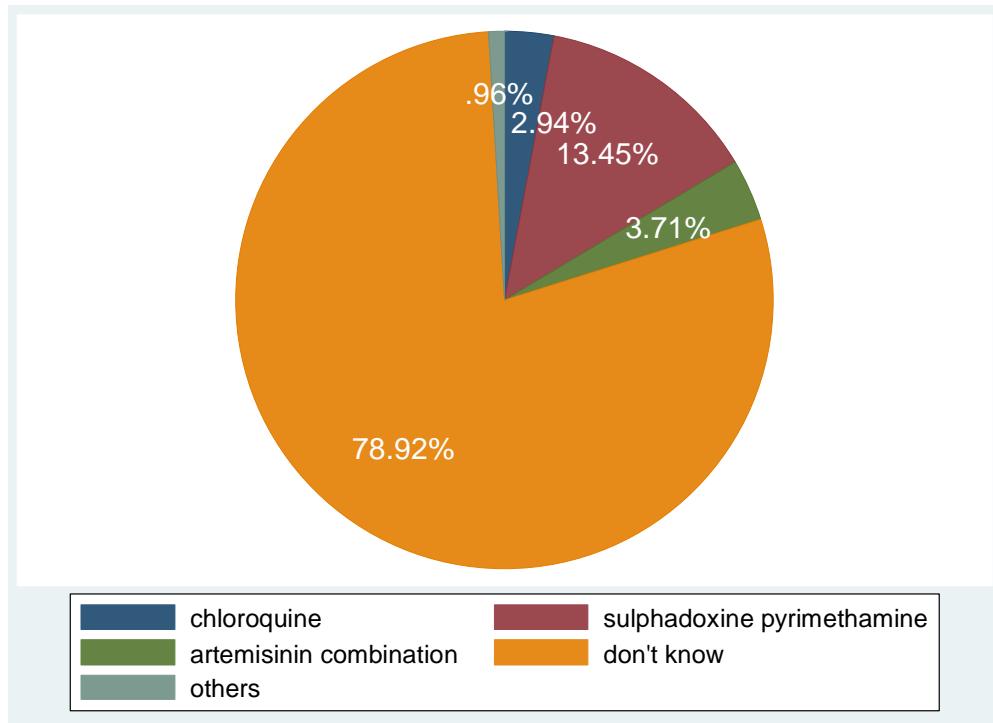


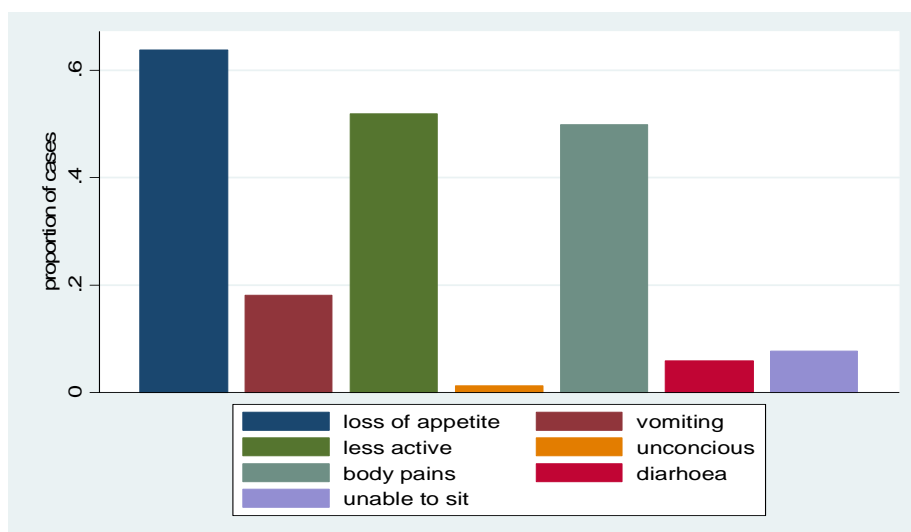
Figure 3: Respondents' awareness of recommended antimalarial medication



Treatment seeking behaviour:

About 24.7% of the sample had a history of fever/malaria in the previous four weeks preceding the interview date (see Table 3 below). Symptoms reported to be associated with the fever included loss of appetite, vomiting, being less active, body pains, diarrhoea, etc. (see figure 3). The mean duration of the fever as reported was about 5 days, (max 15 days and minimum of 1 day). At the time of the interview about 12% of those that had fever were still having the symptoms.

