Awareness of Antimalarial Policy and Use of Artemisinin-Based Combination Therapy for Malaria Treatment in Communities of Two Selected Local Government Areas of Ogun State, Nigeria

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Abstract

With limited data on the awareness of changes in the use of antimalaria drugs and availability and use of artemisinin-based combination therapy (ACT) in the context of the Roll Back Malaria (RBM) program, we conducted this descriptive cross-sectional study of 262 registered women attending antenatal clinics and 233 mothers of under-five children. We used a questionnaire to assess the awareness, availability and use of ACT in Ijebu North and Yewa North Local Government Areas (LGAs) of Ogun State. Malaria is holo-endemic in these areas, and the RBM program has been implemented for years prior to the 2010 RBM deadline. Data were also collected through focus group discussions, along with secondary data from hospital records. Hospital stock records showed inadequate and inconsistent supplies of ACT drugs in hospitals surveyed. Only 23.0% of respondents knew about ACT drugs. About 48% preferred analgesics over ACT drugs (0.6%) for malaria treatment. Lack of awareness was the major reason for non-use of ACT drugs (86.1%). Communities in Yewa North had more supplies of ACT drugs and knew more about ACT than those in Ijebu North. Adequate information on ACT needs to be made available and accessible under a public–private partnership if 2010 RBM targets (now past) and the 2015 Millennium Development Goal (ongoing) for malaria are to be realized in the study communities and Ogun State in general.

Introduction

Malaria remains a major global public health and development challenge, particularly in Nigeria (Federal Ministry of Health 2010). It is currently estimated that 90% of global episodes of clinical malaria and 90% of global malaria mortality occur in sub-Saharan Africa. Most of the early treatments for fever and uncomplicated malaria occur through self-treatment at home with antimalarial drugs bought from patent medicine sellers, and treatment is rarely sought at health facilities (Goodman et al. 2007; Okeke et al. 2006). Several studies on treatment-seeking for fever and malaria in sub-Saharan Africa, particularly southern Nigeria, showed that patent medicine sellers remained the most common source of treatment for fever and malaria (Brieger et al. 2002; Goodman et al. 2007). This is because drug stock-outs are common in public facilities, and, also, patent medicine sellers are perceived as more friendly and approachable (Williams and Jones 2004).

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Among clients of patent medicine sellers, a high proportion seek care for fever or malaria, as well as other common complaints such as cold, headaches, stomach aches, diarrhea and sexually transmitted infections (Adome et al. 1996). Of those with fever or malaria, the small proportion who use formal health facilities are those with severe malaria. In some cases, too, traditional healers are sought (Lindblade et al. 2000; McCombie 1996; Molyneux et al. 2002). In a pilot study of the awareness, accessibility and use of the malaria control strategies within the context of the Roll Back Malaria (RBM) program among at-risk groups in Nigeria, only 16.2% of respondents (23.5% mothers of children under five years vs. 8.8% pregnant women) were aware of a change in policy on malaria treatment using antimalarials (Adeneye et al. 2007). Similarly, the 2010 Nigeria Malaria Indicator Survey showed that knowledge of artemisinin-based combination therapy (ACT) drug that can be used to treat malaria was low (12.0%) compared to aspirin or paracetamol (44.0%); chloroquine (37.0%); sulphadoxine-pyrimethamine (13.0%) and quinine (7.0%) (National Population Commission [Nigeria] et al. 2012). In recent years, considerable efforts have been made in training health providers in Nigeria on how to effectively diagnose and treat malaria with ACT,

particularly in febrile children (National Population Commission and MEASURE DHS ICF Macro 2009). Hence, education of health providers and communities about diagnosis and change in antimalarial treatment policy, particularly on the change from monotherapies such as chloroquine and sulphadoxine-pyrimethamine to ACTs and how to correctly dispense and use ACT are vital components of effective case management (Kokwaro 2009).

Malaria control efforts in sub-Saharan Africa have been affected by the development and spread of parasite resistance to commonly used first-line antimalarials, notably chloroquine and sulphadoxine-pyrimethamine, reported in almost all malaria-endemic countries in Africa, including Nigeria (Federal Ministry of Health 2010; WHO 2000; 2001). Consequently, the World Health Organization (WHO) has recommended the use of ACT (WHO 2001).

Malaria control efforts in sub-Saharan Africa have been affected by the development and spread of parasite resistance

ACT is the current standard of care for the treatment of patients with uncomplicated falciparum malaria in Africa. The implementation of ACT is one of the key evidence-based and cost-effective malaria control measures initiated to enable malaria-endemic countries to achieve the goals set in the Abuja Declarations and Plans of Action by African Union heads of state and governments at the African Summit to Roll Back Malaria in April 2000 (Nabarro and Tayler 1998; TDR News 1999). One of the RBM goals was to ensure that least 60% and 80% of patients, by 2005 and 2010, respectively, had access to and used correct and affordable treatment within 24 hours of symptom onset, particularly for under-five children. The goal was to halve malaria morbidity and mortality worldwide by 2010 and to further reduce the burden by 50% by 2015 (Muheki et al. 2004; Nabarro and Tayler 1998; TDR News 1999). The RBM goal is also expected to contribute to the Millennium Development Goal (MDG) for malaria of halting and beginning to reverse the incidence of malaria and other major diseases by the target date of 2015 (Teklehaimanot et al. 2005).

