

**IMPROVING ACCESS TO MALARIA RAPID
DIAGNOSTIC TEST IN NIGER STATE NIGERIA:
AN ASSESSMENT OF IMPLEMENTATION UP TO
2013**

Awoleye Joshua Olatunji

Nigeria

50TH International Course in Health Development

September 16, 2013 – September 4, 2014

KIT (ROYAL TROPICAL INSTITUTE)

Development Policy & Practice/

Vrije Universiteit Amsterdam

Improving access to Malaria Rapid Diagnostic Test in Niger State Nigeria: An assessment of implementation up To 2013

A thesis submitted in partial fulfillment of the requirement for the degree of Master of Public Health

By

Awoleye Joshua Olatunji
Nigeria

DECLARATION:

Where other people's work has been used (either from a printed source, internet or any other source), this has been carefully acknowledged and referenced in accordance with departmental requirements.

The thesis; **"Improving access to malaria rapid diagnostic test In Niger state Nigeria: An assessment of implementation up to 2013"** is my work.

Signature:



50th International Course in Health Development (ICHHD)
September 16, 2013 – September 5, 2014
KIT (Royal Tropical Institute)/ Vrije Universiteit Amsterdam
Amsterdam, Netherlands
September 2014

Organised by:

KIT (Royal Tropical Institute), Department of Policy and Practice
Amsterdam, Netherlands

In Co-operation with:

Vrije Universiteit Amsterdam/ Free University of Amsterdam (VU)
Amsterdam, The Netherlands

TABLE OF CONTENTS

ACKNOWLEDGEMENT	vii
ABBREVIATIONS AND ACRONYMS	viii
GLOSSARY OF TERMS	xi
ABSTRACT	xii
INTRODUCTION	xiii
CHAPTER ONE: BACKGROUND INFORMATION ON NIGER STATE	1
1.1 <i>Geographical profile</i>	1
1.1.1 Demographic profile	2
1.1.2 Socio-economic situation	2
1.2 <i>Health and epidemiological profile</i>	3
1.3 <i>Health service utilization</i>	5
1.4 <i>Why Niger State was selected for the study</i>	6
1.5 <i>Niger state Health system</i>	7
1.6 <i>Ministry of Health Governance Structure in Niger state (Organogram)</i>	8
2 CHAPTER 2: TWO: PROBLEM STATEMENT, JUSTIFICATION, STUDY OBJECTIVES, METHODOLOGY AND LIMITATIONS	10
2.1 <i>Problem statement</i>	10
2.2 <i>Justification</i>	12
2.3 <i>Objectives</i>	12
2.3.1 Overall objectives	12
2.3.2 Specific objectives	12
2.4 <i>Methodology</i>	13
2.4.1 Data review	13
2.4.2 Literature review	14
2.4.3 Conceptual Framework	14
2.4.4 Limitations of the study	15

3 CHAPTER THREE: OVERVIEW OF MALARIA CASE MANAGEMENT IN NIGER STATE ----- 16

3.1	<i>Epidemiology of Malaria in Niger state</i>	16
3.1	<i>State Malaria Control Structure</i>	16
3.2	<i>The role of NMCP in Niger state malaria control activities</i>	17
3.3	<i>Key players</i>	17
3.4	<i>Niger State Malaria Control Programme Interventions</i>	18
3.4.1	<i>Malaria in Pregnancy</i>	18
3.4.2	<i>Advocacy, Communication and Social mobilization (ACSM)</i>	19
3.4.3	<i>Health System Strengthening</i>	19
3.4.4	<i>Information Management</i>	19
3.4.5	<i>Prevention of Malaria</i>	20
3.4.6	<i>Diagnosis and case management</i>	20
3.5	<i>Current Performance of Niger state Malaria Control Program</i>	21

4 CHAPTER FOUR: FINDINGS/RESULTS----- 23

4.1	<i>Chapter Layout</i>	23
4.2	<i>Policy and macro environment</i>	23
4.2.1	<i>Nigeria National Malaria diagnosis and treatment guidelines as contained in the strategic plan</i>	23
4.2.2	<i>Implementation of Guidelines on Malaria diagnosis in Niger State</i>	24
4.3	<i>Individual and Household characteristics</i>	24
4.3.1	<i>Age</i>	24
4.3.2	<i>Educational level, poverty, and vulnerability</i>	25
4.4	<i>Geographic Accessibility</i>	25
4.4.1	<i>Service Location</i>	25
4.4.2	<i>User's Location</i>	27
4.5	<i>Financial Accessibility</i>	27
4.5.1	<i>User's resources and willingness to pay</i>	27
4.5.2	<i>Costs and price of services (Peters et al. 2008)</i>	28
4.6	<i>Availability</i>	29
4.6.1	<i>Health workers, drug equipment</i>	29
4.6.2	<i>Demand for services</i>	33

4.7	<i>Acceptability</i>	34
4.7.1	User's Attitude and Expectations	34
4.7.2	Characteristics of Health Services	35
4.8	<i>Quality</i>	35
4.9	<i>Best practices that enhance the use of RDTs</i>	39
4.9.1	Using Community Health Worker (CHWs) to implement RDTs	39
4.9.2	Regular supply of ACT and RDT	40
4.9.3	Stock monitoring	40
4.9.4	Education	40
4.9.5	Social marketing increases RDTs utilization	41
5	CHAPTER FIVE: DISCUSSION	42
5.1	<i>Policy and macro environment</i>	42
5.2	<i>Individual and household characteristics</i>	43
5.3	<i>Geographical accessibility</i>	43
5.4	<i>Financial accessibility</i>	44
5.5	<i>Availability</i>	44
5.6	<i>Acceptability</i>	45
5.7	<i>Quality</i>	46
6	CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS	48
6.1	<i>Conclusions</i>	48
6.2	<i>Recommendations</i>	50
	REFERENCES	52
	ANNEX 1: Stakeholder Analysis	63

Figures

Figure 1.0: Map of Niger state Nigeria	1
Figure 1.1: Distribution of causes of death in children before age 5 as at 2012.....	3
Figure 1.2: Households owning at least one LLINs 8 months post campaign Dixon et al. (2012)	6
Figure 1.3: Structure of Health system.....	7
Figure 1.4: SMOH organogram	8
Figure 2.1: Conceptual framework for assessing access to health services (Peters et al. 2012)	15
Figure 3.1: Niger State malaria control programme organogram	17
Figure 4.2: Number of health facilities by ownership	26
Table 4.1: Staff Strength in the state	30
Figure 4.3: Quantity of ACTs and RDTs supplied to Niger state by SuNMAP and NMCP in 2013.	31
Figure 4.5: Number of patients with fever as against number with positive test result, Niger state January to October HMIS 2013 Data.....	36
Figure 4.6: Number of patients with fever versus parasitological confirmation of malaria with RDTs, Niger state, January to October 2013 HMIS	37
Figure 4.7: Patients tested Positive using RDTs as against number of patient treated at health facility, Niger state January to October, 2013 HMIS... 38	
Figure 4.8: Total patients tested with RDTs as against total patients treated at health facility, Niger state January to October 2013 HMIS.....	38

Tables

Table 1.0: Summary of Geo-political organization/demographic variables of Niger state	2
Table 1.1: Nigeria health profile of selected indicators (WHO, 2014)	4
Table 1.2: Niger state Summary of major health indicators.....	4
Table 3.1: A summary of the extent of implementation of the Niger state malaria control implementation framework, January to September 2012 (NMCOP 2013).....	21
Table 4.1: Staff Strength in the state	30

ACKNOWLEDGEMENT

To the master planner, the all powerful, author of wisdom, knowledge, and understanding who in His infinite mercies has seen me through the challenging moments.

To my dear wife, Veronica, I appreciate your emotional sacrifices, prayers, supports and holding the fort. I love you.

To my beloved children: Esther, Emmanuel, Peace and Abidemi who have been supportive. I miss you.

I am grateful to The Government of The Netherlands who through NUFFIC offered me full scholarship for this study.

I am grateful to The Royal Tropical Institute and to the entire staff under the directorship of Mrs. Prisca Zwanikken for knowledge impacted on me.