Figure 4: Other reported symptoms associated with the fever



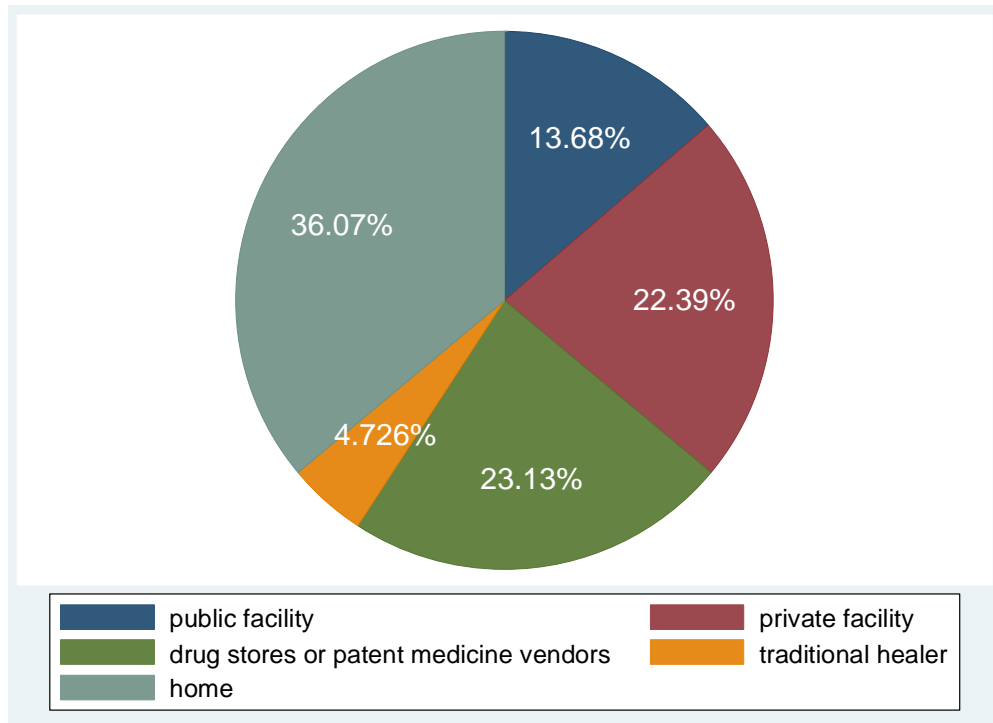
About 53.78% of those who had fever sought treatment within the first 24 hours. And about 5.64% of people never sought any form of treatment (see Table 3 below). The main reason for not seeking treatment was that the fever was not serious enough to necessitate treatment. For those who sought treatment (see figure 4), the initial sources of treatment of febrile illness were: home or self treatment (36.07), drug stores (23.13%), government facilities (13.68%), private hospitals (22.39%) and traditional healer (4.73%). Self treatment with available medications at home was the most commonly reported source of treatment followed by purchase of drugs from drug stores without prescription. Only about 21.07% used a malaria diagnostic service to confirm the diagnosis of malaria before commencing treatment (see Table 3 below).

