FACTORS INFLUENCING THE UTILIZATION OF RAPID DIAGNOSTIC TESTS IN DIAGNOSIS OF MALARIA BY HEALTHCARE PROVIDERS, ALIMOSHO LGA, LAGOS STATE, NIGERIA.

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CERTIFICATION

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DEDICATION

This piece of work is dedicated to God Almighty and the benefit of Mankind.

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ABSTRACT

Prompt and accurate diagnosis is crucial for effective management of malaria cases and case management still remains a vital component of the malaria elimination strategies. The new national treatment guidelines were initiated to improve case management and reduce morbidity and mortality due to malaria in the country. However, success depends on health workers compliance to the treatment guidelines. This study therefore seeks to document the gaps in knowledge with respect to diagnosis of malaria, availability and utilization of Rapid Diagnostics Tests (RDTs) by health workers in health facilities. This study identified the factors influencing the utilization of Rapid Diagnostic Tests by health workers for the diagnosis of Malaria in health facilities in Alimosho Local Government Area (LGA), Lagos, Nigeria.

This study was a descriptive cross-sectional survey carried out between March and April, 2016. The respondents were selected using a multistage sampling technique, hence 89 health facilities from the 36 wards of the LGA were included in the study. A four hundred and twenty (420) pre-tested structured interviewer administered questionnaires were used to collect information on socio-demographic, awareness, knowledge, perception and factors influencing the availability and utilization of RDTs in health facilities. Data analysis was done using Epi info version 7. Univariate analysis was done by frequencies and percentages while association between the dependent variable: utilization of RDTs and independent variables: age, sex, years of practice, occupation and level of education were tested using Prevalence odds ratio. Multivariate analysis using binary logistic regression was done to determine the predictors of utilization of RDTs with level of significance set at P value <0.05.

Majority of the healthcare providers interviewed were female (83.3%). The mean age of respondents was 35.9 years (S.D ± 8.76). RDTs were readily available (77.1%) and utilized (65.1 %%) in health facility. Presumptive diagnosis of malaria (94.7%) was the preferred method of diagnosis in all facility type. The main reasons for non-utilization of RDT were unreliability of RDTs test results (34.76%), supply related issues (34.52%), cost of RDTs (12.86%) and preference for other methods (8.8%). Factors influencing utilization of RDTs among healthcare providers were: type of health facility (aOR= 6.53, 95%CI= 1.18-36.21. P=0.03), Supervisory visits to health worker from higher levels (aOR= 10.52. 95%CI=1.77-62.48, P=0.01) and availability of RDTs test kits at health facility (aOR= 18.90, 95%CI= 23.97-80.25, P<0.01)

 Use of RDTs was low despite its availability at health facilities. Most health workers still used the presumptive diagnosis method in management of malaria cases. Perceived unreliability, supply related issues and cost remained limiting factors to the use of RDTs. Interventions such as sensitization of healthcare providers on the national treatment guidelines on RDTs, provision of RDTs at subsidized rate and supportive supervision of healthcare providers is recommended. In addition, training and re-training of healthcare providers is suggested to improve malaria case management in the State.

Key words: Health workers, Malaria treatment guidelines, Malaria case management, Use of RDTs, Availability of RDTs.

Word count: 466

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LIST OF ABBREVIATIONS

ACTS	Artemisinin based combination therapy
AS	Academic Supervisor
CHEW	Community Health Extension Workers
CHO	Community Health Officer
FMOH	Federal Ministry of Health
HEFAMAA	Health Facility Monitoring and Accreditation Agency
HMIS	Health Management Information System
IDSR	Integrated Disease Surveillance and Response
LCDA	Local Council Development Agency
LGA	Local Government Area
LGA	Local Government Area
LSMOH	Lagos State Ministry of Health
NGO	Non-Governmental Organization
NMCP	National Malaria Control Program
NMEP	National Malaria Elimination Programme
P.I	Principal Investigator
P.S	Programme Supervisor
PHC	Primary Health Centre
R.A	Research Assistants
RBM	Roll Back Malaria
RDT	Rapid Diagnostic Test
UNICEF	United Nations Children's Fund
WHO	World Health Organization

CHAPTER ONE

INTRODUCTION

1.1   Background

Globally, it is estimated that half of the world's population is at risk of malaria: In 2008, an estimated 3.3 billion people were at risk of malaria globally. Of this total, 2.1 billion were at low risk, 97% of whom were living in regions other than Africa. The 1.2 billion at high risk lived mostly in the African (49%) and South-East Asia (37%) (WHO, 2008). There were estimated 247 million malaria cases among the 3.3 billion people at risk in 2006, causing nearly a million deaths, mostly children under 5 years. One hundred and nine countries were endemic for malaria in 2008, 45 of which were in the African region.(WHO, 2008). Eighty percent of the cases in Africa were in 13 countries, and over half of these malaria cases were in Nigeria, Democratic Republic of the Congo, Ethiopia, United Republic of Tanzania and Kenya (WHO, 2012)

Nigeria bears up to 25 percent of the malaria disease burden in Africa, hence contributing largely to the one million lives lost each year in the region. Most of the deaths occur in children and pregnant women (UNICEF, 2005). Malaria is endemic and constitutes a major public health problem despite the curable nature of the disease. Malaria-related deaths account for up to 11 percent of maternal mortality (UNICEF, 2005). Additionally, Malaria contributes up to 25 percent of infant mortality and 30 percent of under-five mortality. The disease over-burdens the already-weakened health system: nearly 110 million clinical cases of malaria are diagnosed each year, and malaria contributes up to 60 percent of outpatient visits and 30 percent of admissions (MICS, 2010). The economic loss to Nigeria due to malaria is estimated at N132 billion annually (RBM) due to loss of man hours resulting from sickness and cost of treatment. It is a

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major cause of absenteeism from work and school. It contributes to poverty and results in poor pregnancy outcome (Jimoh et al., 2007).

It is important to note that among the component of malaria control strategies, case management still remains the hallmark and core component of malaria elimination programme. It entails early diagnosis and prompt treatment of patients with recommended and effective antimalarial drugs present in the country. However, in most health facilities (tertiary, secondary and primary health care centres) across the country, The main stay of diagnosis is still through clinical examination (symptoms and signs) which is presumptive, less reliable. Presumptive diagnosis sometimes available at community/PHC level and subsequently leads to resistance of antimalarial drugs due to lack of precision against the protozoa (NMEP, 2014)

In 2007, the government through National Malaria Elimination Programme (NMEP) had introduced RDTs as one of the parasitological diagnosis method for bridging the gaps in malaria case management policy in the country especially at peripheral health facilities (NMEP, 2014). The Nigerian National Guidelines for Diagnosis and Treatment of Malaria was aligned with the revised 2010 WHO recommendations on universal diagnostic testing for malaria. The National Malaria Control Programme (NMCP) Strategic Plan 2009-2013 aims to achieve "timely and equitable access to malaria diagnosis and treatment by all sections of the population. Prompt parasitological diagnosis, either by microscopy or RDT, is strongly recommended in all suspected cases of malaria (WHO, 2010). Parasitological laboratory diagnosis is gradually being scaled-up in Nigeria. The target for parasitological diagnosis is 40% of all malaria diagnosis by 2013 and 60% by 2014. No target has yet been set for 2015. The NMCP recommends hospitals,

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large primary health centers with inpatient beds and tertiary care facilities as the facilities where microscopy should be available. The NMCP recommended the use of RDTs at secondary facilities and in certain outpatient clinics of tertiary facilities when microscopy is not available. (NMEP, 2014).

1.2   Problem Statement

Malaria is one of the leading causes of morbidity and mortality in Sub-Sahara Africa. It is estimated that around 350-500million malaria disease episodes occur annually. Estimates showed that nearly 60% of cases of clinical malaria and over 90% of the deaths around 1 million (700,000 to 1.3 million) attributed to malaria occurred in Africa (WHO, 2006). In 2010, there were estimated 216 million cases of malaria worldwide, of which 91% were due to *P. falciparum*. The vast majority of cases (81%) were in the African region followed by the South-East Asia (13%) and Eastern Mediterranean regions (5%). The estimated number of malaria cases per 1000 persons at risk of malaria, taking into account population growth over time, showed a reduction in case incidence of 17% globally between 2000 and 2010. Declines in cases incidence was seen in every region due to global malaria control initiatives and strategies. In 2010, there were estimated 655,000 malaria deaths worldwide. It is estimated that 91% of deaths were in the African region. About 86% of deaths globally were in children under 5 years of age. (WHO 2011) According to the National Malaria Elimination Programme (NMEP) Strategic Plan 2014-2020, malaria accounts for about 60% of outpatient visits and 30% of hospitalizations in Nigeria. The burden of the disease is exacerbated by the fact that barely half (53%) of cases received appropriate antimalarial drugs from formal health facilities (Breman et al., 2004). In Lagos, malaria remains one of the leading causes of morbidity and mortality in the state. Malaria is responsible for 70% of outpatient attendance at the secondary healthcare facilities and over 80% of all tracer diseases reported by primary healthcare facilities (HMIS/ LSMOH, 2015).