I appreciate study materials provided by Niger state malaria control team especially the RBM Program Manager 'Mrs. Mercy Dawaba' and ARFH state program officers 'Miss. Blessing Stephen.'

I appreciate quality fellowship and prayers with Chris Thron and for editing the thesis. And to the second editor 'Mrs. Karen Batjes' I appreciate.

And, I am grateful to the Redeemed Christian Church of God 'City of Life Parish' Karu-Abuja for all the support to my family.

To my colleagues, the 50th batch of the Royal Tropical Institute/Vrije Universiteit Amsterdam, I appreciate your love.

ABBREVIATIONS AND ACRONYMS

ACSM:	Advocacy Communication and Social Mobilization
ACT:	Artemisinin Combination Therapy
AM:	Artesunate/Mefloquine
AMFm:	Affordable Medicine Facility-malaria
ANC:	Antenatal Care
AOP:	Annual Operation Plan
ARFH:	Association for Reproductive and Family Health
ARI:	Acute Respiratory Infection
BCG:	Bacillus Calmette-Guerin
CHAI:	Clinton Health Access Initiative
CHEWS:	Community Health workers
CHOs:	Community Health Officers
CQ:	Chloroquine
DfID:	Department for International Development
DPT:	Pertussis and Tetanus
FMoH:	Federal Ministry of Health
GF:	Global Fund
GFATM:	Global Fund (AIDs, Tuberculosis and Malaria)
HF:	Health facility
HFs:	Health facilities
HMB:	Hospital Management Board
HMIS:	Health Management Information System
HMM:	Home Management of Malaria
HSS:	Health System Strengthening

IEC:	Information Education and Communication
IMR:	Infant mortality Ratio
ITN:	Insecticide Treated Net
LGAs:	Local Government Areas
LLIN:	Long Lasting Insecticide Treated Net
LMIS:	Logistic Management Information System
M&E:	Monitoring and Evaluation
MIS:	Malaria Indicator Survey
MMR:	Maternal Mortality Ratio
NDHS:	National Demographic Health Survey
NMCOP:	Niger State Malaria Control Programme
NMCP:	National Malaria Control Programme
NMR:	Neonatal Mortality Ratio
NPC:	National Population Commission
NSMCP:	Niger State Malaria Control Programme
ORT:	Oral Rehydration Therapy
PHCDA:	Primary Healthcare Development Agency
PMI:	Presidential Malaria Initiative
PMVs:	Patent Medicine Vendors
PW:	Pregnant Women
RBM:	Roll-Back Malaria
RDTs:	Rapid Diagnostic Tests
RMCs:	Roll Model Caregivers
SACA:	State Agency for the Control of AIDS
SFH:	Society for Family Health
SHI:	Sustainable Healthcare Initiative

SMOH:	State Ministry of Health
SOP:	Standard Operating Procedure
SP:	Sulphadoxine Pyrimethamine
SPs:	Service Providers
SuNMAP:	Support National Malaria Programme
TWG:	Technical Working Group
UMR:	Under five Mortality Ratio
UNDP:	United Nation Development Programme
UNESCO:	United Nations, Education, Scientific and Cultural Organization
UNICEF:	United Nation Children Education Fund
USD:	United State Dollar
WHO:	World Health Organization
WHS:	Ward Health System
WTP:	Willingness to Pay

GLOSSARY OF TERMS

Artemisinin-based combination therapy (ACT): "A combination or one of its derivatives with an anti-malaria or anti-malaria of a different class" (WHO, 2010).

Uncomplicated malaria: "Symptomatic infection with malaria parasitaemia without signs of severity and or evidence of vital organ dysfunction" (WHO, 2010).

Malaria: "Malaria is a life-threatening parasitic disease transmitted by mosquitoes; the parasite is transmitted from person to person through the bite of a female Anopheles mosquito, which requires blood to nurture her eggs" (RBM, 2000).

Monotherapy: "Anti-malaria treatment with a single medicine (either a single active compound or a synergistic combination of two compounds with a related mechanism of action)" (WHO, 2010).

Severe falciparum malaria: "Acute falciparum malaria with signs of severity and/ or evidence of vital organ dysfunction" (WHO, 2010).

Home Management of Malaria (HMM): According to ARFH (2014), HMM is strategy whereby volunteers (called Role Model Caregivers-RMCs) from the project community are identified and trained to treat children under five with fever at home while children above five and adults are directed to the health facility. The purpose is to ensure prompt treatment of children under five within 24 hours of onset of fever.

Purdah: "practice that was inaugurated by Muslims and that involves the seclusion of women from public observation by means of concealing clothing (including the veil) and by the use of high-walled enclosures, screens, and curtains within the home" (Encyclopedia Britannica, 2014).

ABSTRACT

Background: Nigeria adopted the WHO diagnosis and treatment guidelines within the framework of its 2009-2013 strategic plan, which included the use of Rapid Diagnostic Tests (RDTs) prior to commencing malaria treatment with Artemisinin Combination Therapy (ACTs). Niger State is one of the leading states in Nigeria in malaria control interventions. It commenced RDTs implementation with the Global Fund Round 8 Grant in 2012.

Objective: To explore accessibility barriers to the use of Malaria RDTs and formulate recommendations for improving the uptake of RDTs in Niger State

Methodology: Analysis of HMIS data, review of grey and published literature.

Findings: Only 27 percent of public health facilities (HFs) implement RDTs with the aid of donor funds. Seventy-seven percent (n=540,926) of the fever cases that appear in these HFs during January – October 2013 were tested with RDTs, 53 percent were confirmed cases of malaria, 60 percent of which were treated, while 9 percent of cases were treated presumptively. In 2013, 871,702 of ACTs were supplied as against 332,466 of RDTs. Private Sector presumptive treatment of malaria outnumbers public HFs treatment on the bases of confirmation. Stock-out of RDTs is the major constraint, and severe fever tends to trigger presumptive treatment.

Conclusions: Implementation of RDTs leads to a reduction in the use of ACTs; however, more of ACTs reduction could be achieved if the State Government directed more resources towards the acquisition of RDTs. Accessibility of RDTs is linked to the level of awareness of the potential users about the service and availability.

Keywords: HMIS, RDTs, Malaria, Niger, Accessibility

Word count: 13,050

INTRODUCTION

This thesis on malaria case management using Rapid Diagnostic Tests (RDTs) is based on my experience in malaria research, monitoring and evaluation (R/M&E) in Niger State Nigeria. For the past five years I have worked for the Association for Reproductive and the Family Health (ARFH) and Society for Family Health (SFH). These are Non-Governmental Organizations that coordinate and implement Global Fund HIV and AIDS, Tuberculosis and Malaria (GFATM). As Monitoring and evaluation specialist, I provided support for National Malaria Control Programme (NMCP) on national surveys and supportive supervision to states and health facilities.

According to NMCP, Niger State is one of the best three states in Nigeria in malaria control. The State was recognised by The Global Fund in 2012 for malaria Round 8 implementation. It is one of the states where the Support for Malaria Programme (SuNMAP), a Department for International Development (DfID) Fund and The GFATM Round 8 are implementing malaria interventions. I also have four years malaria project work experience in Niger State.

Association for Reproductive and Family Health (ARFH), a sub-recipient to NMCP on GFATM Round 8 malaria, was shadowed with the responsibilities such as: malaria case management through supply and tracking RDTs and Artemisinin-based Combination Therapy (ACTs), advocacy communication and social mobilization; and health system strengthening through capacity building and monitoring and evaluation (ARFH, 2010).

In the course of my work, I came to understand that it's not all fever cases been treated presumptively are malaria. I experienced several times whereby patient demanded anti-malaria drug without confirmatory test or with negative RDT test result. I have seen lopsidedness of commodity procurement and distribution. All these necessitated this study. World Health Organization's (WHO) recommendation that all fever cases should undergo parasitological confirmation prior to treatment (WHO, 2010). We shall examine whether RDTs access has been significantly improved. As a benchmark Uganda case where 39 percent reduction in ACT utilization was observed due to the introduction of RDTs may be considered (Kyabayinze et al. 2010). This paper provides an assessment of implementation on RDTs up to 2013.