Table 10 Treatment seeking behaviour

Variable	Category	number	% of sample
Have you or any members of your household had fever in the last 4 weeks?	Yes	413	24.70
	No	1259	75.30
	Total	1672	100
Still suffering from fever?	Yes	51	12.35
	No	362	87.65
	Total	413	100
What was done immediately (within the first day of the fever)?	Nothing, waited for fever to improve	177	42.86
	Nothing, waited for symptoms to intensify	18	4.36
	Sought treatment within the first day of onset of fever.	218	53.78
	Total	413	100

Did you seek treatment later?	Yes	184	94.36
	No	11	5.64
	Total	195	100
Reason for not seeking treatment.	Fever was not serious	9	72.73
	No money for treatment	2	27.27
	Total	11	100
Where was treatment sought?	Government clinic/hospital	55	13.68
	Private clinic	90	22.39
	Drug store	93	23.13
	Traditional healer	19	4.73
	At home	145	36.07
	Total	402	100
Was any antimalarial used for the treatment?	Yes	336	81.36
	No	77	18.64
	Total	401	100
Antimalarial drug used for treatment of fever	Artesunate monotherapy	30	8.93
	Chloroquine	37	11.01
	Sulphadoxine pyrimethamine	115	34.23
	Quinine	3	0.89
	ACT	22	6.55
	Don't know	129	38.39
	Total	336	100
	Was any malaria blood test performed?	Yes	83
No		306	77.66
Don't know		5	1.27
Total		394	100
Result of malaria test	Positive	56	67.47
	Negative	6	7.23
	Don't know	21	25.30
	Total	83	100

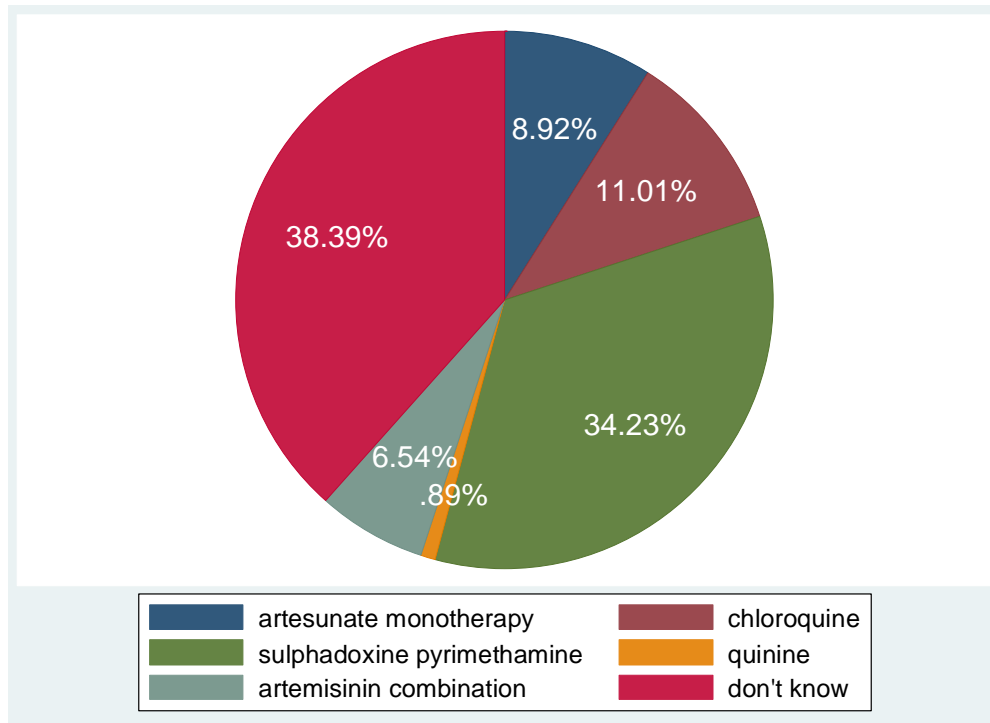
Figure 5: Sources of treatment for fever



Antimalarial drug use and access to ACT

Out of those who sought treatment, 83.79% used an antimalarial medication for the treatment of the fever. The various antimalarial drugs used were: sulphadoxine - pyrimethamine (31.25%), chloroquine (11.01%), artesunate monotherapy (8.93%), and quinine (0.89%). Only a very small proportion (6.55%) of cases used an ACT for the treatment of fever. Over a third of the respondents (38.39%) did not know which antimalarial medication was used for the treatment.