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In 2010, the World Health Organization recommended universal testing before treatment in suspected cases of malaria [WHO, 2010]. These recommendations include expansion and increased accessibility of malaria diagnosis methods (microscopy and rapid diagnostic test kits) to all health facilities at all levels and sectors of health care delivery. Malaria microscopy has challenges as a primary tool for scaling up diagnosis. These challenges include cost and manpower capacity needs, quality control and infrastructure (Ayalew et al., 2014). RDTs, while not a substitute for microscopy, addresses many of the limitations of microscopy. Hence, the use of RDT is a more viable option for scaling up the access to diagnosis (Batwala et al., 2010). However. RDT also has its own challenges such as the brand, storage and use of excess buffer. These challenges can be surmounted by quality training and supportive supervision. Furthermore, a recent study validated the usefulness and reliability of RDTs test results for malaria diagnosis in both children and adults. (Ajumobi et al., 2015)

One of the objectives of the National Malaria Strategic Plan 2014–2020 is to test all care-seeking persons with suspected malaria using RDT or microscopy by 2020 [FMOH, 2014]. Prior to this, the national malaria policy recommended testing before treatment for children above 5 years and adults and presumptive treatment for children under -five. In order to achieve this objective, it is imperative for all levels and sectors of the Nigerian health system to have access to and appropriately utilize malaria diagnostic tools. To achieve this, the National Malaria Elimination Programme (NMEP) has implemented a scale up plan and deployment of RDTs to primary healthcare facilities in the public sector in the country [Mokuolu et al., 2013)

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1.3 Justification of the study

Malaria is clinically indistinguishable from many other diseases but treatable if appropriate management is given early. Other treatable acute infections can cause significant morbidity and mortality, it is therefore important to distinguish malaria from non-malaria febrile illness early, to allow prompt and appropriate treatment of all causes of fever (WHO, 2010). Early Diagnosis and Prompt treatment of malaria cases is one of the core components of malaria case management control strategies. Early and accurate diagnosis of malaria followed by prompt treatment reduces the severity of the disease in malaria endemic regions.

According to the FMOH/NMEP strategic plan 2009-2013, with the introduction of artemisinin-based combination therapy (ACT) for treatment of malaria in many low-resource settings, there is a need to target treatment to patients with parasitological confirmed malaria. This is to improve the quality of care, reduce over consumption of anti-malarial drugs which in turn delay development and spread of drug resistance (FMOH/NMEP, 2006). The Nigerian National Guidelines for Diagnosis and Treatment of Malaria in line with WHO recommendations on universal diagnostic testing for malaria recommended confirmation of the diagnosis of malaria in all suspected cases before administration of treatment. This new recommendation emphasizes the importance of high-quality microscopy or, where not feasible or available, quality-assured rapid diagnostic tests (RDTs). (WHO, 2010).

The use of parasite-based diagnosis afford an opportunity for other causes of fever to be identified and appropriately treated. The availability of RDTs offers a good opportunity to extend parasitological confirmation of malaria infection to peripheral areas where quality

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microscopy cannot be guaranteed (WHO, 2011). However, in spite of free distribution of RDTs and ACTs to public health facilities as well as several malaria case management trainings conducted for healthcare providers in Lagos State, the diagnosis of malaria is still largely based on presumptive treatment in some primary healthcare centres and secondary health facilities. One of the challenges of RDTs use is building trust among healthcare providers in the test results, efficacy and effectiveness of parasite based diagnostic tests. This was why this study was carried out to assess and identify the factors influencing the utilization of rapid diagnostic tests among health workers in the diagnosis of malaria in Alimosho Local Government Area (LGA). Alimosho is the most populated LGA in the country.

However, it was also not known how readily available these RDTs are in both public and private health facilities and if health workers are actually using them. This study therefore seeks to document and investigate the gaps in knowledge with respect to methods of diagnosis of malaria, availability and utilization of RDTs by health workers in these facilities in Alimosho LGA, Lagos. This study will also contribute to the evidence of availability and utilization of RDTs in Nigeria and Sub-Saharan Africa. It is expected that the findings from this study would identify some evidences and understanding needed to guide deployment, policy formation on use of RDTs, pragmatic malaria diagnosis and treatment policy change in the state as well as the country and thereby contributing further to reduction in malaria morbidity and mortality in the state and country at large.

1.4 Research Questions

1. What is the level of awareness of Rapid Diagnostics test in the national guidelines for the management of Malaria among health workers in Alimosho LGA, Lagos.

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2. What is the level of availability of RDTs at primary health care centres in Lagos.

3. What is the level of utilization of RDTs among health workers in Alimosho LGA, Lagos.

4. What are the factors affecting level of awareness for the use of RDTS at the among health workers in Alimosho LGA.

1.5   Aim and Objectives

1.5.1   General Objectives:

To identify the factors influencing the utilization of Rapid Diagnostic Tests among health workers in the diagnosis of malaria among health facilities in Alimosho LGA, Lagos.

1.5.2   Specific objectives:

1. To assess the healthcare providers' level of awareness on Rapid Diagnostics Test in health facilities in Alimosho LGA.

2. To determine the availability of RDTs in health facilities in Alimosho LGA, Lagos.

3. To assess the level of utilization of RDTs in health facilities in Alimosho LGA. Lagos.

4. To identify the factors influencing the utilization of RDTs by healthcare providers in Alimosho LGA.

CHAPTER TWO

LITERATURE REVIEW

2.1   Malaria Epidemiology

Malaria is a life-threatening disease caused by protozoan parasite that is transmitted to humans through the bites of infected female Anopheles mosquitoes. Malaria in humans is caused by 5 *Plasmodium parasites: Plasmodium falciparum, P. vivax, P. malariae, P. ovale and P. knowlesi. P. falciparum* is the most prevalent malaria parasite on the African continent. It is responsible for most malaria-related deaths globally. *P vivax* is the dominant malaria parasite in most countries outside of Sub-Saharan Africa (WHO, 2015). About 3.2 billion people, almost half of the world's population is at risk of malaria (WHO, 2015). Malaria is an acute febrile illness. In a non-immune individual, symptoms appear 7 days or more (usually 10–15 days) after the infective mosquito bite. The first symptoms are fever, headache, chills and vomiting: may be mild and difficult to recognize as malaria, if not treated within 24 hours. Children with severe malaria frequently develop one or more of the following complications: severe anaemia, respiratory distress in relation to metabolic acidosis, or cerebral malaria. In adults, multi-organ involvement is also frequent. In malaria endemic areas, people may develop partial immunity, allowing asymptomatic infections to occur (WHO, 2015)

Nigeria has a suitable climate for malaria transmission throughout the country and over 97% of the populations are at risk (FMOH, 2004), the only exception is the area south of Jos in Plateau State. There are five ecological strata from south to north of Nigeria which defines vector species dominance, seasonality and intensity of malaria transmission: mangrove swamps, rain forest, guinea, Sudan and Sahel-savannah. Accordingly, the duration of the transmission season

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decreases from south to north from perennial in most of the south to only 3 months or less in the border region with Chad (FMOH/NMCP,2008). The dominant species of malaria parasites is *Plasmodium falciparum* which account for over 95% of cases with *P. ovale* and *P. malariae* playing a minor role with the *P malariae* being quite common as a double infection in children (FMOH/NMCP, 2006). Despite so many gains in malaria prevention and treatment, the widespread prevalence of counterfeit, substandard medicines and improper diagnosis leading to resistance of antimalarial drugs. These substantially contributed to the alarmingly high number of malaria deaths and costs of health care in Nigeria. An estimated 100 million malaria cases and 300,000 malaria deaths occurred in each year in Nigeria making the country with the highest number of malaria casualties worldwide (FMOH/NMCP, 2006).

According to the Nigerian National Malaria Strategic Plan 2014-2020, malaria is responsible for 60 percent of outpatient visits to health facilities, 30 percent of childhood deaths, 25 percent of deaths in children under one year, and 11 percent of maternal deaths. The economic impact includes costs of health care, working days lost due to sickness, day lost in education, decreased productivity due to brain damage from cerebral malaria, loss of investment, tourism and diversion of household resources (Greenwood et al., 2005). In Nigeria, the economic impact of malaria can be attributed to low gross national income per capital (GNI) of US$260 (FMOH, 2005).

2.2 Diagnosis of Malaria

Early and accurate diagnosis is one of the cornerstone for effective malaria case management. There are many diagnostic methods currently and commonly in use in Nigeria. They are presumptive diagnosis, microscopic diagnosis and the use of rapid diagnostic tests. Most of them have their merits and demerits. For instance, the microscopic diagnosis of malaria is time-

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consuming, labor-intensive and costly (Bell et al., 2006) (Hamer et al., 2006]. There is also a lack of reliable microscopy in the majority of primary healthcare centres and some secondary health facilities. On the other hand, clinical diagnosis based on malaria symptoms has proven to be unspecific, irrational use of antimalarial and subsequently leading to resistance of these antimalarial drugs [Kallender et al., 2004]. However, these shortcomings of microscopy and clinical diagnosis have favoured the use and deployment of RDTs, which allows diagnosis even in health settings where laboratory facility is lacking. RDTs have been found to be cost-effective both in Nigeria and elsewhere [Uzochukwu et al., 2009).