The number of ACT treatment courses ordered and procured by national governments of endemic countries through the WHO for use in their public health sector increased from around half a million in 2001 to 31.3 million in 2005; 25.5 million of those were for countries in Africa, including Nigeria (Bosman and Mendis 2007). Since 2004, there has been a strong commitment in many of the countries, under the auspices of the National Malaria Control Program in Nigeria, to making ACTs available in the public sector. Unfortunately, efforts have suffered from problems of funding for purchases, from procurement bureaucracy and from gaps in supply chain management (Medicines for Malaria Venture 2008). Moreover, quality and affordable ACTs have not yet penetrated the profit-oriented private sector (Bosman and Mendis 2007).

Resolution 12.5 of the World Health Assembly, published May 23, 2007, urges member states to progressively discontinue the provision of oral artemisinin monotherapies and to promote use of ACTs in both the public and private health sectors. Member states are further urged to implement policies that prohibit the production, marketing, distribution and use of such monotherapies (Federal Ministry of Health 2010).

Studies have shown that ACT is much more effective than monotherapies, notably chloroquine and sulphadoxine-pyrimethamine, but is more much more expensive (TDR 2006). ACTs are over ten times more expensive than the traditional drugs currently used in Africa as monotherapy. Thus, according to reports, combination therapy would be out of reach for the majority of the population in sub-Saharan Africa, especially when purchased out-of-pocket from private sector shops and pharmacies (Medicines for Malaria Venture 2008; WHO 2001). Reports have shown, however, that ACTs have reduced the number of malaria cases and deaths and are much more cost-effective than conventional antimalarial drugs (Muheki et al. 2004; TDR 2006). Yet despite the effectiveness of ACT in improving malaria health outcomes, difficulties in reordering and maintaining supplies (Kokwaro 2009) and affordability remain key barriers and subjects for policy debate, particularly in sub-Saharan Africa (Muheki et al. 2004). To address these barriers, the Affordable Medicines

Facility – malaria (AMFm) model was designed and is being managed by the Global Fund as an innovative financing mechanism to expand access to ACTs through the public, private and non-governmental organization (NGO) sectors. Financial support for the initiative comes from UNITAID (an international facility for the purchase of drugs against HIV/AIDS, Malaria and Tuberculosis), the United Kingdom Department for International Development (DFID) and other donors, while the RBM program continues its important partnership role with the AFMm. Following a successful pilot implementation of AMFm in eight countries – Cambodia, Ghana, Kenya, Madagascar, Niger, Nigeria, Tanzania (including Zanzibar) and Uganda – implementation of Phase 1 began in 2010 in several countries, including Nigeria (The Global Fund to Fight AIDS, Tuberculosis and Malaria 2013).

ACTs have reduced the number of malaria cases and deaths and are much more cost-effective than conventional antimalarial drugs

In Nigeria, as in other African countries, addressing the malaria burden is a major challenge and forms a major disease control component of the National Health Policy and Strategic Plan (Federal Ministry of Health 2009; National Population Commission and MEASURE DHS ICF Macro 2009). Since the introduction of the RBM program in Nigeria in 1999, malaria control in the country has been transformed. The Federal Ministry of Health's National Malaria Control Program designed and developed a five-year strategic plan for malaria control. It builds on the National Malaria Strategic Plan (NMSP) for malaria control developed by the National Malaria Control Program in partnership with the RBM partners, states' ministries of health and their local government areas (LGAs), and other stakeholders to enable national scale-up of key preventive and curative interventions. As a result of these initiatives, the RBM goals have been achieved by 2010 and the MDGs are expected to be achieved by 2015 (Federal Ministry of Health 2009). The major targets for malaria control in the country during the five-year period of the NMSP included reducing malaria-related mortality by 50% by the year 2010, and delivering prompt and appropriate treatment, according the national treatment guidelines, to at least 80% of febrile patients by 2011, sustaining the level to 2013 (Federal Ministry of Health 2009). In line with the road map to achieve the 2010 RBM targets, about 128 million doses of ACT were projected for distribution to ensure comprehensive nationwide coverage for under-five children by 2010 (Federal Ministry of Health 2005a).

Taking a cue from the National Malaria Strategic Plan, the Ogun State government introduced a free malaria treatment program in 2008, using ACT for all febrile children under five years who presented at various public primary and secondary health facilities. The program's success depends on the public knowing about it, understanding its value, and using it. In view of the dearth of empirical data on the awareness, availability and use of ACT in the context of RBM program, the need to examine these became imperative. The study therefore assessed the success of the antimalarial policy and use of ACT for malaria treatment. In doing this, peoples' awareness and use of ACT, ability and willingness to pay, with emphasis on their perceived fair price for a course of the drug, were taken into cognizance in communities of two selected local government areas of Ogun State, Nigeria.