1.1.1 Demographic profile

The Nigeria national bureau of statistics estimated Niger state's population in 2014 to be 4,372, 029 people (2,215,824 males and 2,156,206 females) (National bureau of statistics, 2014). Up to 85 percent are farmers, while 15 percent are involved in vocations such as business, white collar jobs, craft and arts. Table 1.0 below provides additional information.

Table 1.0: Summary of Geo-political organization/demographic variables of Niger state

Key Demographic Indicators	Number/Description
Number of Local Government Areas (LGAs)	25
Number of political wards	274
Number of Emirate councils	8
Number of districts	143
Number of village heads	1,066
Major ethnic groups	Nupes (40%), Gwaris (32%), and Hausas (28%) (Ndagi, 2012)
Number of households	866,665
Urban population	30%
Rural population	70%
Predominant religion	Muslim and Christianity with few traditionalists

Source: Niger state Government, 2007

Allocation of resources including health is subject to number of LGAs per state, political wards and other indicators as contained in Table 1.0. Importantly, number of households is the bases for distribution of health intervention such as Long Lasting Insecticide Nets (LLINs), immunization coverage, numbering houses for national surveys. According to the UNESCO Round table on literacy, 19.3 percent of males and 18.2 percent of females are literate (UNESCO, 2012).

1.1.2 Socio-economic situation

The principal means of livelihood in Niger State are tourism and farming (State Bureau of Statistics & Niger state planning commission, 2011). In 2009, the agriculture sector contributed approximately 41.7 percent to the Nigeria economy while the tourism sector added estimated of 0.79 percent (National Bureau of Statistics, 2010). There is no study to support contributions of agriculture and tourism sectors in Niger state; however predominant occupation of people of Niger is agriculture. The state is

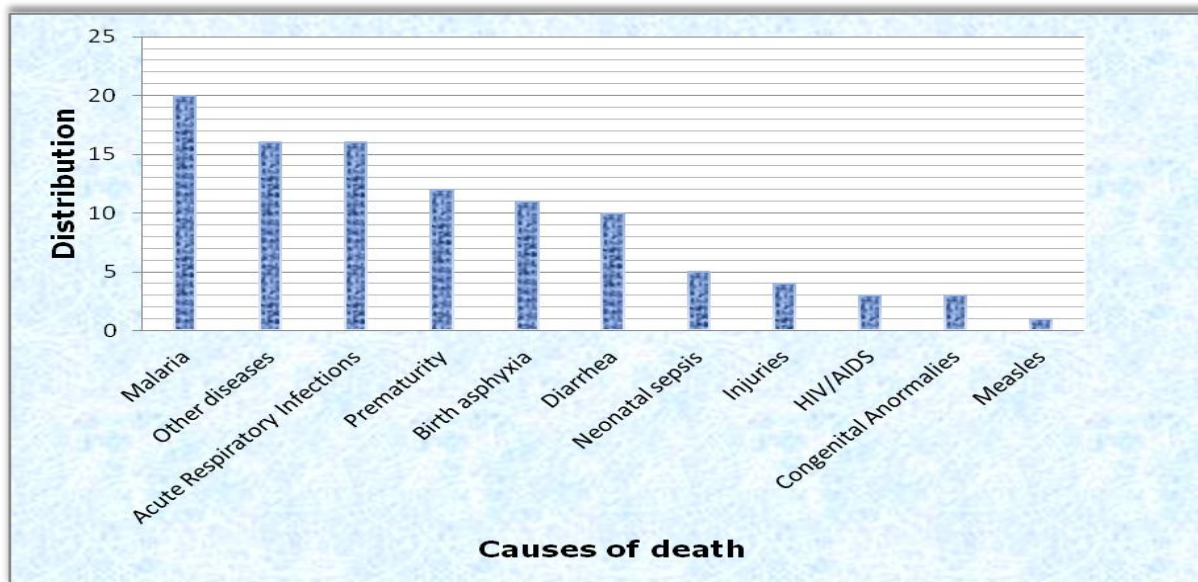
endowed with fertile land and annual precipitation ranging from 1100mm to 1600mm which favours agricultural productions (State Bureau of Statistics & Niger state planning commission, 2011).

Three of Nigeria’s hydroelectric dams (Kainji, Jebba, and Shiroro) are situated in Niger state. This plays significant role in social economic position of Niger state in Nigeria. Mineral resources available in Niger are lime stone, copper, kaolin, columbite, marble, lead, silica, sand, iron, quartzite, gold, and ball clays. The state’s Gross Domestic Product in 2007 was estimated at \$6.00 Billion and per capital at \$1,480 (State Bureau of Statistics & Niger state planning commission, 2011).

1.2 Health and epidemiological profile

According to WHO (2014), malaria is top on the list of causes of death in children before age five of 2012 (see Figure 1.1), while measles (1 percent) is the least on the distribution list. This distribution is typical of Nigeria in general, and is consistent with the Niger State Ministry of Health (NSMOH) report from Niger State that malaria is the leading cause of death in children (NSMOH, 2006).

Figure 1.1: Distribution of causes of death in children before age 5 as at 2012



Source: WHO, 2014

Nigeria’s North Central zone (which includes Niger state) has the highest mild anaemia by haemoglobin level of 28.4 percent (n=857) among all the geo-political zones in Nigeria (NPC, NMCP & ICF International, 2012). This is probably the result of high incidence of infectious disease such as malaria (see Figure 1.1).

There is no study conducted that gives a comprehensive health profile of Niger state. At the country level (Nigeria), findings from WHO (2014) report are shown in Table 1.1 below. NACA (2012) shows prevalence of HIV/AIDS in Nigeria by state, and Niger state was estimated at 4 percent.

Table 1.1: Nigeria health profile of selected indicators (WHO, 2014)

Selected indicators	Number
Incidence of malaria per 100,000 population	28,710
Prevalence of Tuberculosis per 100,000 population	161
Prevalence of HIV 100,000 population	2,030
Under five mortality rate per 1000 live births in both sexes	124
Maternal mortality ratio per 100,000 live births	560

Source: WHO, 2014

Figure 1.1 and Table 1.1 reveal high infectious diseases in Nigeria which correlate with Niger state when compared with Table 1.2 below.

Rate of non-communicable disease are increasing. In 2008, WHO estimated blood pressure among age 25 and above at 38.6 percent for males and 41.2 percent for females. Also, raised blood glucose for same age group was found to be 7.9 percent for males and 8.3 percent for female. Obesity among person of age group 20 years and above was at 5.1 percent for males and 9 for females (WHO, 2014).

Table 1.2: Niger state Summary of major health indicators

Major Health Indicators	Figure
Incidence of malaria per 100,000	580,380 (NSMCP, 2013)
Neonatal Mortality Ratio (NMR)	37/1000 (NDHS, 2013)
Infant mortality	69/1000 (NDHS, 2013)
% of deliveries by a skilled providers	28.6 percent (n=1,247) (NDHS, 2013)
% delivered in a health facility	25.3 percent (n=1,247) (NDHS, 2013)
Under five Mortality Ratio (UMR)	128/1000 Live Births (NDHS, 2013)
Antenatal Care (ANC)	59.9 percent (NDHS, 2013)

National demographic health survey 2013 indicator was used as a proxy health indicator since there is no such recent study in Niger state. Approximately one child out of eight delivered in Nigeria within the period under review died before age five 5 (NDHS, 2013). There is a reduction in death among children when compare 2008 (157/1000 live births) to 2013

(128/1000 live births) NDHS-2013 reports. This is still far from target of Millennium Development Goal. See table 1.2 for other relevant indicators.

1.3 Health service utilization

Utilization levels of specific preventive and treatment services in Niger state are outlined below, as they give a general indication on access to essential health services.

Uptake of modern contraceptive: modern contraceptive use by married women age 15-49 was estimated at 5.6 percent, the use of contraception rises with educational achievement of women (NDHS, 2013).