In addition, WHO recommended prompt parasitological confirmation by microscopy or with a rapid diagnostic test (RDT) was recommended for all patients with suspected malaria before treatment is started and confirmed cases of uncomplicated *Plasmodium falciparum* malaria should be treated with artemisinin-based combination therapy (ACT)(WHO, 2009). The results of parasitological confirmation can be available in 30 minutes or less. Treatment, solely on the basis of symptoms should only be considered when a parasitological diagnosis is not possible Prompt and accurate diagnosis as well as treatment of malaria reduce disease and prevent deaths. It also contributes to reducing malaria transmission (WHO, 2010).

2.3   Level of awareness of Malaria RDTs among health workers
The Federal Ministry of Health through National Malaria Elimination Programme and Donor agencies/ partners had formulated a new malaria treatment policy. Despite these concerted efforts by the FMOH, there is dearth of knowledge on the level of awareness of healthcare providers in the country on the new diagnostic and treatment policies especially for children and extent at which these healthcare providers implement the changes and adherence to these policies (FMOH, 2005).

2.4 Factor affecting the availability of RDTs for diagnosis

Despite the phased roll out of RDTs in public and some selected private health facilities in the country by National Malaria Elimination Programme and donor agencies. Malaria case management in Nigeria is still weak, weak supply chain system and poor delivery of services at the public health facility level. The MIS 2010 revealed that of those children who received malaria treatment, only 5% of children under- five with fever had their blood tested for malaria. In Nigeria, a recent study on availability and use of rapid diagnostic tests and artemisinin-based combination therapy in public and private health facilities revealed that limitation to the use of RDTs were unreliability of RDTs test results, supply issues, costs, preference for other methods of diagnosis and providers' ignorance (Uzochukwu, 2010)

Studies have reported cross reactivity of the various RDTs with autoantibodies such as rheumatoid factor, resulting in false positive tests for malaria. Studies in patients with positive rheumatoid factor have shown that the false positive reactions are higher with the PfHRP2 tests using IgG capture antibody (16.5% to 83%) compared to the PfHRP2 tests using IgM antibodies (6.6%) and the pLDH test (3.3%) (Kakkilaya, 2003)

The sensitivity of the RDTs at low levels of parasitemia and for non-immune populations remains a problem. Further, the RDTs have been reported to give false negative results even at higher levels of parasitemia. Therefore, in cases of suspected severe malaria or complex health emergencies, a positive result may be confirmatory but a negative result may not rule out malaria. Further, a negative RDT result should always be confirmed by microscopy (Kakkilaya, 2003). The NMCP and donor partners are working with the states to improve the delivery of malaria case management by implementing new guidelines. These guidelines include: rolling out malaria RDTs with a sustainable supply chain framework to both public and private health

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facilities, improving supportive supervision, State and LGA level trainings for laboratory and health personnel on the appropriate use of RDTs and microscopy. FMOH/NMEP through donor partners will also be providing technical guidance to develop and implement a comprehensive quality assurance/quality control program. The technical guidance was to improve forecasting, management, distribution, capacity building and strengthening pharmaceutical and commodity management systems at the state, LGA as well as the facility level (PMI, Malaria OR, 2014)

2.5   Level of utilization of RDTs

Prompt and accurate diagnosis is very crucial for effective management of malaria cases in order to reduce morbidity and mortality caused by poor management of patients particularly among under-fives and pregnant women. Malaria diagnosis for long had depended solely on presumptive (clinical) diagnosis, which has low specificity leading to over-diagnosis and over-treatment (Reyburn et al, 2010). Thus, reliable diagnostic services for malaria are critical in order to reduce wastage of expensive drugs, e.g. artemisinin combination therapy (ACT), and reduce drug resistance. Evidence from O'Meara (2010) revealed the declining burden of malaria in some endemic countries increases the risks of over-diagnosis and over-treatment even further.

Malaria rapid diagnostic tests (RDTs) assist in the diagnosis of malaria by detecting evidence of malaria parasites (antigens) in human blood. It is a device that detects malaria antigen in a small amount of blood, usually 5–15 μL, by immunochromatographic assay with monoclonal antibodies directed against the target parasite antigen and impregnated on a test strip. The result, usually a colored test line, is obtained in 5–20 min. RDTs require little capital investment or electricity, simple to perform, easy to interpret, require limited training, and allow for the diagnosis of malaria at the community level (Chansuda et al., 2007). RDTs permit a reliable detection of malaria infections particularly in remote areas with limited access to good quality

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microscopy services (WHO, 2016). WHO recommends prompt parasite-based diagnosis in all patients suspected of malaria before treatment is administered. Malaria rapid diagnostic tests (RDTs) have the potential to greatly improve the quality of management of malaria infections.

In Nigeria, The Federal Ministry of Health, through the NMEP scaled-up malaria diagnosis by introducing RDTs to reduce inappropriate dispensing of ACT and improve case management and which was introduced in the country in early 2007 (FMOH/NMCP,2006). However, RDTs have, as also confirmed in the present study some technical and operational challenges including their accuracy and implementation. When compared to microscopy as a gold standard, the accuracy of RDTs which is commonly measured by their sensitivity and specificity due to false negative and positive results (FMOH/NMCP, 2006).

2.6   Factor affecting the level of utilization of RDTs

Diagnostic testing usually represents the starting point in a clinical intervention, and the use of diagnostic tests presumes that appropriate patient management based on testing will follow. In many settings where RDTs have been introduced, the true rate of parasitemia has been found to be considerably lower than expected. Therefore, to avoid wastage, quantification of antimalarial should be based on the expected proportion of laboratory-confirmed cases and expected compliance to negative test results (USAID, 2011). A study in Tanzania (Deus et al., 2011) revealed that RDTs had low sensitivity and specificity, which varied widely depending on fever and parasite density, using RDTs reduced over-treatment with anti-malarial significantly. In Nigeria, a study on availability and use of rapid diagnostic tests in public and private health facilities revealed that the limitation to the use of RDTs were unreliability of RDTs, supply issues, costs, preference for other methods of diagnosis and providers' ignorance (Uzochukwu, 2010). In order to reinforce the belief of healthcare providers on the reliability of the test result of

RDTs, health authorities should ensure the continuous deployment and scale-up of RDTS. Health authorities must also take into consideration the fact that communities and health workers have been taught that "fever equals malaria", sometimes "even when proven otherwise" and to demonstrate that not all fever is caused by malaria parasites.

Health authorities should ensure that quality control measures are maintained. There are accurate data available through the National HMIS to drive evidence-based quantification of ACTs and RDTs. In addition, monitoring and supervision, health education, training of healthcare providers on the use of RDTs and development of appropriate management algorithm for parasite negative cases (USAID, 2011)

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CHAPTER THREE
METHODOLOGY

3.1   Study Area

This study was conducted in Alimosho Local Government Area, Lagos Nigeria. Alimosho is a Local Government Area in the Ikeja Division, Lagos State, Nigeria. It is the most populous LGA in the country with estimated population of 2,047,026 inhabitants (Male - 1,099,656 Female - 947,370). (LSMOH, 2006). Lagos state including Alimosho LGA lies in the tropical rainforest zone with large water bodies, malaria transmission occurs all year-round. Due to its dense population and perirural setting, Alimosho LGA is classified as high malaria risk area. Alimosho LGA has Five (5) Local Council Development Areas and 36 wards namely: Mosan – Okunola, Agbado Oke-odo, Egbe –Idimu, Igando-Ikotun and Ayobo-Ipaja Local Council Development Area (LCDA) (LSMOH, 2006)

Alimosho LGA has 343 health facilities which is the highest number of both public and private health facilities in the State (Public- 25 and Private -319) though, some unregistered with the state (HEFAMAA/LSMOH, 2011).The public health facilities offering primary level of care are managed by the Medical Officer of Health who coordinates the health activities of these facilities. There are other healthcare providers in the facilities including nurses, community health officers (CHOs), pharmacy technicians and community health extension workers (CHEWs). The private health facilities are managed by medical doctors and midwives. The public and private health facilities providing secondary level of care are owned by the state government and individuals respectively (LSMOH, 2011)

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3.2   Study design

A cross-sectional study involving health facilities providing primary care in Alimosho LGA, Lagos was employed.

3.3   Study population

The study population included all the health care providers in Alimosho LGA. The public health care providers were health workers who operated within the governmental health service such as Medical officer of health, medical officers, midwives, community health nurses; CHEWs.while private health care providers included the medical officers, midwives, auxiliary nurses.

3.3.1   Eligibility criteria

3.3.2   Inclusion criteria

1. Only health care workers from health facilities offering primary health care service in Alimosho LGA were involved.

2. The health workers included medical doctors, nurses, community health officers (CHOs), Pharmacist technicians, environmental health officers and community health extension workers from health facilities who manage malaria disease in the LGA.