Methods

Study Area

The study was carried out in two randomly selected LGAs of Ogun State, which is located in the southwestern part of Nigeria, where malaria is holo-endemic and the RBM program is being implemented. The LGAs are Ijebu North and Yewa North, two of 20 in Ogun State. Ijebu North and Yewa North are 140 km northeast and 170 km north of Lagos, respectively, in the rain forest zone of southwest Nigeria. Two communities (Oru/Awa-Ilaporu and Mamu) in Ijebu North and

two (Igbogila and Ijoun) in Yewa North were randomly selected as the study units. Inhabitants of these LGAs are predominantly farmers and traders, and transmission of malaria is high during the rainy season between April and November (Ayanlade et al. 2010; Ekanem 1996; Omikunle 1999). The location of the study LGAs in Ogun State is shown in Figure 1.

Figure 1. Ogun State map showing the study local government areas

Basic social amenities such as roads, water, health facilities and educational institutions abound in the selected LGAs. Health facilities in Ijebu North include a general hospital, primary healthcare centres (PHCs), health clinics, health posts and private clinics. Yewa North also has a general hospital, PHCs, health clinics, health posts, private clinics and an alternative health clinic. Many patent medicine sellers abound in the two LGAs, with stocks of ACTs and antimalaria monotherapies (Information, Youth, Sports and Culture Division [INLG] 1997; Omikunle 1999; YNLG 2003).

Study Design

This is a descriptive cross-sectional study on the awareness, availability and use of ACT in the context of the RBM program in Ijebu North and Yewa North LGAs of Ogun State. The major target populations for the study were pregnant women and mothers of under-five children. A total 233 mothers of children under five and 262 pregnant women attending antenatal clinics were interviewed during the household and clinic surveys, respectively, in the selected communities. The two questionnaires were similar, but the one administered to the pregnant women had an additional section on intermittent preventive treatment of malaria in pregnancy (IPTp).

Mothers of under-five children were selected for the household survey using a multi-stage sampling process with a combination of simple random and systematic sampling (Varkevisser et al. 2003). The first stage involved selecting two LGAs from the list of 20 in Ogun State, using the simple random sampling technique. Adopting the balloting approach, we wrote the LGA names on pieces of paper and grouped them into threes according to their geo-political zone, placed them in three containers to represent those zones, and shuffled them. One LGA was subsequently picked

from two of the three containers, randomly selected. The second stage involved selecting two communities in each of the two LGAs, using the balloting approach without replacement. The third stage involved randomly selecting enumeration areas (EAs), that is, one EA for each rural community and three EAs for each semi-urban community. In doing this, a list of all the EAs from the 2005 national census delineation exercise in the selected LGAs was obtained from the National Population Commission (NPC). Subsequently, a systematic sampling of 96 and 19 households from Oru/Awa-Ilaporu and Mamu in Ijebu North LGA and 109 and 9 households from Igbogila and Ijoun in Yewa North LGA were made. Then, a mother of an under-five child from each selected household was selected for interview. If a mother of an under-five child was not found in a selected household, the next household was selected.

For the clinic survey, the sampling frame for the selection of study units was the list of pregnant women registered for antenatal care at the selected health facilities. Women were randomly selected and interviewed on exit from the clinic. Their names were noted on each visit to the health facilities in order to avoid duplication of respondents. To ensure confidentiality, the list of names was subsequently destroyed.

Data Collection Procedures

The study involved interviewer-administered semi-structured questionnaires for both clinic and household surveys. In addition, in-depth interviews were conducted with health providers in health facilities visited, and secondary data were collected through hospital records. In this regard, records from the service delivery point ledger and monthly summary form relating to ACT supplies and distribution of the brand, drug formulation and quantity of ACTs supplied monthly between 2006 and 2008 were checked at the health facilities. Similarly, the observation technique was adopted for noting the dispensation of ACTs. Data collection first involved a formative qualitative study of people's perceptions, beliefs and practices concerning malaria prevention and treatment through focus group discussions (FGDs) and in-depth interviews. It is important to emphasize that the questions in our survey related to the broad categories of perceptions, beliefs and practices from the formative study, because these served as the platform for the design and development of the questionnaire contents. Moreover, the effective management and control of malaria, particularly in pregnant women and children under five, is usually a function of several factors, such as those relating to knowledge, perception, attitude and treatment practices. Thus, it is assumed that a change in community and individual knowledge will lead to a change in behaviour. Cognitive variables such as attitudes and beliefs, as well as expectations of future events and outcomes, are major determinants of health-related behaviour, such as use of ACTs for malaria treatment (Chen and Land 1986; Munro et al. 2007; Rosenstock 1966).

The formative study was then followed by the use of questionnaires in household and clinic surveys. Prior to the actual survey, a pretest to ascertain the validity and reliability of the questionnaire and data collection procedures was carried out.