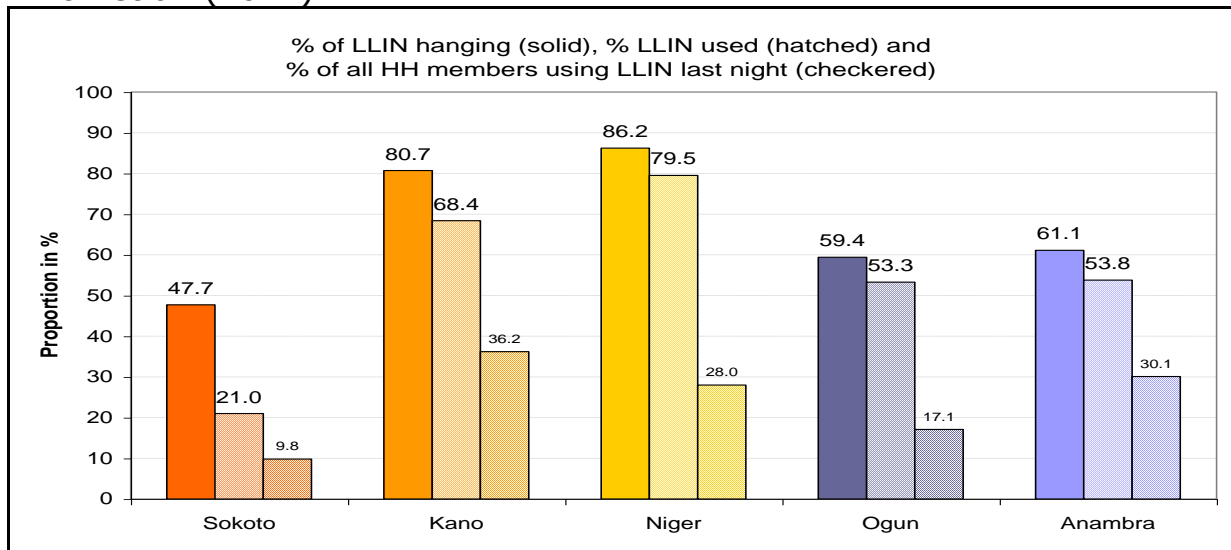
Antenatal attendance: To prevent maternal and child death and ill health during pregnancy, delivery antenatal care by skilled health service providers is important. NDHS 2013 shows that 59.9 percent (n=916) of women had antenatal care from skilled providers, 28.6 percent delivered by skilled providers, 25.3 percent delivered in a health facility (HF) (NDHS, 2013).

Uptake of treatment for fever: 38.4 percent (n=121) of children with fever sought for treatment at the health facility in Niger state (NDHS, 2013).

Uptake of oral rehydration therapy (ORT): In Niger state, out of 107 children with diarrhea only 63.5 percent were given ORT (NDHS, 2013).

Vaccination coverage: According to NDHS (2013), vaccination coverage shows that 23 percent (n=253) of children 12-23 months were fully vaccinated with Bacillus Calmette-Guerin (BCG), measles, and three doses each of Diphtheria, Pertusis and Tetanus (DPT), and polio vaccines, again educational attainment of women plays significant roles in the vaccination processes (NDHS, 2013).

Figure 1.2: Households owning at least one LLINs 8 months post campaign
Dixon et al. (2012)



Source: Dixon et al. 2012

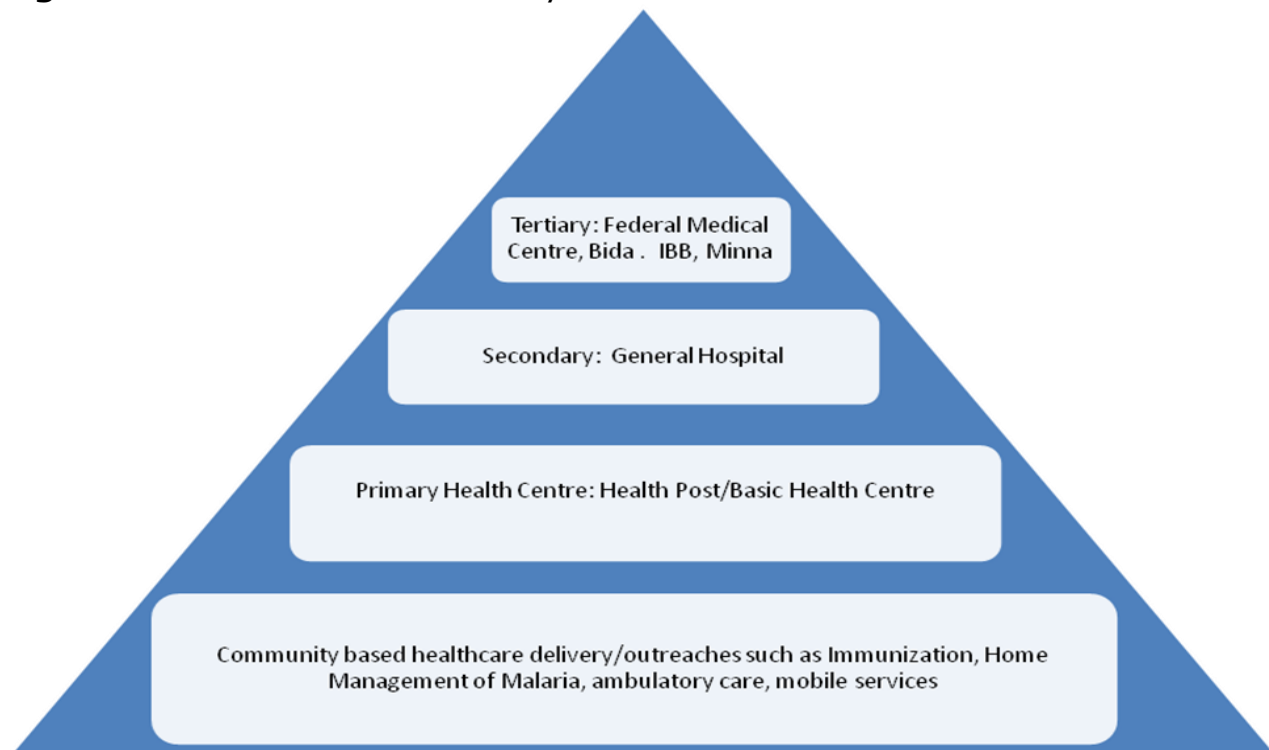
Long-lasting Insecticide Treated Nets (LLIN): As a follow up to LLIN supplied to Niger state and others, SuNMAP conducted a survey to ascertain ownership and utilization. Niger state received the largest supply but utilization was found far below quantity received (Dixon et al. 2012). To reduce significantly death and illness due to malaria through LLIN utilization, the difference between LLIN ownership and use must be reduced (Dixon et al. 2012).

1.4 Why Niger State was selected for the study

In malaria intervention efforts such as funding (state government and donors) and coordinated activities, Niger state is one of the top 3 states in Nigeria and the leading state in the North Central Zone. It spends annually an estimated sum of 5.2 Billion Naira on malaria control activities, and enjoys supports from donors in the area of: programme management, Long Lasting Insecticide Nets, ACT and RDTs supplies; and capacity building for health workers at public and private health facilities. These expenditures increased access to healthcare services especially antenatal visits and led to reductions in malaria in children and during pregnancy (Senyo, 2014).

1.5 Niger state Health system

Figure 1.3: Structure of Health system



Source: NMCOP, 2013

There exist 4 layers of healthcare delivery: Community (example: Home management of malaria), primary, secondary and tertiary (see Figure 1.3). They are under the control of the Federal (example: Federal Medical Centre, Bida), State and Local Governments. Public and private Healthcare deliveries are made up of orthodox, traditional and alternative (WHO, 2008) and are regulated by the 3 tiers of government, public healthcare are operated with cardinal principle of primary healthcare.

There is Primary Healthcare Development Agency (PHCDA) under State Ministry of Health (SMOH) that is responsible for human resource for health including health workers discipline and transfers (NMCOP, 2013). There are malaria control programme at each level of health system except at the community level that only implement.