3.4   Sample size determination

Using the sample size formula for cross-sectional study design:

$$N = \frac{(Z_u)^2\, pq}{d^2}$$

$$n = \frac{(1.96)^2 \times 0.31 \times 0.69}{0.05^2} = \frac{3.8416 \times 0.31 \times 0.69}{0.0025}$$

$$= \frac{0.8217}{0.0025}$$

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= 329

Where

n = calculated sample size

$Z\alpha$ = Standard normal deviate at 1.96

p = Documented prevalence on utilization of RDTs by health workers (literature search) = 31%

(Uzochukwu et al., 2010).

q = 1- 0.31(p) = 0.69

d = level of precision set at 0.05 (95% confidence interval)

Putting into consideration a non-response rate of 20%, (N * 1/1-nr)

= 329 * 1/1-0.2

= 411

3.5   Sampling technique
A Multistage sampling technique was adopted. A total of 210 participants were sampled from each public and private health facilities respectively.

Stage 1: Selection of Ward: - From the 36 wards in Alimosho LGA, 21 wards were selected by balloting (simple random sampling technique).

Stage 2: Selection of health facilities:- From each of the 21 selected wards, one (1) public health facilities and three private health facilities were randomly selected by balloting.

Stage 3: Selection of health workers:- From each health facility, ten health workers were from the list of all health workers by balloting.

3.6 Data collection methods

3.6.1 Study instrument

Structured and pre-tested interviewer-administered questionnaire was used during the study (Please see appendix 1). The questionnaire contained four sections on socio- demographic data, knowledge and training of healthcare providers in diagnosis and treatment of malaria, availability and utilization of RDTs and perception of healthcare providers on the usefulness of RDTs. The questionnaires and informed consent forms were translated into Yoruba, the language of the study area.

3.6.2 Training of Research Assistants

A team of four research assistants were recruited and trained on the study protocol and the administration of study tools. The research assistants were health volunteers from the Alimosho Local Government Area. The research assistants had two days training on the administration of the questionnaire at the LGA secretariat, Lagos.

3.6.3 Pretesting of research instrument

The questionnaire was pretested to twenty healthcare providers in Ogba Primary Healthcare Centre in Ifako ijaiye LGA which is not part of the study area. The interviewers were trained on procedures for conducting the survey, revision of the questionnaires to reduce errors and bias. Questionnaires were checked daily for error and inconsistencies.

3.7 Data management and analysis

3.7.1 Study variables

The dependent variable: Utilization of RDTs.

Independent variables: Age, Sex, Years of practice, Education level, aware and access of healthcare providers on National guideline on RDTs, Perception of healthcare providers on the usefulness of RDTs.

3.7.2 Data Analysis

Data was entered, cleaned, and analyzed using Epi Info 7. Univariate analysis was done to generate frequencies of key variables. Summary statistic was presented using tables and means. Bivariate analysis was done to determine the association between the dependent variable and the independent variables. Logistic regression was done to identify factors affecting the utilization of RDTs. All analyses were done at 95% significance with the level of significant set at 5%.

3.8 Ethical considerations

Ethical approval was processed from the Institution Review Board of Lagos State University Teaching Hospital (LASUTH) (Appendix 3). Informed consent was gotten from respondents before the commencement of administration of structured interviewer-administered questionnaires (Appendix 2). Permission sought from the Alimosho LGA authorities before commencement of the study (Appendix 4 and 5)

Right to decline/withdraw from Study: The respondent were informed that the participation was voluntary and could opt out or not participate in the study any time to choose to do so.

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Confidentiality of data: The information obtained from participants was treated with strict confidentiality throughout the study. Codes were used to identify participants and completed questionnaires were in complete concealment. Data was kept in a password protected computer by the investigator.

3.9   Study Limitation

One of the limitations of this study was that the respondents could have reported favourably on the use of RDTs because they have been familiar with its use Secondly, some of the public health facilities had fewer numbers of healthcare providers as against what was expected. To resolve this, more healthcare providers were enrolled from the private health facilities.

CHAPTER FOUR

RESULTS

4.1. Socio-demographic characteristics

The demographic characteristics of the respondents are summarized in Tables 4.1.1. Four hundred and twenty respondents participated in the survey, 159 health workers from the 21 public health facilities and 261 health workers from the 68 private health facilities. In all, 89 Health facilities in Alimosho Local Government Area were visited during the study.

Majority of the health workers interviewed were female (83.3%). The mean age of respondents that participated in the study was 35.9 year (S.D ± 8.76). Most respondents were between 30-39years accounting for 51% of the age group. One hundred and thirty two health workers that are interviewed are Nurses and Midwives which account for 54.5% of all the health workers in the study. The distribution of cadre of health workers is presented in the Table 4.1.1. However, two hundred and fifty five health workers interviewed has had received Post- secondary education accounting for 60.7% as shown in the table 4.1.1 Furthermore, Out of the health workers (n=405) who participated in the study, One hundred and fifty one (151) has practiced medicine for 0-4years accounting for 37.3%.

Table 4.1.1: Socio- demographic characteristic of the respondents

Variable	Frequency	Percent (%)	N =420
Sex			
Male	70	16.7	
Female	350	83.3	
Age group (yrs.)			
<20	1	0.2	
20-29	98	23.3	
30-39	214	51	
40-49	65	15.5	
50-59	40	9.5	
≥60	2	0.4	
Cadre			
Medical doctor/ Nurse Midwives	154	39.5	
Community health workers*	97	23.1	
Lab Scientist/Technician/pharm tech	61	14.4	
Auxiliary nurse	97	23.1	
Others**	23	5.8	
Level of Education			
Primary	3	0.7	
Secondary	98	23.3	
Post-secondary***	255	60.7	
Tertiary	64	15.2	
Clinical Practice (yrs.) (n=405)			
0-4	151	37.3	
5-9	132	32.6	
10-14	55	13.6	
15-19	18	4.4	
20-24	19	4.7	
25-29	15	3.7	
≥ 30	15	2.7	

*CHEW/CHO/EHO   ** Volunteer health workers ***School of Nursing and health technology

4.2   Respondents who received in- service training on malaria case management and supervision by healthcare providers from the Federal, State and Implementing Partners.

One hundred and Thirty one (31.2%) of health workers (N=420) interviewed admitting to have received some form of In -service training on diagnosis and treatment of malaria. However, Fifty –eight health workers (44.4%) out of the 131 that admitted to have received in service training had it less than 12months preceding the time of study. Fifty nine health workers interviewed (45%). Out of the 131 that admitted having received training acknowledged that it was provided by Government. This is presented in the table 4.2.1. One hundred and six (25.5%) health workers interviewed admitted to have received some form of monitoring and supervision visits from officers of federal, state and partners from the last 6months preceding the time of study. However, out of this 106 that admitted to had received supervisory visits, 62(58.5%) were from public health facility and 44(41.5%) from private health facility.

Table 4.2.1: Respondents who had received in-service training on malaria case management

Variables	Frequency	Percent (%)
Received in –service training (N=420)		
Yes	131	31.2
No	289	68.8
Most recent training(months) (N=131)		
<12	58	44.4
12-23	33	24.8
>24	40	30.8
Sponsor of the training (N=131)		
Donor Agencies	7	5.3
Government	59	45
Health facility	11	8.4
Non-governmental organization	53	40.5
Non responses	1	0.8
Supervision visit (N=415)		
Yes	106	25.5
No	309	76.5

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4.3 Awareness and Access to the national guidelines on RDTs for the diagnosis and treatment of malaria.

Two hundred and three (48.2%) health workers interviewed were aware of the national guidelines on RDTs for the diagnosis and treatment of malaria while two hundred and seventeen were not as shown in the table 4.3.1. Out of the 202 respondents interviewed, one hundred and eleven (55%) health workers agree to had have access to the national guidelines on RDTs while ninety one (45%) health workers did not as shown in table 4.3.1 below.

Furthermore, 218(55.7%) of health workers interviewed affirmed that there were no special arrangement in the preservation of RDTs at the health facility. This was presented in table 4.3.1.2. 215(51.8%) of health workers agreed that temperature need to be considered when storing RDTs as shown in table 4.3.1.2

Table 4.3.1: Awareness and Access to the national guidelines on RDTs for the diagnosis and treatment of malaria

Variables	Frequency	Percent (%)
Aware to National guidelines (N=420)		
Yes	203	48.2
No	217	51.8
Access to National guidelines (N=203)		
Yes	111	55
No	91	45

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Table 4.3.1.2: Respondents awareness of preservation and storage of RDTs at the health facility.

Variables	Frequency	Percent (%)
Awareness of preservation of RDTs (n=391)		
Cold boxes	12	3.1
Moisture proof envelopes	62	15.9
No special arrangement	218	55.8
Don't Know	79	20.2
Non responses	20	5.1
Storage of RDTs (n=415)		
Clean environment	70	16.9
Temperature	215	51.8
Humidity	22	5.3
Moisture	22	5.3
Don't know	82	19.8
Non responses	4	0.9

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4.4 Availability and utilization of RDTs at health facility for the diagnosis of malaria

As shown in the table 4.4.1, 321 (77.7%) of health workers interviewed said the RDTs were available in their facilities. 269/413 (65.1%) respondents had used RDTs in one time or the other in their facilities while 316/413(78.8%) respondents were currently using RDTs in their facilities. The main reasons for not using of RDTs were 29/101 (28.7%) due to cost of RDTs, 27/101 (26.7%) of them prefer other methods and 20/101 (19.8%) of them due to unreliability of RDTs test results. This was presented in table 4.4.2.