The main sections of the household and clinic survey questionnaires from which the focus of this paper was derived include those that probed respondents' background characteristics. They included age, religion, level of education, marital status and occupation. Others probed respondents' awareness and use of ACT and their ability and willingness to pay for ACTs, with emphasis on the perceived fair price they would pay for a course of treatment. Understanding willingness to pay is of particular importance in analyzing pricing policy for health products such as ACTs. In this context, data on willingness to pay is used to study the screening effect of prices, that is, whether those who buy ACTs at a particular price are more likely to use the product, as well as their direct causal effect: whether higher prices cause higher use through psychological effects (Cohen and Dupas 2010). Moreover, ACTs are only free for children under five at public health facilities; they are paid for at the other healthcare outlets such as patent medicine sellers and private hospitals, where a significant number of patients seek healthcare (Brieger et al. 2002; Goodman et al. 2007).

In addition, prerequisites for the success of the antimalaria drug policy on ACT use include getting the drug treatment to most people at the lowest possible cost, increased acceptance, willingness and ability to pay, and utilization of the drug as prompt, adequate and appropriate treatment of malaria.

Ethical Considerations

Approvals for the main study on which this paper is based were obtained from the State Ministry of Health, LGAs and the community prior to the commencement of the study in the communities. Ethical approval for the research protocol for the larger study with assigned number UI/EC/11/0075 was obtained from the University of Ibadan/University College Hospital (UI/UCH) Ethics Committee. Informed consent of all research participants for the study was sought and obtained in written form using an informed consent form to signify their willingness to participate.

Understanding willingness to pay is of particular importance in analyzing pricing policy for health products such as ACTs.

Data Analysis

Quantitative and qualitative data for each phase of the study were analyzed using EpiInfo 6.04a and the textual analysis program, Textbase Beta software, developed by Bo Summerlund and distributed by Qualitative Research Management of Desert Hot Springs, CA (Fielding and Lee 1998; Miles and Huberman 1994). Statistical analyses of the quantitative data were conducted using analysis of variance and chi-square tests at a 95% level of significance. Analysis of variance (ANOVA) was used in showing the relationship between measurements of the mean and the variance, or "random error," of each subgroup in the study in order to provide information needed to determine if the difference between the two was significant. Chi-square, a non-parametric test of statistical significance for bivariate tabular analysis, was used to show whether or not two different samples (of people) were different enough in some characteristics or aspects of behaviour.

In analyzing the qualitative data, the tapes of participant responses from FGDs were first transcribed and typed. The electronic transcripts were then saved as ASCII text files and subsequently summarized, categorized, coded and sorted into text segments according to similarities and differences in individual opinions and views. A standard node tree of domains and concepts of interest was developed for coding the text, using the Textbase Beta software. The program allows files to be given variable assignments, and thus it was possible to sort and then compare patterns of opinions and views as discussed by the respondents.

Results

Socio-demographic Characteristics of Respondents

Of the 495 respondents surveyed, 262 (52.9%) were pregnant women and 233 (47.1%) were mothers of children less than five years old. Overall, 50.9% and 49.1% of respondents were from Yewa North and Ijebu North LGA, respectively. A larger number (68.5%) were Christians, and 97.6% were married. Most were artisans (38.4%) and traders (25.9%) and had some formal education. Of the 262 pregnant women interviewed, 40.1% were from private hospitals and 59.9% were from public hospitals. Respondent age ranged from 16 to 40 years, with a mean age of 28.8 years (27.9 years among pregnant women vs. 28.7 years among mothers of children under five) and a median of 30 years (30 years among pregnant women vs. 23 years among mothers of children under five). Respondents' socio-demographic characteristics are presented in Table 1.

Table 1. Socio-demographic characteristics of respondents

Socio-demographic characteristics	Pregnant women		Mothers of under-five children		Total	
	Number	%	Number	%	Number	%
Local Government Area						
Yewa North	133	50.8	129	49.2	119	51.1
Ijebu North	114	48.9	252	50.9	243	49.1
Total	**262**	**52.9**	**233**	**47.1**	**495**	**100.0**
Communities						
Igbogila	123	46.9	109	46.8	232	46.9
Ijoun	10	3.8	9	3.9	19	8.2
Oru/Awa-Ilaporu	108	41.2	96	41.2	204	41.2
Mamu	21	8.0	19	3.8	40	8.1
Total	**262**	**52.9**	**233**	**47.1**	**495**	**100.0**
Religion						
Christianity	193	73.7	146	62.7	339	68.5
Islam	69	26.3	83	35.6	152	30.7
Traditional	0	0.0	4	1.7	4	0.8
Total	**262**	**52.9**	**233**	**47.1**	**495**	**100.0**
Marital status						
Never married	3	1.1	6	2.6	9	1.8
Married	258	98.5	225	96.6	483	97.6
Divorced	1	0.4	1	0.4	2	0.4
Separated	0	0.0	1	0.4	1	0.2
Total	**262**	**52.9**	**233**	**47.1**	**495**	**100.0**
Education						
None	52	19.8	42	18.0	94	19.0
Primary	86	32.8	52	22.4	138	27.9
Secondary	103	39.3	111	47.6	214	43.2
Post-secondary	21	8.0	28	12.0	49	9.9
Total	**262**	**52.9**	**233**	**47.1**	**495**	**100.0**
Occupation						
Unemployed	1	0.4	1	0.4	2	0.4
Housewife	23	8.8	20	8.6	43	8.7
Farming	41	15.6	17	7.3	58	11.7
Artisan	76	29.0	114	48.9	190	38.4
Civil servant	19	7.3	25	10.9	44	8.9
Professional (e.g., banker)	8	3.1	12	5.2	20	4.0
Trading	86	32.8	42	18.0	120	25.9
Student	5	1.9	0	0.0	5	1.0
Other	3	1.1	0	0.0	3	0.6
No response	0	0.0	2	0.9	2	0.4
Total	**262**	**52.9**	**233**	**47.1**	**495**	**100.0**