Figure 6: antimalarial drug used for the treatment of fever



For the respondents that know and have heard about ACTs, most agreed that they knew where to obtain ACTs and that they could afford to buy ACTs. Most of them also agreed that they preferred using ACTs and disagreed that ACTs had more side effects compared to other anti-malarial such as CQ and SP.

Determinants of choice of treatment

The results from the model of the treatment source and anti-malaria use are shown in [tables 4 and 5](#) respectively. The factors that were significant in influencing treatment source are wealth index and level of education of the household head. Those from wealthier households were more likely to use private hospitals and informal sources treatment than use government facilities. Also, those wealthier households were more likely to seek care from a private facility than use informal sources of treatment compared to poorer households. The difference was however not significant. Individuals from a household where the household head had completed tertiary education were more likely to seek care from a private facility than seek care from informal sources compared to individuals from households where the household head had no education. Other factors such as marital status of the household head, sex, religion, occupation and household size were not found to influence the choice of the source of treatment.

Table 11: Multiple regression output: determinants of choice of treatment (n=413)

Variables		Sources of treatment			
		Government vs. informal sources ^b		Private vs. informal sources ^b	
		β value	P	β	P value
Wealth index		-.19 0.08*		.08	0.30
Head Education	Primary	-.08	0.90	.47	0.46
	Secondary	.41	0.53	.62	0.30
	Tertiary	-.04	0.96	1.28	0.06*
		No education ^b			
Marital status of head	Married	-.08	0.90	.015	0.98
	Not married ^b				
Sex of head	Female	.19	0.66	.54	0.13
	Male ^b				
Religion	Christian	.44	0.17	.086	0.76
	Muslim ^b				
Household size		.06	0.53	.10	0.92
Age		-.02	0.10	-.02	0.47
Employment status	Formal sector	.73	0.38	.68	0.31
	Informal sector	.47	0.61	.89	0.21
	Unemployed ^b				

β : Regression coefficient; *statistically significant 10% level; ^bBase category

The factors significantly influenced the type of antimalarial drug used were wealth index, level of education of the household head, occupation, household size and source of treatment. Individuals that are more likely to use ACTs compared to the artesunate monotherapy include those from wealthier homes, Individuals from households with educated heads (primary, secondary or tertiary), Individuals from households where the household head was employed. People from larger households were more likely to use artesunate monotherapy than use ACT compared to individuals from smaller households. Also, individuals from larger households were more likely to use other medications (such as CQ & SP) than use an ACT compared to people from smaller households. This difference was however not significant.

Those who sought care from government facilities were more likely to ACTs compared to than use monotherapies or other medications compared to those who sought care from private hospitals. Age, marital status, sex, religion of the household head was not found to influence the type of antimalarial drug use.

Table 12: Multinomial logistic regression output: Determinants of choice of antimalarial
(n=413)

Variables		Type of antimalarial used			
		Artesunate monotherapy vs. ACT ^b		Other antimalarial (CQ, SP & quinine) vs. ACT ^b	
		β	P value	β	P value
Wealth index		-.33	0.09	-.10	0.55
Head Education	Primary	-18.23	0.001*	-16.80	0.001*
	Secondary	-17.61	0.001*	-16.86	0.001*
	Tertiary	-16.72	0.001*	-16.33	0.001*
	No education ^b				
Marital status of head	Married	-.72	0.51	-.71	0.45
	Not married ^b				
Sex of head	Female	.05	0.96	.15	0.85
	Male ^b				
Religion	Christian	.52	0.42	-.17	0.75
	Muslim ^b				
Household size		.46	0.02*	.22	0.26
Age		-.00	0.82	-.01	0.536
Employment status	Formal sector	-17.67	0.001*	-17.88	0.001*
	Informal sector	-17.08	0.001*	-17.01	0.001*
	Unemployed ^b				
Source of treatment	Government facility	-2.79	0.006*	-2.09	0.032*
	Others	-.28	0.749	1.24	0.116
	Private Facility ^b				