Table 4.4.1: Availability and utilization of RDTs at health facility

Variables	Frequency (N=413)	Percent (%)
Availability of RDTs at HF		
Yes	321	77,7
No	92	22.3
Ever used RDTs at HF		
Yes	269	65.1
No	144	36.9
Currently using RDTs in HF		
	314	78.8
Yes		
No	99	24.2

Table 4.4.1: Availability and utilization of RDTs at health facility

Variables	Frequency (N=413)	Percent (%)
Availability of RDTs at HF		
Yes	321	77,7
No	92	22.3
Ever used RDTs at HF		
Yes	269	65.1
No	144	36.9
Currently using RDTs in HF		
	314	78.8
Yes		
No	99	24.2

Table 4.4.1: Availability and utilization of RDTs at health facility

Variables	Frequency (N=413)	Percent (%)
Availability of RDTs at HF		
Yes	321	77.7
No	92	22.3
Ever used RDTs at HF		
Yes	269	65.1
No	144	36.9
Currently using RDTs in HF		
Yes	314	78.8
No	99	24.2

Table 4.4.2: Respondents' reasons for not using RDTs

Variables	Frequency (N-101)	Percent (%)
Cost of RDTs	29	28.7
Not reliable	20	19.8
Prefers other methods	27	26.7
Supply issue/not available	12	11.9
Technical issue	4	4
Non responses	9	8.9

4.5 Respondents' perception of usefulness of RDTs against other diagnostic methods

From the table 4.5.1, Out of 420 respondents who had used RDTs in the past said they preferred RDTs to other methods because it saves time 181/420 (43.1%), 94/420 (23.1%) of them prefer RDTs because it performs similar to other methods. 81/420(19.2%) of them said, it performed poorly when compared to other methods. More than 66% of the respondents rated accuracy of RDTs to be good, very good or excellent. So also, more than 95% of the respondents rated the ease of use of RDTs to be good, very good and excellent.

Furthermore, from table 4.5.2: Supply issue, unreliability of RDTs test results, cost and preference of other methods with 146/420 (34.7%), 145/420 (34.5%), 54/420 (12.8%) and 37/420 (8.8%) respectively were most important limitations to the use of RDTs at the health facilities. A majority of them 200/420 (47.6 %%) were satisfied with the benefits of RDTs while a few 140/420 (33.3%) were not satisfied and 80/420 (19.1%) were indifferent.

4.5 Respondents' perception of usefulness of RDTs against other diagnostic methods

From the table 4.5.1, Out of 420 respondents who had used RDTs in the past said they preferred RDTs to other methods because it saves time 181/420 (43.1%). 94/420 (23.1%) of them prefer RDTs because it performs similar to other methods, 81/420(19.2%) of them said, it performs poorly when compared to other methods. More than 86% of the respondents rated accuracy of RDTs to be good, very good or excellent. So also, more than 95% of the respondents rated the ease of use of RDTs to be good, very good and excellent.

Furthermore, from table 4.5.2: Supply issue, unreliability of RDTs test results, cost and preference of other methods with 146/420 (34.7%), 145/ 420(34.5%), 54/420 (12.8%) and 37/420 (8.8%) respectively were most important limitation to the use of RDTs at the health facilities. A majority of them 200/420 (47.6 %%) were satisfied with the benefits of RDTs while a few 140/420 (33.3%) were not satisfied and 80/420 (19.1%) were indifferent.

Table 4.5.1: Respondents' perception of usefulness of RDTs against other diagnostic methods

Variables	Frequency	Percent (%)
RDTs performs poorly than others	81	19.3
RDTs performs similar to others	97	23.1
RDTs performs better than others	7	1.7
RDTs saves time	181	43.1
Not sure	51	12.1
Non responses	3	0.7
Accuracy rating of RDTs (n=418)		
Excellent	37	8.6
Very Good	219	52.4
good	111	26.6
poor	40	9.6
Very poor	11	2.6
Ease of use rating of RDTs (n=417)		
Excellent	212	50.8
Very Good	170	40.8
Good	24	5.8
Poor	4	0.9
Very poor	7	1.7

Table 4.5.2: Respondents' limitation and benefit of RDTs

Limitation to the use of RDTs

Variable	Frequency (N=420)	Percent (%)
Cost of RDTs	54	12.9
Supply related issues	145	34.5
Not reliable	146	34.8
Ignorance on the part of providers	8	1.9
Prefers other methods	37	8.8
Not trained on how to use it	8	1.9
Difficult to use	1	0.2
Needs special skills	7	1.7
Non responses	14	3.3
Benefit of RDTs		
Satisfied	200	47.6
Not Satisfied	140	33.3
Indifferent	80	19.1

4.6 Bivariate analysis

Table 4.6.1 shows the association between utilization of RDTs by healthcare providers, respondents' socio- demographic characteristic and some selected variables. Respondents who were aware of the national guidelines on RDTs 137(68.5%) significantly ($P<0.01$) were more likely to utilize RDTs than those who do not 178(82.4%). Respondents who had access to national guidelines on RDTs 90(82.6%), ($P<0.01$) were 2.96 more likely to utilize RDTs at their health facilities than those who do not have access 56 (61.5%). In addition, respondents who had RDTs readily available in their health facilities 304 (95.6%) ($P<0.01$) were 20 times more likely to utilize RDTs in their facilities than those who do not 6 (6.5%).

Furthermore, respondents who were paid supervisory visits by federal, state and partners 90 (85.7%) ($P<0.01$) were 2.22 times more likely to utilize RDTs than those who did not receive any visits 224(73%). Respondent from private health facilities 167 (64.2%) though, significantly ($P<0.01$) were less likely to utilize RDTs than those from the public health facilities 149 (94.9%).

Table 4.6.1: Association between utilization of RDTs and some selected variables.

Variables	Utilization of RDTs Yes N (%)	No N (%)	Total	POR	CI	P value
Sex						
Female	266(76.2)	83(23.8)	349	1.15	0.64-2.09	0.64
Male	50(73.5)	18(26.5)	68			
Age group (yrs.)						
<30	69(69.6)	20(39.1)	99	0.90	0.75-1.67	0.74
≥30	250(77.8)	71(22.2)	321			
Health Facility Type						
Private	167 (64.2)	93 (35.8)	260	0.10	0.05-0.21	<0.01*
Public (ref)	149 (94.9)	8 (5.1)	157	1.00		
Educational level						
Primary	1 (33.3)	2 (66.7)	3	0.16	0.16- 1.75	0.15
Post- primary(ref)	315 (76.1)	99 (23.9)	414	1.00		
Cadre						
Doctors	23 (67.7)	11 (32.4)	34	0.65	0.30- 1.35	0.26
Other cadre (ref)	267 (76.3)	83 (23.7)	350	1.00		
Years of Practice (yrs.)						
0 -4	75 (77.3)	22(22.7)	97	1.08	0.62- 1.89	0.89
≥5 (ref)	180 (76)	57(24.1)	237			
Awareness of Nat guide.						
Yes	137 (68.5)	63 (31.5)	200	0.46	0.29-0.76	<0.01*
No (ref)	178(82.4)	38 (17.6)	216			
Received in -service training						
Yes	100 (77.5)	29(22.5)	129	1.15	0.70-1.88	0.56
No (ref)	216 (75)	72(25)	288	1.00		
Most recent training (mnths)						
<12	43 (75.4)	14(24.6)	57	0.81	0.35-1.85	0.62
≥12 (ref)	57 (79.2)	15(20.8)	72	1.00		
Supervision by Fed, State & IP						
Yes	90 (85.7)	15 (14.3)	105	2.22	1.22- 4.06	<0.01*
No (ref)	224 (73)	83 (27.1)	307	1.00		
Access to Nat. guidelines						
Yes	90 (82.6)	19 (17.4)	109	2.96	1.55- 5.67	<0.01*
No (ref)	56 (61.5)	35 (38.5)	91	1.00		
Availability of RDTs						
Yes	304 (95.6)	14 (4.4)	318	20.25	35.25-	<0.01*
No (ref)	6 (6.5)	86 (93.5)	92	1.00	90.35	

* Statistically significant

4.7 Multivariate analysis

Table 4.7.1 shows a regression model of factor influencing utilization of RDTs by healthcare providers. Health facility type, supervision of healthcare providers and availability of RDTs were found to be significant predictors of utilization of RDTs. Respondents from private health facilities were ten times less likely to utilize RDTs than those from the public health facilities. Though, statistically significant (OR= 0.10, 95%CI= 0.05-0.21, P<0.01) However, it remained statistically significant after adjusting with other variables (aOR=6.53, 95%CI=1.18-36.21, P=0.03).