Respondents' Awareness of ACT

Table 2 summarizes respondents' awareness of the change in antimalaria drugs according to their status. Few (23.0%) respondents (20.2% pregnant women vs. 26.2% mothers of children under five) knew of the change in antimalarial use. The LGA and community of respondents' residence positively influenced their level of awareness of the change. More respondents in communities of Yewa North knew about it than those in Ijebu North, as presented in Table 3. Table 4 shows that respondents' level of education had a direct association with their awareness of the change (χ^2 = 50.13, df= 6, p < .05).

Table 2. Respondents' awareness of change in antimalaria drugs according to their status

Are you aware of changes in antimalaria drugs?	Mothers of under-five children		Pregnant women		Total	
	Number	**%**	**Number**	**%**	**Number**	**%**
Yes	61	26.2	53	20.2	114	23.0
No	172	73.8	205	78.2	377	76.2
Undecided	0	0.0	4	1.5	4	0.8
Total	**233**	**100.0**	**262**	**100.0**	**495**	**100.0**

Table 3. Respondents' awareness of change in antimalaria drugs by their LGA and community

	Are you aware of change in the use of antimalarials?							
	Yes		No		Undecided		Total	
	Number	**%**	**Number**	**%**	**Number**	**%**	**Number**	**%**
Local government area								
Yewa North	104	41.3	146	57.9	2	0.8	252	50.9
Ijebu North	10	4.1	231	95.1	2	0.8	243	49.1
Total	**114**	**3.0**	**377**	**76.2**	**4**	**0.8**	**495**	**100.0**
χ^2 = 114.28, df = 6, p < .05								
Communities								
Igbogila	89	38.4	141	60.8	2	0.9	232	46.9
Ijoun	15	78.9	4	21.1	0	0.0	19	3.8
Oru/Awa-Ilaporu	8	3.9	194	95.1	2	1.0	204	41.2
Mamu	2	5.0	38	95.0	0	0.0	40	8.1
Total	**114**	**23.0**	**377**	**76.2**	**4**	**0.8**	**495**	**100.0**
χ^2 = 114.28, df = 6, p < .05								

LGA = local government area.

Table 4. Respondents' awareness of change in antimalaria drugs according to level of education

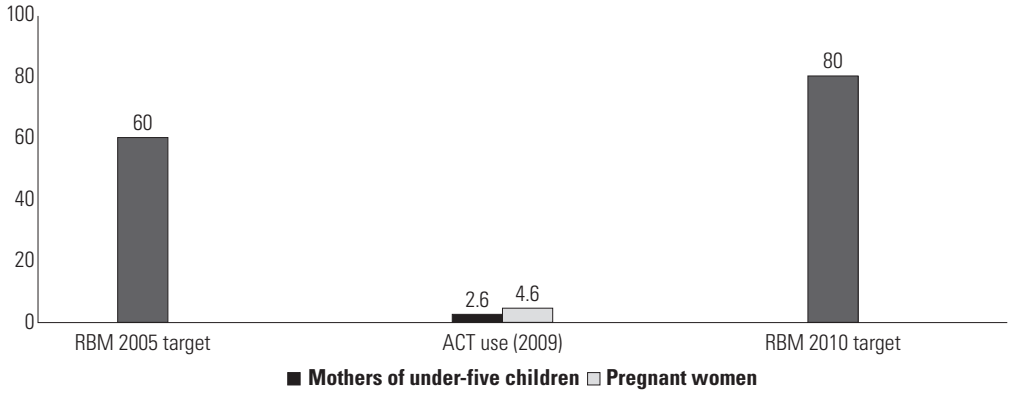
	Are you aware of change in the use of antimalarials?							
	Yes		No		Undecided		Total	
	Number	**%**	**Number**	**%**	**Number**	**%**	**Number**	**%**
Education								
None	16	17.0	76	80.9	2	2.1	94	19.0
Primary	26	18.8	112	81.2	0	0.0	138	27.9
Secondary	42	19.6	171	79.9	1	0.5	214	43.2
Post-secondary	30	61.2	18	36.7	1	2.0	49	9.9
Total	**114**	**23.0**	**377**	**76.2**	**4**	**0.8**	**495**	**100.0**
χ^2 = 114.28, df = 6, p < .05								

Statistical tests using Chi-square further indicated that pregnant women registered for antenatal care at public hospitals (24.8%) knew more about the change than those attending private hospitals (13.3%) ($\chi^2 = 6.84$, df = 2, $p < .05$). Multiple regression further reinforced LGA of residence (0.85) and facility type attended for antenatal care (0.31) as the two key factors that had joint effects on respondents' awareness of the change. Factors such as age, marital status, religion, education and occupation had no significant joint effect.