β : Regression coefficient; *statistically significant at 5%; ^bBase category

Discussion

This study provides information on malaria treatment seeking behaviour and anti-malarial drugs use pattern in an endemic area in Lagos, Nigeria. The data were collected in December 2009, more than 5 years after the change in treatment policy to ACT. Before this study little information exists on malaria treatment seeking and antimalarial drug use patterns at household level after the change in treatment policy. Most of the previous studies were conducted before the change in policy to ACT [14,15,17-19]. There is therefore limited information on the proportion of people that currently use the recommended antimalarial.

Also the proportion that use ACTs within 24 hours of the onset of symptoms is not known [10].

The study assessed the awareness of the current treatment policy and the antimalarial drug use patterns in the study population to determine the proportion that used an ACT for treating malaria. The study also examined how socioeconomic and demographic factors affect the use various sources of treatment options and type of medication used for treating malaria in Mushin LGA, Lagos.

The findings show that a very small proportion of the people with malaria within the recall period did not seek any form of treatment. This is similar to the finding of a previous study in Nigeria and other parts of Africa [20-22]. Of those who sought treatment, a great majority of them were treated at home with the use of various local brands of SP, CQ and artesunate monotherapy, which is similar to previous findings in Burkina Faso [23-25]. Self-treatment of uncomplicated malaria is common practice throughout Africa [13]. In line with previous studies from Nigeria and other countries in Africa, this study found that a great proportion of treatment for fever takes place at home and by the purchase of over the counter antimalarial medications from drugs stores/PMVs [13, 26, 27]. A drug sales outlet survey in Nigeria found that 16.7% of outlets stocked the recommended first-line treatment for uncomplicated malaria and that 92.5% of all outlets surveyed had non-artemisinin therapies (such as CQ and SP) in stock [28]. A significant proportion of drug store keepers and PMVs (more than 70%) did not know about the change in recommended malaria treatment from chloroquine and SP to ACTs [28]. Also, about 92% of the drug stores had SP in stock, 72% had CQ, whereas only 9% had ACTs [29]. There are also concerns that the drugs purchased from drug vendors could be fake and substandard [26].

The findings also revealed very limited knowledge of the currently recommended first line medication for treating malaria. Only a tiny fraction of the respondents could correctly state the currently recommended first line medication i.e., ACT. This result is similar to those from a qualitative survey conducted in Ona-Ara Local Government area (LGA), in south western Nigeria, where a limited number of the study participants had heard of the recommended ACT [30]. Despite the fact that ACTs are now the recommended first line medication for the treatment of uncomplicated malaria in Nigeria, less than 7% of the study sample reported the use of ACTs for treating malaria. The most common antimalarial used was SP, which is no longer recommended for treating malaria. Wealth index, level of education, occupation and household size were found to positively influence the use of ACTs.

The level of coverage of ACTs was found to be very low in the study population. This suggests that the change in policy has not translated into a change in the choice of medication type by people suffering from malaria. The gap in knowledge on the current treatment policy could be responsible for most of the respondents still using ineffective medications. A similar study in Cambodia in 2002, two years after the change in treatment policy to ACTs, found that only about 8% of people received the recommended treatment for malaria [31].

Prompt access to effective treatment is clearly associated with reduced malaria morbidity and mortality in endemic areas [32-34]. In April 2000 in Abuja, Nigeria, African heads of state made a commitment to ensure that at least 60% of those suffering from malaria have prompt access to affordable and appropriate treatment within 24 hours of onset of symptoms [32]. More recently, the Roll Back Malaria (RBM) partnership target aims that at least 80% of malaria patients are diagnosed and treated with effective anti-malarial treatments within 24 hours of the onset of symptoms [9]. In this study, in about half of the instances, there was a delay in seeking treatment beyond one day after the onset of symptoms and a very small proportion of cases were confirmed by a laboratory diagnosis. Thus, efforts will be needed to educate this population on the currently recommended medications and the need for 'Early Diagnosis and Prompt Treatment (EDPT)' in order to prevent complication of symptoms. Highly subsidized and quality-controlled ACT regimens are needed in order to improve access. Increasing access to ACTs and displacing artemisinin monotherapies from the market will help to delay resistance to artemisinin [35].