Respondents who were paid supervisory visits by federal, state and Implementing Partners were 2.22 times more likely to utilize RDTs than those not supervised (OR=2.22, 95%CI= 1.22-4.06, P<0.01) however, it remained statistically significant after adjusting for other variables (aOR= 10.52, 95%CI=1.77-62.48, P=0.01). Respondents who had RDTs readily available in their health facilities were 20 times more likely to utilize RDTs than those who did not have it readily available (OR= 20.25, 95%CI= 35.25-90.35, P<0.01) and it still remained statistically significant after adjusting for other variables (aOR=18.90, 95%CI=23.97-80.25, P<0.01)

Table 4.7.1: Predictors of utilization of RDTs among respondents.

Variables	Unadjusted OR	95%CI	P value	aOR	95% CI	P value
Health facility type						
Private	0.10	0.05-0.21	<0.01	6.53	1.18-36.24	0.03
Public (ref)						
Aware of National guidelines						
Yes	0.46	0.29-0.76	<0.01	0.00	0.27-3.20	0.93
No (ref)						
Access to national guidelines						
Yes	2.96	1.55-5.67	<0.01	0.94	0.00-0.00	0.97
No(ref)						
Supervision visit to Healthcare providers						
Yes	2.22	1.22-4.06	<0.01	10.52	1.77-62.48	0.01
No (ref)						
Availability of RDTs						
Yes	20.25	35.25-90.35	<0.01	18.90	23.97-80.25	<0.01
No (ref)						

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1   Discussion

This study discussed the factors affecting the utilization of RDTs among healthcare providers in Alimosho LGA, Lagos.

5.1.1   Awareness of national guidelines on RDTs by health workers

More than half of the health workers interviewed in the public health facility were more aware and have access to the national guidelines on malaria which is slightly lower in Private compared with the finding from a study which reported 15.5% among health workers in Tanzania (Minzi o., 2008). Within the professional cadre, Doctors and CHEWs/CHOs were more likely aware understandably because they use it in the treatment of their patients and surprisingly, the Laboratory technicians were less aware. This calls for the deployment of means of creating awareness of the national guidelines about RDTs among health workers. If people do not know about guidelines, they might likely not adhere to it.

More than one quarter of the respondents adjudged that they had a form of in serving training on diagnosis and treatment of malaria and half (45%) of the training sessions were provided by government which was slightly higher (48%) in a study reported in Uganda (Daniel et al.,2008). Just one quarter of the health workers interviewed received some form of supervision from higher authorities (Federal, State and Partners) and mostly done in public health facilities which could be deemed unsatisfactory despite the funds expended on monitoring and supervision framework. Efforts should be geared towards implementing the National Malaria Elimination Programme supportive supervision framework in both private and public health facilities.

5.1.2 Availability and utilization of RDTs by health workers

From the findings of this study, RDTs were largely available (95.4%) in the public health facilities when compared to the (67.4%) of private health facilities. This finding , could indeed complement a policy shift of the Federal Ministry of Health through the National Malaria Elimination programme (NMEP) scaling-up ongoing RDTs implementation to the private sector since (about 60%) of the citizenry patronize the private health facilities in the country (FMoH/NMEP,2006). In the study area (Alimosho, Lagos), private health facilities accounts for over 75% of healthcare delivery infrastructure (LSMoH, 2011) At this juncture, it is important to note that RDTs are supplied free of charge by government and other implementing partners to all public primary health facilities and to some selected private health facilities which obviously, may have accounted for the large presence of RDT in public facilities.

Despite the fact that the government supply public health facilities RDTs free of charge, the main source of RDTs for most health facilities was amazingly through the Pharmacies (60.7%)(open market) probably through the cheer numbers of the private health facilities (n=210) in the study area (LSMoH, 2011) Since most RDTs available in private health facilities were purchased in the open market, this could lead to ineffective, expired, less sensitive and specific RDTs and other quality control issues. Another important finding worthy to mention is that most health workers interviewed said RDTs could be affected by temperature and unclean environment which is also similar to the findings in a study reported in Southeast, Nigeria (Uzochukwu., 2010). This finding is of utmost importance because it showed that health workers could minimize the effect of false positive and negative results, maintain the quality of RDTs and other quality control issues.

So also, one of salient findings from this study is the limitation to the use of RDTs as noted by the respondents which were unreliability of RDTs, supply issues, cost and prefers other methods. This is similar to findings reported in a study conducted in Nigeria on the availability and utilization of RDTs in both public and private health facilities (Uzochukwu, 2010). The issue of cost and supply could exacerbated, or likely to favour the treatment of malaria cases without a parasitological confirmation by health workers as against the WHO guidelines on diagnosis and treatment of all suspected malaria cases (WHO, 2009). However, some health workers from the study gave the unreliability of RDTs as a reason for not utilizing available RDT. This implies that there is a level of suspicion about the RDT results despite the fact that in a recent study reported that RDTs have been found to have a sensitivity of 90.6% and a specificity of 95.9% in Nigeria (Nwachukwu et al., 2008). Also, in another study conducted in Zanzibar, It has been noted that health workers still treat for malaria even when RDT result is negative (Msellem et al., 2009).

5.1.3 Method of diagnosis

It is important to note that majority of the facilities in this study still uses presumptive diagnosis approach in the diagnosis of malaria. This finding could be described as not unusual as it is in tandem with previous findings reported in many endemic countries [Amexo et al., 2004). Diagnosis and treatment of malaria using presumptive approach means increased likelihood of needless prescription of antimalarial and unwanted drug resistance(Zacchaeus et al., 2007) , because many health workers have been taught that "fever equals malaria", sometimes "even when proven otherwise" (USAID, 2011).

However, the findings from this survey revealed that use of RDTs was higher than microscopy which is the main stay of laboratory diagnosis. The low use of microscopy at 58% when

compared to other methods   is in tandem with the findings of a previous study in Nigeria (Meremikwe et al., 2007).

5.1.4 Perception of RDTs by health workers

Majority of the health workers interviewed in this study preferred RDTs to blood film microscopy and presumptive diagnosis approach because it saves time. They also preferred RDTs because of ease of use. These are positive findings as seen in study reported in Tanzania and Uganda, as this will encourage the use of RDTs. Majority of health workers who were using RDTs tend to be satisfied with the results they get and few fraction were indifferent. At this juncture, it is expedient to say that most of the health workers did not have a special arrangement in preserving RDTs. This could be responsible for the poor/negative results making them fell this essential tool/utility (RDTs) are not reliable.

5.1.5 Supportive Supervision to health workers

Supportive supervision should be an integral part of the healthcare delivery system. Supportive supervision will ensure that on the job capacity building of health workers particularly on the use of RDTs is ensued at all levels. In studies conducted in Uganda and Zanzibar (Asiimwe et al., 2010) (Msellem et al., 2009) revealed that provision of supportive supervision and incentives to nurses and other health workers increased the high adherence to test results and use of RDTs and ACTs which was also in concordance with our findings in this study because supportive supervision was significant factor to the utilization of RDTs

5.2 Conclusion

The awareness, access and use of the national guidelines on RDTs for the diagnosis and treatment of malaria was fairly guided in most of the health facilities, The Availability and utilization of RDTs among health workers is comparatively high in public health facilities. This is not surprising, because government provided them free of charge with occasional out of stock syndrome; however, it is not readily available in the private health facilities.

Furthermore, among the facilities that once used RDT in the past, some have stopped using it mostly for the reason of perceived reliability, cost, supply issues and just simply prefers other methods. In this study, Presumptive diagnosis approach is still a common practice among health workers regardless of the sector they practice. Presumptive diagnosis encourages the irrational use of antimalarial drugs without parasitological confirmation of cases as against the WHO recommendations, leading to antimalarial / ACT drug resistance and further increasing and compounding the burden of the disease.

In addition, there is need for government at all levels to institute supportive supervision of health workers as integral part of healthcare delivery system especially in the use of RDTs at the health facilities. This is to ensure that healthcare providers are continuously informed on the cost of treating all patients regardless of the test results is huge, both for the patients and health system as a whole.

5.3   Recommendations

Based on the findings in this study, the followings are our recommendations:

5.3.1   To the Federal Government (Federal Ministry of Health) and Donors

1. The Federal Ministry of Health through National Malaria Elimination Programme, Donors, implementing partners and other stakeholders should urgently disseminate information about the existing national guidelines/policies on diagnosis and treatment of malaria as recommended by WHO. This should be done in conjunction with Nigeria Medical Association (NMA), Association of Private General Medical of Nigeria (APGMN), National Association of Nurse and Midwives e.t.c in the national guidelines on malaria planning and implementation process.

2. They should ensure the sensitization and enlightenment campaign of all health workers on the usefulness and proven advantages of RDT over other methods of diagnosing malaria especially at Primary Healthcare Centres and other peripheral health facility.

3. Government, donors and implementing partners should Government; donors should ensure the availability of RDTs and ACTs in both public and private facilities and should be provided free of charge or at a subsidized rate to health facilities to ensure continuous availability, sustained utilization of RDTs and rational use of ACTs in all health facilities.