Respondents' Use of ACT

When respondents were asked whether they had ever taken ACTs, only a few (3.6%; 6.0% in Yewa North vs. 1.2% in Ijebu North) said they had taken the new combination drug. Figure 2 illustrates ACT use among respondents by status.

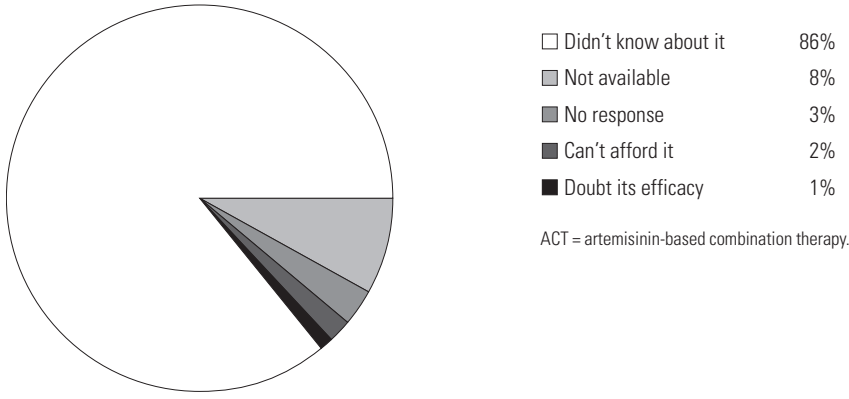
Figure 2. ACT use by respondents according to their status



ACT = artemisinin-based combination therapy; RBM = Roll Back Malaria program.

On the one hand, the reasons that informed the choice of ACT for malaria treatment among respondents were, "it is very effective/works faster" (83.3%) and "was prescribed at the hospital/pharmacy" (5.5%). However, 11.2% were undecided on their reason for choosing ACT. On the other hand, reasons given for non-use of ACT are illustrated in Figure 3. While most (85.5%) respondents had never taken ACTs, 10.5% could not recall or were unsure, and 0.4% did not respond. Their probability of having taken ACTs was positively associated with education ($\chi^2 = 33.02$, df = 9, $p < .05$), ranging from 11.1% (no formal education) to 44.4% (post-secondary).

Figure 3. Reasons for non-use of ACT for malaria treatment by respondents



ACT = artemisinin-based combination therapy.

Among health providers interviewed, knowledge of malaria treatment using ACTs was high. The main barriers impeding access to ACTs identified by public health providers actively involved in implementing the RBM program included inconsistent and inadequate supplies and difficulty in getting to hard-to-reach areas because of the poor transportation system. In alleviating the impact of the supply problem, a health provider interviewed at the Igbogila PHC revealed that:

> …we usually endeavour to notify the local government health department in Aiyetoro when we're almost exhausting our stock of ACTs, LLINs [long lasting insecticide nets] and IPTp drugs ahead of time so that they can find a way of replenishing our stock of the products.

Furthermore, on the issue of inadequacy and inconsistency of supplies, the State senior program manager interviewed pointed out that:

> …we get LLINs and other control products such as ACTs and IPTp drugs from the Federal Ministry of Health (in Abuja), the State Government and donor agencies such as UNICEF, but it is usually not enough and [not] regular. For the ACTs, we have them in our public primary and secondary health facilities. The adults pay for the drugs. Only children under five years are provided free treatment with the ACTs.

Perceived Fair Price and Willingness to Pay for ACT among Respondents

On the one hand, when respondents were asked how much they would be willing to pay if a course of ACT were sold at a hypothetical price of 500.00 Naira (N) (3.13 US dollars) in their communities, a larger proportion (82.6%; 73.0% Yewa North vs. 92.6% Ijebu North) was willing to pay the 500.00 Naira and 16.8% was unwilling. Very few (0.6%) were indifferent to paying for the drug. Willingness to pay was positively associated with education ($\chi^2 = 58.66$, df = 6, $p < .05$). Further, ANOVA showed that older respondents with a mean age of 29.2 years were more willing to pay the hypothetical price compared to younger ones with a mean age of 27.2 years who were unwilling ($p < .05$).