The study has some limitations. One of the main limitations of this survey is that the sample size was relatively small and the sample may not be totally representative of the whole LGA. In addition, the reported findings from this study were based on self-reported information treatment seeking behaviour and drug use patterns. As in other similar studies, the data may be influenced by reporting bias due to incorrect recall of events or perceived pressure to provide "socially acceptable" answers. To assist in validating the responses, respondents' were asked to show the package of the medication that was used if available. There was also a potential bias in excluding households in which an adult was not present on the day of the study. In order to mitigate this, interviewers were asked to revisit the household on a second occasion.

CONCLUSION

Malaria remains a major cause of morbidity and mortality in many countries. The change in the recommended first line antimalarial from CQ and SP to ACTs, in most countries including Nigeria is a significant step towards reducing the burden of the disease. Six years since the adoption of this policy in Nigeria, this study demonstrates that a change in policy alone is

not sufficient. Steps need to be taken to ensure that the policy is implemented and that effective medication for malaria treatment reach the people who need it. The findings of the survey have important implications for improving access to effective antimalarial drugs. The survey provided some information on the proportion of the people in the study area that use the recommended ACTs. There is need for greater efforts to increase awareness and use of the currently recommended antimalarial drugs. Health promotion and education interventions should stress promptness of use of effective antimalarial medications. Also, there has to be an increase in the public awareness programmes on the current malaria treatment policy in Nigeria. The programmes should provide comprehensive information on various aspects of malaria treatment and diagnosis, using various communication channels. There should also be efforts to improve access to appropriate drugs and rapid diagnostic test for malaria. An understanding of malaria treatment seeking behaviour of people suffering from malaria is very important for the control of malaria in endemic areas.

LIST OF ABBREVIATIONS

ACT: Artemisinin Combination Therapy

AL: Artemether Lumefantrine

CQ: Chloroquine

EDPT: 'Early Diagnosis and Prompt Treatment

LGA: Local Government Area

PCA: Principal Component Analysis

PMV: Patent Medicine Vendor

RBM: Roll Back Malaria

SP: Sulphadoxine Pyrimethamine

WHO: World Health Organization

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

CO contributed to the conception of the study, study design, developed the questionnaire, coordinated the data collection, performed the statistical analysis, and wrote the paper. JA provided guidance and supervision throughout the study each stage of the study. All authors read and approved the final manuscript.

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Malaria Treatment Seeking Behaviour and Access to Artemisinin Combination therapy in Nigeria

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Executive Summary

This policy brief is based on a study conducted in a suburb of Lagos, Nigeria on malaria treatment seeking behaviour and access to artemisinin combination therapy. We present some of the key findings and suggest policy recommendations in this policy brief.

Introduction

Malaria is a major cause of morbidity and mortality, especially among children and pregnant women in Africa [1]. In Nigeria, malaria accounts for about 60% of outpatients' visits, 30% of childhood mortality, 25% of infant mortality and 11 per cent of maternal deaths and at least 300,000 children die of malaria annually [2]. Studies from various parts of Africa, including Nigeria have shown that the affordable and widely available anti-malarial – chloroquine – which was the major first line drug has lost its efficacy due to the emergence of chloroquine-resistant strains - Plasmodium falciparum. Artemisinin based combination therapies (ACTs) have been shown to be highly effective at treating Plasmodium falciparum in most places where they have been studied and are currently recommended in many countries (3). In line with the WHO recommendation, ACTs have been the first-line antimalarial in Nigerian since 2004.

Who is this policy brief for?