5.3.2   To the State Ministry of health and Implementing Partners

1. The State Ministry of Health in collaboration with partners should ensure continuous capacity building of health workers on the use of RDTs through training and re-training, in –service trainings in both public and private health facilities as well as development of appropriate management algorithm for parasite negative cases

2. The State in collaboration with other implementing partners should establish monitoring and supervision framework for supportive supervision and provision of on the job trainings/mentorship of health workers in the delivery of his/her duties.

5.3.3 Local Government and implementing partners

1 The Local government authorities should provide a safe and clean environment for the preservation and storage of the RDTs and other malaria commodities to prevent damage to them and unnecessary false positive and negative results and other quality control issues.

2 Health workers trained above should be allowed to remain in their duty post for couple of years to minimize attrition rate as this is usually not uncommon at his level.

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APPENDIX 1

Questionnaire

Factors influencing the utilization of Rapid Diagnostic Tests among health workers in the diagnosis of malaria among health facilities in Alimosho LGA, Lagos.

Dear respondent,

My name is .... I am gathering information to identify Factors influencing the use of Rapid Diagnostic Tests by health workers in the diagnosis of Malaria among health facilities in Alimosho LGA, Lagos. We kindly request you to respond to the following questions truthfully and to the best of your knowledge. Be assured that all your responses will be treated with utmost confidentiality. Your participation in the study will be highly appreciated. The result of the study will be used to guide the development and dissemination of appropriate public health messages that will address knowledge gaps, correct misconceptions and improve practices that will help in the appropriate diagnosis of the disease. Please do not hesitate to ask, If you have any question. Thank you.

Do you consent to participate?

1. Yes ☐   2. No ☐

Signature...........................
Date.................................
Health facility name: ....

Health facility type: ☐ Private ☐ Public

Ward:..

Section A: Socio-demographic characteristics of respondents

Please write the number for the option chosen in the response box

1) Age at last birthday (years) ....
2) Sex: (1) Male   (2) Female
3) Occupation ....
4) Number of years of practice ....
5) Current job cadre

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APPENDIX 1

Questionnaire

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Dear respondent,

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Do you consent to participate?

1. Yes ☐   2. No ☐

Signature............................
Date.................................
Health facility name: ....

Health facility type: ☐ Private   ☐ Public

Ward:..

Section A: Socio-demographic characteristics of respondents

Please write the number for the option chosen in the response box

1) Age at last birthday (years) ....
2) Sex: (1) Male   (2) Female
3) Occupation ....
4) Number of years of practice ....
5) Current job cadre

49

(1) □ Consultant (2) □ Medical officer (3) □ Nurse/Midwife (4) □ CHEW (5) □ Laboratory scientist (6) □ Auxiliary Nurse (7) □ CHO (8) □ EHO (9) others, (specify) ....

6) Highest level of education completed
   (1) □ No formal education (2) □ Primary school (3) □ Secondary school
   (4) □ School of Health technology (5) □ School of Nursing

   (6) □ Tertiary education (7) □ others...........................

Section B: Knowledge and training of health care providers in diagnosis and treatment of malaria

7) Have you received in-service training in malaria case management? (1)□ Yes (2) □ No

If no to question 7, please skip to question 10

8) How long ago was the most recent training? (1)□ Less than 1year (2)□ 1-2years (3)□ 3years and above

9) Who provided the training?

   (1)□ Government (2)□ Donor agencies (3)□ NGOs

   (4)□ Health facilities management (5)□ Others (specify) ------------------------------ -----------

10) Are you aware of the National guidelines using Rapid diagnostic test (RDTs) kits for the diagnosis, treatment and prevention of malaria?

   (1)□ Yes (2)□ **No** **if NO, skip to Q 15**

11) If yes, do you have access to national guideline? (1) □ Yes (2) □ No

12) Do you use the national guidelines for the diagnosis, treatment and prevention of malaria?

   (1)□ Yes (2) □ No

13) Do you use Rapid diagnostic test Kit for children above 5 in your Hospital/clinic? (1) Yes (2) □ No (3) Don't know **if NO, skip to Q15.**

14) If yes, do you use it (1) always □ (2) sometimes □ (3) never? □

15) Have you had any supervisory visit by officers of the Federal, State ministry of health, Local Government or/ and Partners in the last 6 months?

   (1)□ Yes (2) □ No

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Section C: Availability and utilization of Malaria diagnostic equipment

16) What malaria diagnostic equipment is/are available in the health facility?

(1) MRDT (1)☐ Yes (2)☐ No

(2) Microscopy (functional) (1)☐ Yes (2)☐ No

(3) Both microscopy and mRDT (1)☐ Yes (2)☐ No if No to Q16(1), skip to Q18

17) What is the main source of the mRDT?

(1)   Government ☐   (2)   Bought from a pharmacy ☐

(3)   Donated by an NGO ☐   (4)   Not sure ☐   (5)   others (Specify)
....

18) What are the conditions that need to be considered for RDT storage? (Tick all that apply)

(1)   Temperature ☐   (2)   Humidity ☐   (3)   Moisture ☐

(4)   Clean environment ☐ (5) don't know   (6) others (Specify)
....

19) What is the main method of preservation of RDT kits in the health facility?

(1) No special arrangement ☐   (2) Cold boxes ☐   (3) Moisture-proof envelopes ☐

(4) Don't know   (5) others (Specify) ....

20) What malaria diagnostic methods ever used?

Presumptive diagnosis   (1)☐ Yes   (2) ☐ No

RDT   (1)☐ Yes   (2)☐ No

Microscopy   (1)☐ Yes   (2) ☐ No

21) What malaria diagnostic methods do you use currently in your health facility?

Presumptive diagnosis   (1)☐ Yes   (2)☐ No

RDT   (1)☐ Yes   (2)☐ No

Microscopy   (1) ☐ Yes   (2)☐ No

22) If no to RDT on Q 21, give reason(s) for non-usage of RDT (*Pls tick, what is mentioned, do not read the list)*

    (1) Supply issues / Not available   ☐

    (2) Not reliable   ☐

    (3) Prefer other methods   ☐

    (4) Cost of RDT   ☐

    (5) Technical issues   ☐

    Others (Specify)...

23) How effective do you perceive the different diagnostic methods for malaria?

Accuracy

(1) Presumptive diagnosis ☐strongly disagree ☐ Disagree ☐Somewhat ☐Agree ☐ Strongly agree

(2) RDT   ☐Strongly disagree ☐ Disagree ☐Somewhat ☐Agree ☐ Strongly agree

(3) Microscopy   ☐Strongly disagree ☐ Disagree ☐Somewhat ☐Agree ☐ Strongly agree

Ease of use

(1)presumptive diagnosis ☐Strongly disagree ☐ Disagree ☐Somewhat ☐Agree ☐ Strongly agree

(2) RDT   ☐Strongly disagree ☐ Disagree ☐Somewhat ☐Agree ☐ Strongly agree

(3) Microscopy   ☐Strongly disagree ☐ Disagree ☐Somewhat ☐Agree ☐ Strongly agree

Section D: **Perception of usefulness of RDT**

24) What is your view about RDTs when compared with other malaria diagnostic methods?

    (1) RDTS perform poorly than other diagnostic methods   ☐

    (2) RDTs perform similar with other diagnostic methods   ☐

    (3) RDT perform better than other diagnostic methods   ☐

    (4) Not sure   ☐

    (5) RDT saves time than others   ☐

Others (Specify)...

22) If no to RDT on Q 21, give reason(s) for non-usage of RDT (*Pls tick, what is mentioned, do not read the list*)

(1) Supply issues / Not available   ☐

(2) Not reliable   ☐

(3) Prefer other methods   ☐

(4) Cost of RDT   ☐

(5) Technical issues   ☐

Others (Specify)………………………………………………….

23) How effective do you perceive the different diagnostic methods for malaria?

Accuracy

(1) Presumptive diagnosis ☐strongly disagree ☐ Disagree ☐Somewhat ☐Agree ☐ Strongly agree

(2) RDT   ☐Strongly disagree ☐ Disagree ☐Somewhat ☐Agree ☐ Strongly agree

(3) Microscopy   ☐Strongly disagree ☐ Disagree ☐Somewhat ☐Agree ☐ Strongly agree

Ease of use

(!)presumptive diagnosis ☐Strongly disagree ☐ Disagree ☐Somewhat ☐Agree ☐ Strongly agree

(2) RDT   ☐Strongly disagree ☐ Disagree ☐Somewhat ☐Agree ☐ Strongly agree

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(3) RDT perform better than other diagnostic methods   ☐

(4) Not sure   ☐

(5) RDT saves time than others   ☐

Others (Specify)……………………………………………………………………………

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25) What is the main limitation of the use of RDT in the health facility? *(Pls tick one , do not read the list)*

    (1) Cost to patients   □

    (2) Needs special skill   □

    (3) Supply issue   □

    (4) Ignorance on the part of providers   □

    (5) Not reliable   □

    (6) Prefer other methods   □

    (7) Not trained on how to use it   □

    (8) Difficult to use   □

Others (Specify) ....