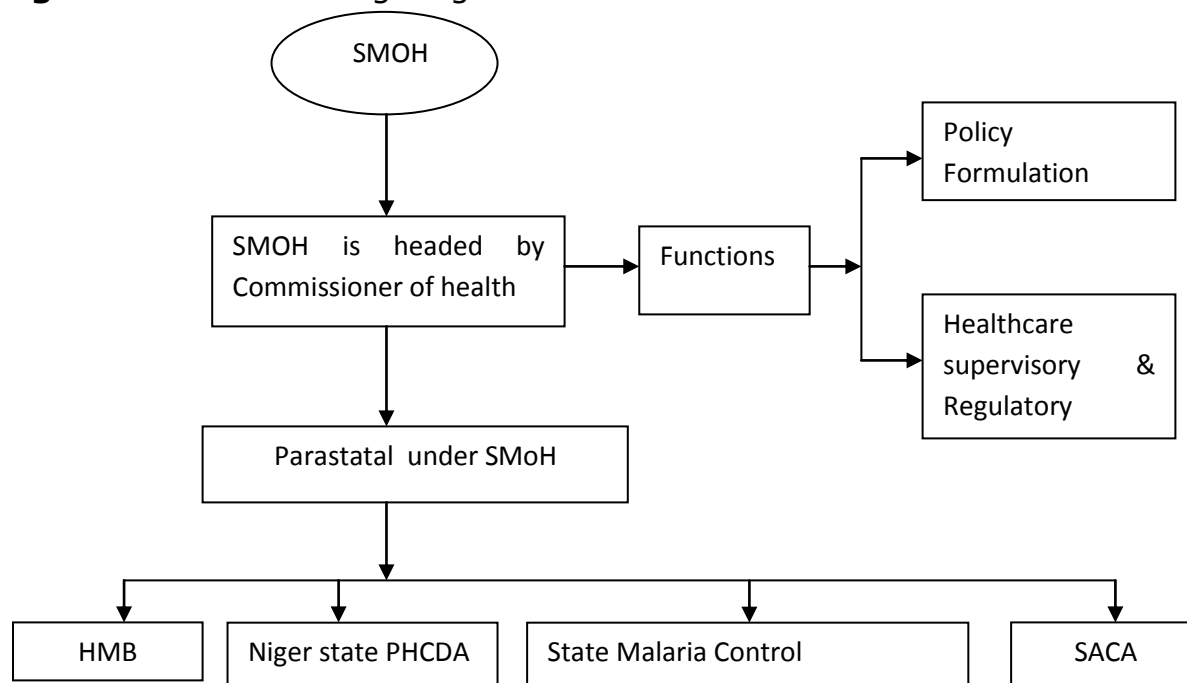
Available human resources personnel in Niger state (totaling 7,514) in the public and private health facilities (HFs) are as follows: 235 physicians, 2037 nurse and midwives; 130 pharmacists and other are contained in table 4.1 below.

Patients do not pay for malaria services at 375 HFs funded by GFATM and SuNMAP, however when commodities are out of stock they return to user fee.

1.6 Ministry of Health Governance Structure in Niger state (Organogram)

The State Ministry of Health and Hospital Services (SMOH) under the leadership of Commissioner whose roles include: policy formulation, regulatory and supervisory on health in the state. SMOH is comprised of State Malaria Control Programme and other parastatals (see Figure 1.2 below).

Figure 1.4: NSMOH organogram



Source: NMCOP, 2013

Key: SMOH = State Ministry of Health, HMB = Hospital Management Board, PHCDA = Primary Healthcare Development Agency, SACA = State Agency for the Control of AIDS

There are 1624 health facilities in Niger state, out of which 24 belongs to state government, 1324 to LGAs, 23 to the Federal Government, and 255 are private. 375 of these are covered by RDTs supplied by GFATM and SuNMAP, implying that 27 percent of public health facilities (n=1371) are covered. Other malaria service delivery points are registered patent

medicine vendors (1200) and pharmacies (70); there is no record that RDTs are in use at these service points.

2 CHAPTER 2: TWO: PROBLEM STATEMENT, JUSTIFICATION, STUDY OBJECTIVES, METHODOLOGY AND LIMITATIONS

2.1 Problem statement

Roll Back Malaria (RBM) estimates that each year there are more than 300 million episodes of severe ailment and at least a million life loss as a result of malaria worldwide (WHO, 2012). In addition, more than 90 percent of the global burden is in sub-Saharan Africa. Children under five years of age are at risk and prone to death due to the disease. Expectant mothers and their unborn babies are also at risk of the disease, which can result to perinatal mortality, low birth weight, and maternal anemia (WHO, 2010).

Malaria continues to be endemic in 106 countries including Nigeria, and while parasite-based diagnosis is expanding, confirmation of most suspected cases of malaria is still inadequate (WHO, 2010). A study conducted in similar setting to Niger state by Uzochukwu et al. (2009) shows that the use of RDTs significantly reduced anti-malaria prescriptions and cost effective when compared to other diagnostic methods for malaria treatment in endemic areas. Even in low transmission region RDTs proved effective (Leslie et al. 2014).

According to the World Health Organization, RDTs is “an antigen-based stick, cassette or card test for malaria in which a coloured line indicates that plasmodial antigens have been detected” (WHO, 2010).

According to WHO’s recommendation that in malaria endemic countries like Nigeria, everyone suspected with malaria should be diagnosed with RDTs or microscopy and those testing positive should be treated with ACTs (WHO, 2010). On the basis of this, Nigeria adopted the requirement for the use of parasitological tests as one of the key interventions in improving malaria diagnosis and treatment (FMOH and NMCP, 2009; WHO, 2009).

Access to malaria confirmatory test continues to be poor in more than half of endemic African nations; at least 80 percent of malaria treatments are without diagnostic testing (WHO 2012). RDTs are hardly obtainable and ACTs supplies are more than twice that of RDTs, over use of ACTs may likely occur in the public and private sectors. Prices of ACTs are far beyond formal mono-treatment, so investments in and adherence to RDTs result will save cost (Bastiaens et al. 2011).

Prior to WHO's recommendation, According to NSMCP (2013) Niger state HMIS database shows that malaria treatment has been based on clinical diagnosis. This aligned with Uzochukwu et al. (2009) study that shows over 50 percent presumptive treatment of malaria in Enugu state Nigeria. Due to the habitual practice of clinical diagnosis and symptomatic treatment of patient, health workers capacity to conduct parasitological diagnosis fell below standard (SuNMAP, 2012).

Clinical diagnosis solely is not dependable, and issues around microscopy (human and technical requirements) necessitated alternatives which RDTs has been found considerably suitable (WHO, 2000).

Prior to implementation of RDT in 2012, capacity assessment of HFs on diagnosis using RDTs was carried out in 6 LGAs and 77 HFs. In Niger state, the result shows that only 36 percent (n=77) HFs surveyed had RDTs available (NMCOP, 2013). The study was conducted at public HFs, but as part of ministry of health regulatory function to all HFs in the state, discovered that in the private sector presumptive treatment was the standard practice (NMCOP, 2013).

The scale-up of diagnostic testing is fundamental to definitive management of malaria and non-malaria febrile ailment and focus anti-malaria medicines to those who need them (WHO, 2011). In Nigeria, most people have a firm perception about symptoms of malaria which outweighs test results as most people seldom consent to test. But rather go straight to purchase anti-malaria medicine, so integration of RDTs into current treatment-seeking and prescribing practices of health care providers is herculean (Ezeoke et al. 2012).

In a study conducted by Comoe et al. (2012), only 34 percent (n=100) of people interviewed were ready to accept RDTs done for malaria. Also, in most cases access to RDTs is a major constraint to malaria case management (Albertini et al. 2011).

To increase access to anti-malaria medicine in Sub-Saharan Africa, Affordable Medicine Facility – malaria (a finance scheme under GFATM) with the aim to expand utilization of ACTs at affordable price in malaria endemic countries was piloted (The Global Fund, 2014). The scheme briskly enhanced availability, affordability, and market share of quality-assured ACTs at the service delivery points however absence of similar increase in RDTs was noticed (WHO, 2012).

Findings from a study conducted by Uzochukwu et al. (2009) on cost effectiveness analysis of the three malaria diagnostic methods shows that RDTs on incremental bases is more cost effective.

2.2 Justification

In spite of merits of RDTs over treatment on the bases of clinical and microscopic diagnosis, access to RDTs remains a major issue (Zhao et al. 2012). It is important to identify and address access barriers to RDTs use because diagnosis using RDTs especially in malaria endemic state like Niger will remarkably enhance effective malaria case management. Also, correct diagnosis will significantly enhance standard of care and ensure that ACTs are used judiciously (WHO, 2012).