Reasons given by the 16.8% of unwilling respondents were: can't afford it (56.6%), no work/no money (33.7%), know nothing about the drug (8.4%) and prefer herbs (1.2%). When these respondents were asked what they would be willing to pay (WTP), their answers ranged from100.00 to 300.00 Naira (0.63 to 1.88 US dollars). The mean WTP was 234.78 Naira (1.47 US dollars) (233.33 Naira; 1.46 US dollars in Yewa North vs. 266.67 Naira; 1.67 US dollars in Ijebu North), with a median of 250.00 Naira (1.56 US dollars).

Health Facility Records and Availability of ACT Supplies in Study Communities

Only the public health facilities surveyed had stocks of ACTs for the age category of one to six years, while none of the private health facilities surveyed had ACTs in stock, as presented in Table 5. Information relating to ACTs in stock over a three-year period (2006–2008) at the health facilities surveyed following examination of records is displayed in Table 5.

…none of the private health facilities surveyed had ACTs in stock

Interviews with health workers at all health facilities visited during the survey showed that none had a copy of the National Policy on Malaria Diagnosis and Treatment document.

ACT drugs for age category one to six years were observed to be in stock and dispensed only in public health facilities, except at Ijoun PHC and Mamu health post. None of the private health facilities had any stock of ACT drugs.

Table 5. Population of under-five children juxtaposed with the stocks of ACTs at surveyed public and private health facilities in study communities, January 2006 – June 2008

Community/LGA	Expected population of children <5 years in the community	Available ACTs (Packs of Malmed®/Larimal® for age category 1–6 yrs only) at health facilities visited January 2006 – June 2008	
		Public	Private
Ijebu North LGA			
Oru/Awa-Ilaporu	2,982	97	0
Mamu	583	0	0
Total	**3,565**	**97**	**0**
Yewa North LGA			
Igbogila	3,384	150	0
Ijoun	272	210	0
Total	**3,656**	**360**	**0**
Grand total	**7,221**	**457**	**0**

ACT = artemisinin-based combination therapy; LGA = local government area.

Discussion

Limitations should be pointed out prior to discussing the study's results. Non-response bias was a primary limitation, some of which may be attributed to the population's poor health education and low awareness of health issues. The second limitation of the study is the focus on two LGAs of Ogun State in one part of the country. A larger study with adequate sample size that is more representative of the geo-political zones of the country is needed to provide better and more generalizable findings. Nonetheless, these limitations do not undermine the validity of findings of this study. Given the widespread concerns about the limited evidence of decreases in malaria-related mortality and morbidity, the results may be useful as a baseline for malaria control improvement efforts on ACT provision for effective malaria treatment with the aim of now meeting the 2015 MDG for malaria in Ogun State in particular and in the country in general, following the past RBM deadline.

The poor awareness of ACTs among respondents perhaps explains the low use of the WHO-recommended combination drugs as first-line treatment in the study area. It is disappointing that very few respondents, particularly mothers of children under five, reported ever having used the new combination therapy, despite the free malaria treatment program being implemented in the State. This is perhaps an indicator of poor implementation of the WHO-recommended change in the use of antimalarials in the study LGAs, as emphasized in the National Policy on Malaria Diagnosis and Treatment document (Federal Ministry of Health 2005b; 2010). It is apparent that a predominant number of people in the study communities are not aware of or using ACT as the new drug recommended for effective treatment of malaria, and are still using declassified antimalarials, notably chloroquine, sulphadoxine-pyrimethamine and artemisinin monotherapies. This implies that the declassified antimalarials are still being distributed and marketed in the study communities, contrary to Resolution 12.5 of the World Health Assembly that advocated for the discontinuation of production, importation, distribution and marketing of such drugs, as emphasized in the National Policy on Malaria Diagnosis and Treatment document. Hence, the regulatory authorities such as the National Agency for Food and Drug Administration and Control (NAFDAC) need to intensify efforts to stop further local production, importation, distribution, and marketing of these declassified antimalarials. In addition, there is need for intensive public health education on ACTs through advocacy and information, education and

communication (IEC) activities by the Ministry of Health in collaboration with the Ministry of Information and Communications in communities across the State, emphasizing the change in antimalarial drug policy and the rationale and benefits of using the new drug, targeting in particular caregivers and households in communities of Ijebu North LGA. To achieve this, IEC materials such as leaflets and posters need be developed and distributed to complement mass media campaigns that will sensitize the public to ACTs in these communities. Health messages aimed at raising awareness of ACT and advocating for its use need to be developed using simple and clear language that people can easily comprehend and identify with. This is particularly important in communities where it is difficult to get health messages across to people who still believe in traditional approaches to healthcare and do not understand the basics of how infections occur through the biomedical framework emphasized by Erinosho and Oke (1994).

It is disappointing that none of the health facilities visited during the study had a copy of the National Policy on Malaria Diagnosis and Treatment document, despite the fact that it was printed and provided to all states for distribution to all LGAs and health facilities across the country (Federal Ministry of Health 2010). The protocols outline basic information to guide healthcare providers on steps to take and drugs to use for effective implementation of malaria treatment using ACT as updated by the Federal Ministry of Health in the policy documents in 2005 and 2010 respectively. Disseminating the most recent document to healthcare providers, particularly in the study areas, is germane in preventing the incidence of malaria-related complications in pregnancy and impacting on the prescribing practices of healthcare providers. It will improve and harmonize malaria management practices at the health facility level in the study communities with those in other parts of the country.