26)   Are you satisfied with the benefits derived from using RDT?

    (1) Satisfied   □

    (2) Not satisfied   □

    (3) Indifferent   □

27) What suggestion(s) do you propose to promote the use of RDT in your Facility?

....
....
....
....
....
....

Thank you for your cooperation.

25) What is the main limitation of the use of RDT in the health facility? *(Pls tick one , do not read the list)*

      (1) Cost to patients   ☐

      (2) Needs special skill   ☐

      (3) Supply issue   ☐

      (4) Ignorance on the part of providers   ☐

      (5) Not reliable   ☐

      (6) Prefer other methods   ☐

      (7) Not trained on how to use it   ☐

      (8) Difficult to use   ☐

Others (Specify) ....

26)   Are you satisfied with the benefits derived from using RDT?

     (1) Satisfied   ☐

     (2) Not satisfied   ☐

     (3) Indifferent   ☐

27) What suggestion(s) do you propose to promote the use of RDT in your Facility?

....
....
....
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....
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Thank you for your cooperation.

APPENDIX 2

Informed Consent Form

Informed Consent Form for Healthcare providers at Primary Health care level.

Research Title: Factors influencing the utilization of Rapid Diagnostic Tests in the diagnosis of Malaria by health care providers in Alimosho LGA, Lagos State, Nigeria

Principal Investigator; Dr Sokoya Olusola Daniel

Organization; Nigeria Field Epidemiology and Laboratory Training Programme (NFELTP), Abuja, Nigeria. Olusolasokoya@gmail.com, Tel No: +2348023897634

Sponsor of Research: Self Sponsored

Names of Supervisors: Prof Fawole and Dr Adedokun from the University of Ibadan

Introduction: I am Dr Sokoya Olusola Daniel, a resident of NFELTP at University of Ibadan. I am doing research on "Factors influencing the utilization of Rapid Diagnostic Tests in the diagnosis of Malaria by health care providers in Alimosho LGA, Lagos State, Nigeria". You have been selected to be part of this research. There may be some words that you do not understand. Please ask me to stop as we go through the information and I will take time to explain.

Purpose of the research.

The purpose of this study will be, to determine factor influencing utilization of Rapid Diagnostic Tests in the diagnosis of Malaria by health care providers in both Public and private health facilities in Alimosho LGA, Lagos State

Risks

There are no risks to you in participating in this study. You will be simply requested to answer the questions as they are asked, and you are not obliged to answer a question if you do not feel like.

Benefits

There may be no direct benefit to you from this study. However, it is expected that the findings of this study will be used to come up with better plans and interventions to reduce the burden of malaria in the State.

Voluntary Participation

Your participation in this research is entirely voluntary. It is your choice whether to participate or not. You may change your mind later and stop participating even if you agreed earlier.

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Voluntary Participation

Your participation in this research is entirely voluntary. It is your choice whether to participate or not. You may change your mind later and stop participating even if you agreed earlier.

Confidentiality

The information that I collect from this research project will be kept confidential. Information will be put away and no one but the researchers will be able to see it. Any information you have given will have a number on it instead of your name. Only the researchers will know what your number is.

Sharing the Results

The knowledge that we get from doing this research will be shared with you through feedback meetings before it is made widely available to the public. Confidential information will not be shared.

Right to Refuse or Withdraw

You do not have to take part in this research if you do not wish to do so. You may also stop participating in the research at any time you choose. It is your choice and all of your rights will still be respected.

This proposal has been reviewed and approved by the Ethical Research Committee/Institution Review Board of Lagos State University Teaching Hospital.

Certificate of Consent

I have read the foregoing information or have had it translated into language I understand. i know enough about the purpose, methods, risks and benefits of the research study to judge that I want to take part in it. I have had the opportunity to ask questions about it and any questions that I have asked have been answered to my satisfaction. I consent voluntarily to participate as a participant in this research.

Name of Participant_____

Signature of Participant _____

Date _____

      Day/month/year

LAGOS STATE GOVERNMENT

LAGOS STATE
UNIVERSITY TEACHING HOSPITAL,
IKEJA

HEALTH RESEARCH AND ETHICS COMMITTEE
REG.NO. NHREC04/04/2008
(www.nhrec.net)

PROJECT TITLE: FACTORS INFLUENCING THE UTILIZATION OF RAPID
DIAGNOSTIC TESTS IN THE DIAGNOSIS OF MALARIA BY HEALTH CARE
PROVIDERS IN ALiMOSHO LGA, LAGOS STATE, NIGERIA.
REF. NO.: LREC/10/06/665
PRINCIPAL INVESTIGATOR: DR. SOKOYA OLUSOLA DANIEL
ADDRESS: DEPT. OF EPIDEMOLOGY, UNIVERSITY OF IBADAN
DATE OF RECIEPT OF VALID APPLICATION: 18/03/16
DATE OF APPROVAL: 12/04/16

This is to inform you that the research described here in the submitted
protocol, the consent forms, advertisements and other participant
information materials have been reviewed and given full approval by the
Health Research and Ethics Committee of LASUTH. (LREC)

This approval dates from 12/04/2016 to 12/07/2016. If there is any delay in
starting the Research, Please inform the HREC LASUTH so that the dates of
approval can be adjusted accordingly. Note that no participant accrual or
activity related to this research may be conducted outside of these dates. All
informed consent forms used in this study must carry the HREC LASUTH
assigned number and duration of HREC approval. In a multiyear research,
endeavor to submit your annual report to the HREC early in order to obtain
renewal of your approval and avoid disruption of your research.

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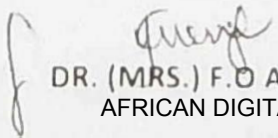SITE WITHOUT PREVIOUS NOTIFICATION.

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A. S. Adehowale. Lecturer I
B.Sc. (Ado), P.G.D. (Lagos)
M.Sc (Lagos), M.Sc. (Ife), PhD (Ife)

J. O. Akinyemi, Lecturer I
B.Tech (Akure), M.Sc. (Ib.), PhD (Ib.)
Res. Fellow (S.A.)

A. F. Fagbamigbe. Lecturer II
B.Sc (Ilorin), M.Sc. (Lancaster), PhD
(Ib.)

B. M. Gbadebo Lecturer II

22nd December, 2015.

The Executive Chairman,
Alimosho Local Government,
Alimosho, Lagos.

Through' Head of Administration
Alimosho LGA.

Through: Medical Officer of Health,
Alimosho LGA.

LETTER OF INTRODUCTION -
DR. SOKOYA OLUSOLA DANIEL.

I write to introduce to you Dr. Sokoya Olusola Daniel who is an M.P.H. Field Epidemiology student with Matric No. 180474 in this Department. *(2015/2016* Academic Session).

Sokoya Olusola is planning to conduct a study titled "Factors Influencing the Utilization of Rapid Diagnostic Tests in the Diagnosis of Malaria by Healthcare provider" in your Local Government to enable him complete his programme.

Kindly give him all necessary assistance in the conduct of the research.

Thank you.

p!:nayo I. Fawole

Training Program
No 50 Haile Selossie Street Asokoro Abuja
Tel. +234 (O) 9 291 3685
African Field Epidemiology Network www.nigeria-feltp.net
A healthier Africa

December 21't, 2015

The Medi cal Director,

Introducing Or Sokoya Olusola Daniel, Resident, Nigeria Field Epidemiology and laboratory Training Program (NFELTP)

In 2005, African Field Epidemiology Network (AFENET) was formally established as a non-profit organization with its Secretariat in Kampala, Uganda. The mission of AFENET is to improve the health of people in Africa, through the strengthening and expansion of applied epidemiology and laboratory capacity in Africa in partnership with Ministries of Health, non-governmental organizations, international agencies, private sector entities and other public sector health agencies.

AFENET currently has 20 member programs of which the Nigeria Field Epidemiology and laboratory Training Program (NFEI TP) is one of them. AFENET is currently funded by the United States Agency for International Development (USAID) and the US Centers for Disease Control and Prevention

Nigeria Field Epidemiology and laboratory Training Program is a competency based program with the primary goal of building epidemiological capacity to support public health systems in Nigeria and beyond It is supported by Centers for Disease Control and Prevention (CDC). Federal Ministry of Health, Federal Ministry of Agriculture and African Field Epidemiology Network (AFENET)

The program is composed of 25 academic didactic sessions and 75 field work As part of the requirements, the residents of the program are expected toconduct and write a thesis on any topic of public health importance as their university dissertation

Dr Sokoyo Olusola Daniel, a cohort 6 resident of the program plans to conduct a study titled *"Factors Influencing the Utilization of Rapid Diagnostic Test in the diagnosis of Malaria by Health Care Providers In Alimosho LGA, Lagos State, Nigeria"* to enable him complete his training.

This is therefore to request your kind assistance to enable him obtain permission to conduct the research in a timely manner

Please accept the assurances of our highest regards.

Ms Gana Chinyere
Senior Administrator, NFELTP

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Nigeria Field Epidemiology and laboratory

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