Also studies conducted by Harchut et al. (2013) and Ansah et al. (2014) show that RDTs utilization improved correct treatment than microscopy (microscopy led to over ACT prescription).

Similarly, improvement was recorded in Uganda whereby 39 percent depletion in ACT prescription due to introduction of RDTs (Kyabayinze et al. 2010). Again, in Zanzibar RDTs use decreased ACT prescription (Msellem et al. 2009).

2.3 Objectives

2.3.1 Overall objectives

To explore accessibility barriers to the use of malaria rapid diagnosis test and formulate recommendations for improving uptake of RDT in Niger state Nigeria

2.3.2 Specific objectives

1. To provide an overview of malaria case management in Niger state
2. To describe supply and demand side factors influencing access to rapid diagnostic tests
3. To describe best practices in optimizing malaria rapid diagnostic test and treatment
4. To formulate recommendations that will improve uptake of RDTs that can be adopted by Malaria Control Programmes in Niger state, and at a national level in Nigeria.

2.4 Methodology

In order to achieve the set objectives, the study will primarily consist of literature review, but it will be supported with analysis of data from Niger state health management information system (HMIS) of 375 public health facilities. The facilities are chosen due to RDTs implementation and availability of data.

Altogether three strategies are applied:

- 1) Data review (HMIS data analysis)
- 2) Literature review
- 3) Application of conceptual frame work

2.4.1 Data review

The Global Fund commenced RDTs roll out in Niger in 2012 with 250 public health facilities (HFs), while simultaneously providing malaria specific HMIS training and documentations. In 2013 the number increased to 375 (15 per LGAs) which constitute the bases for this analysis.

It is important to mention that a total of 1249 HFs (994 public and 255 private HFs); and registered 1200 patent medicine stores, and 70 pharmacies were excluded. In this study, review of January to October HMIS data from supported HFs were carried out. The choice of these HFs is based on completeness of data, timeliness of submission of report and compliance with data quality assessment checklist.

Analysis is based on key performance indicators such as: number of “fever cases, persons presenting with fever and tested using RDTs, persons presenting with fever and tested using microscopy, persons diagnosed clinically for malaria, persons with confirmed uncomplicated malaria treated with ACT; and persons treated with ACTs on the basis of clinical diagnosis only” (Niger state M&E database, 2013).

Aggregations of absolute values by month for each indicator for the period under review was conducted and compared such as: number of patients with fever versus parasitological confirmation with RDTs, quantity of ACTs versus quantity of RDTs supplied in 2013, number of patients with fever as against number with positive test result, patients with positive test result using RDTs as against number of patients treated at HFs (Niger state M&E database, 2013).

2.4.2 Literature review

Peer-reviewed literature was obtained using a keyword search of databases (VU library, and PubMed) and the use of Google Scholar. Grey literature was obtained from searches of institutional websites such as SuNMAP, ARFH, Niger state Government, Nigeria National malaria control programme, and WHO.

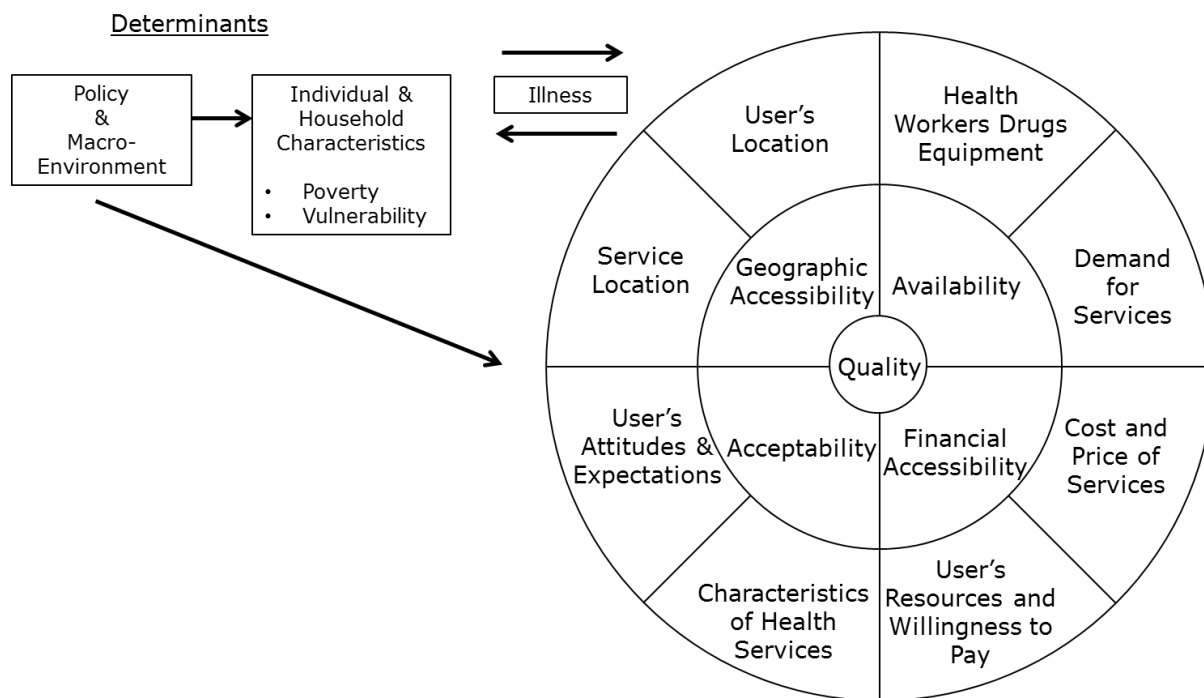
The key search terms used singly and in combination include Niger state, Nigeria, Sub-Saharan Africa, Rapid Diagnostic Tests, RDTs, Artemisinin Combination Therapy, ACT, acceptance, barriers, availability, willingness, perception, stock-out, guidelines, malaria, HMIS.

2.4.3 Conceptual Framework

To effectively analyze access to malaria RDTs in Niger State Nigeria, the conceptual framework of Peters et al. (2008) was adapted. The framework was chosen because of its ability to address demand and supply elements of healthcare delivery in Sub-Saharan Africa. It addresses access to healthcare from perspective of the thematic areas as contained in the framework (Figure 2.1) below. This paper uses the elements in the framework (Peters et al. 2008) to address accessibility barriers to RDTs as follows:

1. Policy and macro environment, these are addressed as: a) Nigeria national malaria diagnosis and treatment guidelines; b) Implementation of malaria diagnosis guidelines in Niger state
2. Individual and household characteristics: a) age, b) educational attainment, poverty, and vulnerability.
3. Illness: ill health due to disease (malaria). This has been covered in chapters 1 and 2.
4. Geographic accessibility: a) service location b) user's location
5. Financial accessibility: a) cost and price of services b) user's resources and willingness to pay
6. Availability: a) health workers, drugs equipment, b) demand for services
7. Acceptability: a) characteristics of Health services b) User's attitudes & expectations
8. Quality: This will be viewed with regards to quality of care, staff, treatment, capacity building, data, and commodity supplies.

Figure 2.1: Conceptual framework for assessing access to health services (Peters et al. 2008)



Source: Peters et al. 2008

2.4.4 Limitations of the study

1. The data analyzed are from health facilities (375) that GFATM is supporting in the state, other HFs mostly treats malaria presumptively and data are not accessible.
2. Though private health facilities clinically diagnose malaria, if their data had been available, it should have been good to analyze them and compare with public health facilities.