Policymakers, The Nigerian government, Nigeria Federal Ministry of Health, State ministries of health

Key Messages

Malaria is a major cause of morbidity and mortality in Nigeria.

Prompt access to effective treatment is essential to reduce morbidity and mortality.

ACTs are now currently the first-line drug for the treatment of malaria in Nigeria.

There is limited level of awareness and usage of ACTs for the treatment of malaria in Nigeria.

Health promotion and education interventions are needed to educate members of the public on the currently recommended antimalarial.

Efforts are also needed to educate the public on the need for 'Early Diagnosis and Prompt Treatment.'

Methods and Results

A household survey was conducted in Mushin, Lagos to assess the malaria treatment seeking behaviour and determine the level of awareness and adherence to the current malaria treatment policy about 6 years after the change in policy in Nigeria. A key objective of the study was to assess level of awareness of ACTs and determine the proportion of people that used the recommended ACT in treating malaria. The survey involved interviewing 422 care givers or household heads in the study area. The following are highlights of some of the major findings and policy recommendations from the study.

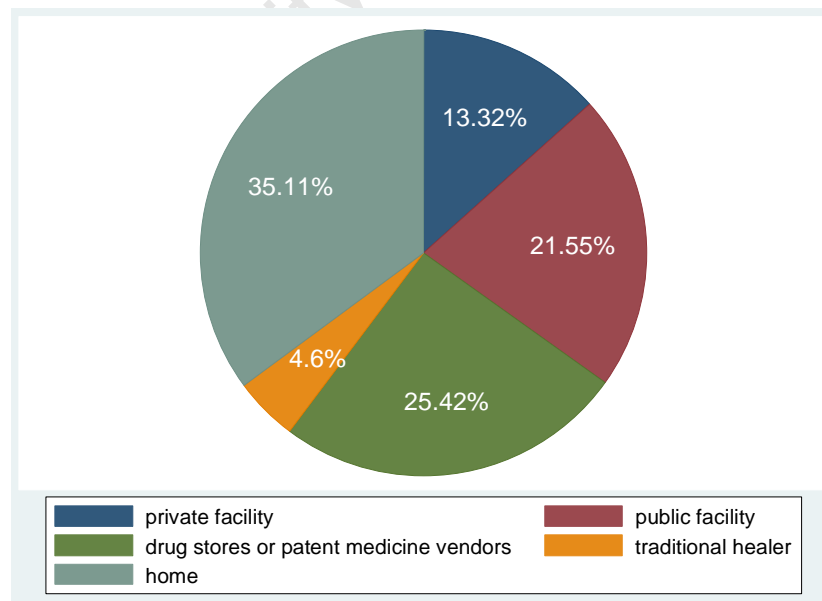
Delay in seeking treatment

Our findings showed there was delay in seeking treatment beyond 24 hours of the onset of symptoms in more than 46% of cases. About 54% of those who had fever sought treatment within the first 24 hours.

Home treatment was the most common source of treatment

For those who sought treatment, the initial sources of treatment for febrile illness were: home or self treatment (35%), drug stores (25%), government facilities (22%), private hospitals (13%) and traditional healer (5%). See figure 1 below.