In view of how long the RBM program has been implemented prior to the free malaria treatment program in Ogun State, the poor awareness of policy change in use of antimalarials and actual use of ACT reported by the respondents in Tables 2 and 3 and Figure 2 is far below, and nowhere near, the RBM target of 60% expected for 2005, not to mention the 80% target expected for 2010, as emphasized in TDR News (2000, 2002). The level of awareness of change in antimalarial use reported in the study is higher than the findings of Adeneye et al. (2007) in a pilot study to evaluate malaria control strategies in Ogun State. Similarly, it is higher than the findings of Ajayi et al. (2008) in which none of the respondents had either heard of or used ACT in a previous qualitative study of the feasibility and community perception on effectiveness of ACT use in the context of HMM in some communities of Oyo State, Nigeria.

Given that the Ministry of Health in the State is implementing a free malaria treatment program with ACT for all febrile children under five presenting at various public primary and secondary health facilities (Adeneye personal communication), the results presented in Table 5 showed the gross inadequacy of stocks of ACT supplied for dispensing in health facilities in the study communities compared to the large number of the expected target population of under-five children. The lack of availability of ACTs, for example, which was indicated by respondents as a reason for non-use of the drug in Figure 3, is corroborated with the data from hospital records presented in Table 5. It attests to the poor implementation of the policy change for using antimalarials emphasized in the National Policy on Malaria Diagnosis and Treatment document. Regular provision of essential drugs such as ACTs to health facilities in the rural areas just as those reported in this study needs be intensified as emphasized in the National Health Policy. We believe that the provision of these essential drugs will enormously contribute to improving the health status of the people.

The low use of ACTs reported in the study is perhaps connected to the ability and willingness of respondents to pay for ACTs in the study communities. These products were not readily available in the public hospitals, where they should not only have been available to adults but free for children. The actual price respondents were willing to pay for a treatment course of ACT suggests the need to ensure equitable affordability of the drugs in the study communities. This could be accomplished through price subsidy for drugs purchased from private sector operators such as patent medicine

sellers, given that the drugs are not available at public health facilities. The high cost of ACTs mentioned by many respondents as a contributing factor to their low use of the drugs could perhaps be attributed to the situation where 62.5% of the population in Ogun State (higher than the national average of 61.2%) live on less than 1.00 US dollar (160.00 Naira) a day, based on purchasing power parity (National Bureau of Statistics 2012).

The reality of the consequent economic burden of the hypothetical price many respondents said they were willing to pay may not have dawned on them at the time of the survey. In reality, they may eventually be unable to afford it. It is possible that when the drugs are actually available for purchase consequent to a malaria case, willingness may wane, with preference for a lower price. In contrast to the cheaper artemisinin monotherapies, and chloroquine- and sulphadoxine-pyrimethamine-based drugs that their prices ranged from 50.00 to 350 Naira (0.31 to 2.19 US dollars), with an average price of 130.00 Naira (0.81 US dollars), the retail market price of an adult treatment course of ACT ranged from 130.00 to 640.00 Naira (0.81 to 4.00 US dollars), with an average price of 340.00 Naira (2.13 US dollars). The retail market price of a course of ACT for children also ranged from 130.00 to 480.00 Naira (0.81 to 3.00 US dollars), with an average price of 256.67 Naira (1.60 US dollars) (Adeneye personal communication). The overwhelming health expenditure, with the majority of it being out-of-pocket expenditures, in spite of the endemic nature of poverty in the country reported by the National Bureau of Statistics (2012), perhaps explains the challenge of choice and preference for the cheaper declassified antimalarials for effective malaria treatment in the study communities, rather than the recommended ACT drugs. Despite ACT's proven efficacy to improve malaria health outcomes, its cost and affordability, particularly in the study communities, remain key areas for policy debate, as emphasized by Muheki et al. (2004). Hence, consumer behaviour patterns in ACT use relative to cheaper and ineffective antimalarials, as demonstrated in this study, need be taken into account when considering the treatment policy on malaria in Ogun State in particular and the in country at large.

It is evident from the study that private health facilities are not involved in implementing the RBM program in the study LGAs, considering the hospital records checked and observations made that none of the private health facilities we visited had ACT drugs to dispense to their clients presenting with malaria. It therefore becomes very important that private health facilities in the LGAs need to be part of the strategy to change malaria treatment guidelines using ACTs if there are to be meaningful improvements in accessing effective antimalarials drugs in the communities. These private health facilities need be involved in the implementation processes of the RBM program, particularly in respect of ACT supplies through the AMFm model being implemented in the country (The Global Fund to Fight AIDS, Tuberculosis and Malaria 2013). This is important if the full potential of the program is to be harnessed to achieve the Millennium Development Goal for malaria now that the RBM 2010 deadline has passed.

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