3 CHAPTER THREE: OVERVIEW OF MALARIA CASE MANAGEMENT IN NIGER STATE

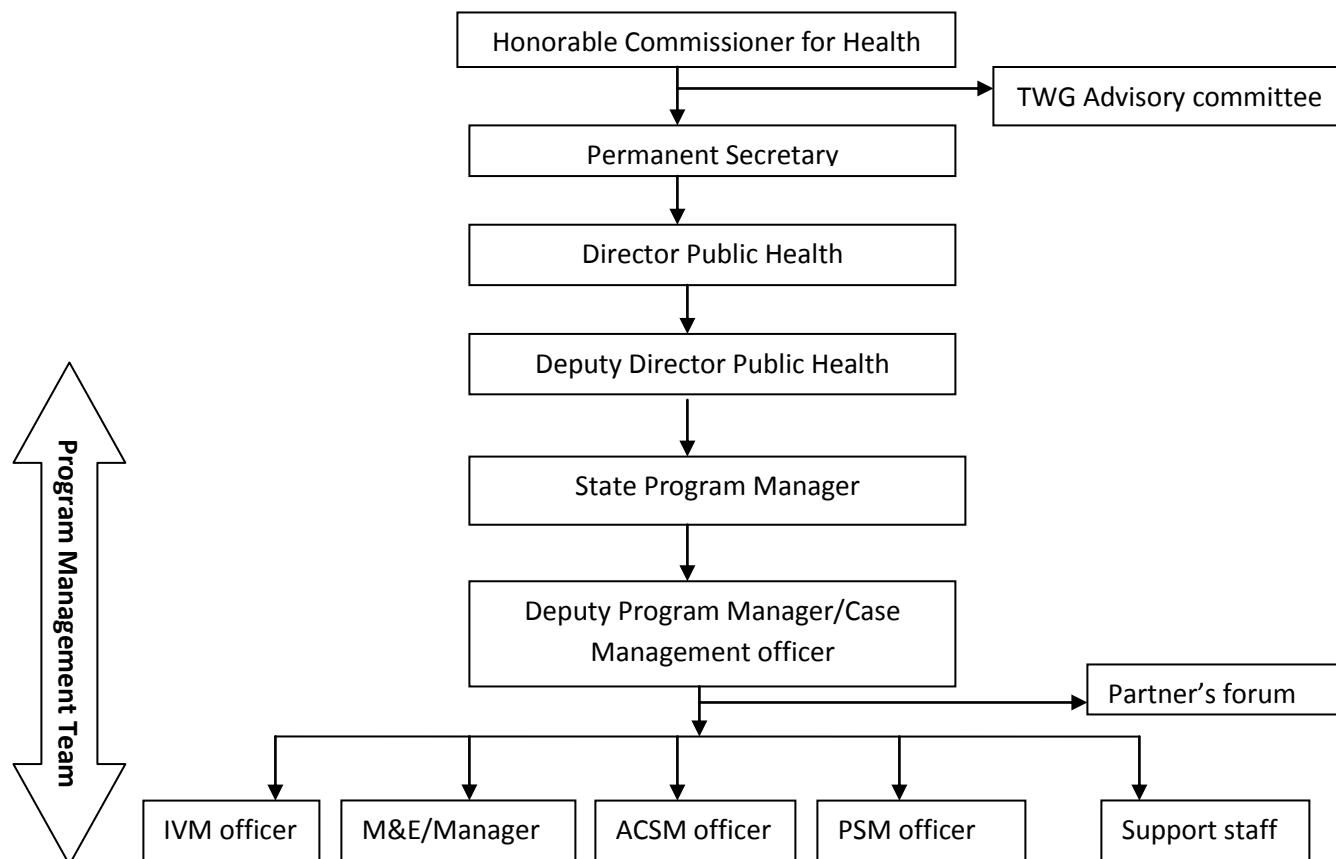
3.1 Epidemiology of Malaria in Niger state

Niger state is endemic with malaria. The disease continues to be a foremost cause of under five and maternal grief and death especially in the rural communities. It is responsible for 65 percent of outpatient health facilities visit (NSMCP, 2006). Death rate is 103 per 1000 live births while maternal death rate is 1,132 per 100,000 live births (NSMCP, 2006). Malaria highest incidence season is July to November however it occurs throughout the year (NSMCP, 2012). "The most prevalent species of malaria parasites in Nigeria is Plasmodium falciparum (>95 percent)" (NPC, NMCP, & ICF International, 2012:4). The major "malaria vector are Gambiae in the wet season and funestus in the dry season" (NSMCP, 2012:19).

3.1 State Malaria Control Structure

Niger state malaria control programme (NSMCP) consists of personnel category as contained in the Figure 3.1 below. They are domicile at state ministry of health and state malaria control programme (NSMCP), there are similar structures at LGAs and health facility levels that directly work with the state team and partners to implement project at service delivery points (NMCOP, 2013).

Figure 3.1: Niger State malaria control programme organogram



Source: NMCOP, 2013

3.2 The role of NMCP in Niger state malaria control activities

NMCP is the Principal Recipient of Global Fund Round 8 Malaria for the public sector while Association for Reproductive and Family Health (ARFH) is the Sub-recipient (SR) to NMCP. The role of NMCP is to provide oversight of grant supported activities, including: administration, commodity procurement, production of HMIS tools, selection of health facilities for implementation, supportive supervision, data quality assessment, and technical assistance during trainings.

3.3 Key players

Stakeholders in malaria control in Niger state consist of ARFH (a SR to NMCP on GFATM Round 8 - public sector), Society for Family Health (a principal recipient for private sector on GFATM Round 8 and sub-recipient to itself on

implementation at private sector) and Support to National Malaria Programme (SuNMAP). Annex 1 contains a comprehensive list of key stakeholders.

ARFH is a SR to NMCP on the GFATM Malaria Round 8, signed a Memorandum of Understanding (MOU) with NMCP to scale up Malaria Control Program (MCP) in six states including Niger. In these States, ARFH's responsibilities are in three categories: - distribution and tracking of LLIN, distribution and tracking of RDTs and ACTs; and strengthening health system for delivery of Malaria control activities. It is responsible for RDTs implementation at the 375 health facilities (ARFH, 2010).

Support for Malaria Programme (SuNMAP), a Department for International Development (DfID) funded in Niger state. Aims to expand access and coverage of malaria control strategies such as curative and preventive (The Johns Hopkins University, 2011). These includes routine distribution of LLIN, training of state malaria control personnel and improve public and private collaboration, to create demand for treatment and prevention (The Johns Hopkins University, 2011).

WHO provides technical assistance during capacity building for healthcare providers and reports on malaria activities in Niger State.

There exist Civil Society Organizations (CSOs) in Niger state that engage in malaria control activities such as provision of linkages between implementer and community leaders. They act as Role Model Caregivers for home management of malaria, and create an enabling environment for advocacy and programme implementation (NMCOP, 2013).

3.4 Niger State Malaria Control Programme Interventions

The following sections highlight the six divisions within Niger state malaria control programme with direct relevance with access to RDTs.

3.4.1 Malaria in Pregnancy

According to NSMOH (2006), pregnant women (PW) make up of 5 percent (249,596) of the population. The maternal death rate is high, partly due to malaria prevalence. Routine LLINs distribution to PW was inadequate, as was Intermittent Preventive Treatment (IPT), approximately half (260,000) of state required IPTs were supplied in 2012 (NMCOP, 2013). IPTs coverage for PW was very poor prior to intervention from SuNMAP and GFATM, but now has improved. Pregnant women at the second and third trimester who receive diagnosis using RDTs and are confirmed cases are also given ACTs (NMCOP, 2013).

3.4.2 Advocacy, Communication and Social mobilization (ACSM)

ACSM is a division within state malaria control programme that anchors demand creation through advocacy, communication and social mobilization. Their activities in the period under review were: advocacy to stakeholders on malaria control, community participation and ownership of malaria control programme; and increase involvement of media in malaria control activities. ACSM is seen as a key division to get politician involved in malaria control interventions (NMCOP, 2013).

3.4.3 Health System Strengthening

This division is responsible for the following activities: human resource planning for malaria control activities, strengthening of existing partnership with public and private sectors for MCP, setting up of Ward Health System (WHS), ensure the availability of material resources (Monitoring and evaluation tools, Logistics management tools etc), and strengthen the involvement of communities in malaria control program(NMCOP, 2013).

The implementation of these activities has been achieved through the support from partners such as ARFH and SuNMAP, which increase high level of participation at every level of implementation. For example: WHO staff facilitates during state health worker's training and supports the supply of malaria commodities thereby enhancing the health status of the people. A good working environment has also been enabled in the state for malaria intervention for partners (NMCOP, 2013).