Figure 1: Sources of treatment for fever



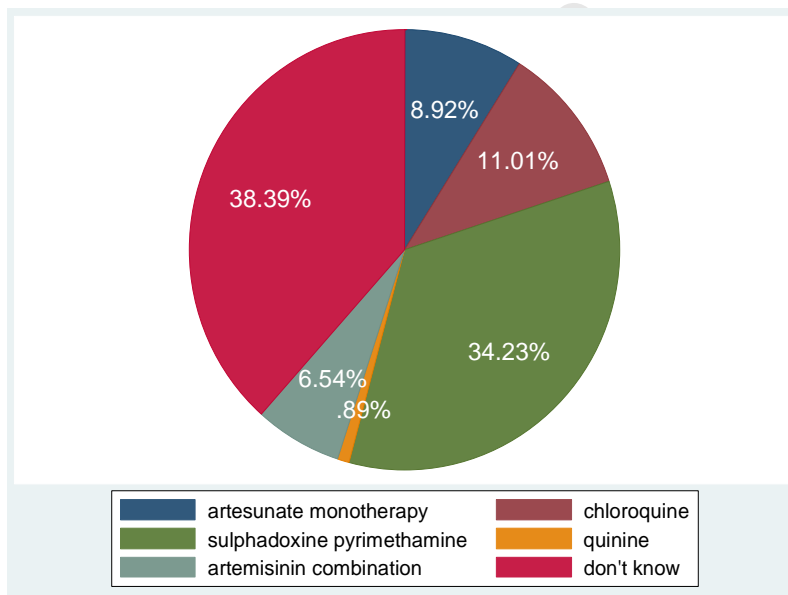
Most antimalarial were bought from PMVs

Malaria medications were often purchased from sources such as drug stores and patent medicine vendors (PMVs) without any prescription. Many of these drug sellers are not regulated in Nigeria. A previous study found that significantly more than 70% of PMVs do not know about the current treatment for malaria [4].

Low level of use of ACTs for treating malaria

Despite the fact that ACT have been the recommended first line medication for the treatment of uncomplicated malaria in Nigeria for about 6 years now, less than 7% of the study sample reported the use of ACT for treating malaria (see figure 2 below). These findings confirm that there is still very low ACT coverage in some parts of Nigeria and suggests that the change in policy has not translated into a change in the choice of medication by people suffering from malaria. Non-recommended drugs, such as CQ & SP were used in most of the cases.

Figure 2: Antimalarial drug used for the treatment of fever



Limited level of awareness about ACT

Most of the respondents did not know the currently recommended first-line antimalarial. The findings revealed very limited knowledge of the currently recommended first line medication for treating malaria. Only about 3% mentioned that ACTs were now recommended for treating malaria. The gap in knowledge on the current treatment policy could be responsible for most of the respondents still using ineffective medications.

Low level of use of laboratory diagnosis

A very small proportion (about 21%) of cases of malaria was confirmed by a laboratory diagnosis.

Conclusion

The level of coverage of ACTs was found to be very low in the study population. Six years since the adoption of this policy in Nigeria, our findings shows that a change policy alone is not sufficient. Steps needs to taken to ensure that the policy is implemented and that effective medications for malaria treatment reach the people who need it. The gap in knowledge on the current treatment policy could be responsible for most of the respondents still using ineffective medications.

Recommendations

Increase Public Awareness of the ACT policy

Information is an important condition for demand of goods and services. There is therefore, a need of regular health promotion and education interventions to educate members of the community on the current malaria treatment policy in Nigeria. The programmes should provide comprehensive information on various aspects of malaria treatment and diagnosis, using various communication channels. One way of doing this can be through radio and TV jingles promoting the use of ACTs. However, there should be innovative ways of communicating the message to people who do not have access to television, radio, or even electricity-especially those in rural areas.

Public education of the need for Early Diagnosis and Prompt Treatment

In about half of the instances, there was a delay in seeking treatment beyond 24 hours after the onset of symptoms and a very small proportion of cases were confirmed by a laboratory diagnosis. Efforts are needed to educate the public on the need for 'Early Diagnosis and Prompt Treatment (EDPT)' in order to prevent complication of symptoms.

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APPENDIX

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TIMELINE#

Activity	Aug 2009	Sept 2009	Oct 2009	Nov. 2009	Dec. 2009	Jan 2010	Feb. 2010	March 2010	April 2010	May 2010	June 2010
Protocol development	■	■	■								
Submission of Protocol for ethical approval			■	■							
Recruiting & Training of field workers					■						
Pilot study					■						
Data Collection						■					
Data entering & Cleaning						■	■				
Data analysis								■			
Writing of thesis								■	■		
Submission of First draft									■		
Submission of First draft										■	
Final submission of thesis											■