3.4.4 Information Management

This division's responsibility aligned with Awoleye (2011) that says, the mandate of monitoring and evaluation (M&E) systems include: data verification and validation and compare source data vis-à-vis reported, mentor service providers on tool utilization, track commodities stock level, forecast requirement of commodities and institute supportive supervision. Other responsibilities are:

- Supports National surveys such as District Health System (DHS) and improve existing database of malaria control program.
- Provide logistic support for state malaria control programme (NSMCP) to improve data collection.
- Also shadows with data quality, analysis, and provide feedback
- The division anchors malaria related aspect of state health management information system (HMIS).

The activities have improve availability of data generation, data flow, harmonization of data from all public and private health facilities to LGAs, the division also represent the state at national meetings. In 2013, the division supported the training of 750 health facilities service providers on HMIS (NMCOP, 2013).

3.4.5 Prevention of Malaria

The division is responsible for malaria prevention activities such as: distribution of Long Lasting Insecticide Net (LLINs), Indoor residual spray (IRS), and routine distribution of Intermittent Preventive Treatment for PW. The division trained 40 personnel for larviciding of open drains and vector breeding sites. In order to leverage resources from other sectors, they established working relationship with other ministries such as state ministry of women affairs, ministry of environment, agriculture, and works (NMCOP, 2013).

3.4.6 Diagnosis and case management

Diagnosis of malaria in Niger state includes the use of clinical, RDT and microscopy. Microscopy is available in most tertiary, secondary and few primary healthcare facilities (NMCOP, 2013). Quality assurance, control and monitoring of laboratory practices was seldom conducted and where present, was inadequate but now expected to increase following capacity building exercise on microcopy for laboratory scientists. Malaria laboratory diagnosis using microscopy attracts fee charges in the facilities where it is available (NMCOP, 2013).

RDT is used in only donor funded public health facilities and few private healthcare facilities on physicians request (NMCOP, 2013).

In 2012, a total of 770 healthcare service providers selected from 25 LGAs were trained on the use of RDTs with funding from GFATM and DfID. First point of contact for malaria treatment (PMVs and pharmacies) is not reached with the intervention. Role Model Caregivers (described in section 3.3) are left out as well (NMCOP, 2013).

In the North Central Nigeria (Niger state inclusive), out of 297 children (6-59 months) 38.6 percent sought (highest in the survey) for treatment from health facility while in Niger state, 38.4 percent (n=121) sought treatment (NDHS, 2013). In the North Central out of 856 children with fever and tested with RDTs, 45.1 percent confirmed having malaria parasite. Also out of 857 children, 28.4 percent had mild anaemia (NPC, NMCP, ICF International, 2012).

3.5 Current Performance of Niger state Malaria Control Program

Niger state has been identified as one of the top 3 states with the potential of achieving vision 3-20:20 in the year 2020 goal (State of service address, 2008). The vision simply means making Niger state one of the best three in all aspects of development in Nigeria by year 2020 (Dhacko, 2012). One of the Vision 3-20:20 elements is to free Niger state of malaria. To achieve this, the state adopted national Roll-back Malaria (RBM) strategy as soon as the strategy was launched in 2000.

To assess achievement of each programme target based on major activities and determine their implementation level, the following were used: completely implemented, more than 50 percent implemented, less than 50 percent implemented and implementation not commenced (see Table 3.1 below).

Table 3.1: A summary of the extent of implementation of the Niger state malaria control implementation framework, January to September 2012 (NMCOP, 2013)

Thematic area	Total activities planned	Completely implemented	More than 50% implemented	Less than 50% implemented	Implementation not commenced	Percentage Performance (%)
PM	5	0	1	0	4	20
MIP	11	5	2	2	2	64
RDTs	26	12	3	2	8	58
ACSM	6	0	3	2	1	50
HSS	10	7	1	1	1	80
IM	10	4	4	0	2	80
Total	68	28	14	7	18	62

Source: NMCOP, 2013

Key: HSS = Health system strengthening, ACSM = Advocacy Community and social mobilization, Malaria in Pregnancy = Malaria in Pregnancy, PM = Prevention of malaria, IM = Information management, AOP = Annual operation plan (NMCOP, 2013)

To calculate performance percentage, number of completely implemented activities was added to the number of activities that have been more than 50 percent implemented and divided by the total activities planned. The overall performance shows 62 percent of the year 2012 annual operation plan; this is below target of 80 percent (NMCOP, 2012).

To increase awareness and uptake of malaria services in the state, SuNMAP staff with state malaria control team carried out demand creation activities such as: advocacy at community level. This involves the use of Information, Education and Communication (IEC) materials produced in local languages, messages at places of worship (mosques and churches), drama, radio, sensitization activities and annual world malaria day activities such as: lectures, debates, quiz completion and essay writings (George et al. 2014).

4 CHAPTER FOUR: FINDINGS/RESULTS

4.1 Chapter Layout

This chapter presents results of the literature review, complemented by the analysis of Niger state secondary data, using Peters et al. (2008) as a conceptual framework.

The adapted conceptual framework ascribes accessibility of RDTs to key elements of the framework which further helps to understand that accessibility is subject to policy and macro-environment, individual and household characteristics, illness, availability, accessibility (financial and geographical), acceptability, and quality connects the four dimensions.

4.2 Policy and macro environment

This section presents: a) National malaria diagnostic and treatment guidelines (which the state government adopted), b) Implementation of guidelines on malaria diagnostic in Niger state.

4.2.1 Nigeria National Malaria diagnosis and treatment guidelines as contained in the strategic plan

Nigeria National Malaria Control Programme (NMCP) Strategic Plan 2009-2013 consists of guidelines for diagnosis and treatment of malaria according to FMOH & NMCP (2008). And partly aligned with the 2010 edition of WHO's recommendation for parasitological confirmation of malaria by RDTs as one of the prioritized interventions in improving diagnosis and treatment (FMOH & NMCP, 2008).

The plan explains purpose of achieving "timely and equitable access to malaria diagnosis and treatment by all section of the population and as close to the home as possible" (FMOH & NMCP, 2008:24). Prompt parasitological diagnosis with RDT is adopted by Nigeria for suspected cases of malaria (Ige and Ayandipo, 2014).

At national level, expanding access to RDTs use aims to increase parasitological diagnosis to 40 percent in 2013 and 60 percent by 2014, (President's Malaria Initiative, 2013). These targets may be difficult to achieve as diagnosis using RDTs is limited and coverage is largely dependent on donors. The 2010 malaria indicator survey, revealed that only 9.1 percent of under five children with fever in the North central region of Nigeria had

parasitological confirmation using RDTs (NPC, NMCP, ICF International, 2012), Niger state inclusive.

Findings from similar setting (Sudan) in Africa show that RDTs roll out was successful at the community through HMM and led to improvement in treatment seeking attitude of people (Elmardi et al. 2009). A similar study in Uganda concluded that, RDTs implementation through RMCs will require availability and acceptance by the community and that they have the capacity to conduct test (Mukanga et al. 2010).

4.2.2 Implementation of Guidelines on Malaria diagnosis in Niger State

The 2009-2013 Strategic Plan for malaria in Niger state is implemented in collaboration with NMCP through Global Fund Round 8 (GFATM). RDTs were first rolled out in 12 states in Nigeria, including Niger state, as a follow-up to WHO recommendation on parasitological diagnosis (FMOH & NMCP, 2008).

Translating the shift in guidelines to shift in routine use where test are applied by service providers requires clear messages and guidelines that are adapted to the local settings (Rowe et al. 2005, Hamer et al. 2007). However, in Niger state this is not the case. To improve this trend, capacity buildings were conducted at all HFs (375) and 400 RMCs supported by GFATM. Also, monthly review meetings, supportive supervision and data collection were instituted (NMCOP, 2013).

4.3 Individual and Household characteristics

“Individual and household characteristics have to do with socio-economic position, vulnerability and the health status. Poverty can be examined as a determinant of illness or health needs” (Peters et al. 2008). This section presents Individual and household characteristics: a) age, b) educational level, poverty and vulnerability.

4.3.1 Age

In Niger state, findings from analysis of state HMIS 2013 data show that 40 percent of patients treated for malaria are children and approximately 21 percent of them are treated symptomatically through HMM (Niger State M&E database, 2013). Similarly, NDHS (2013) shows that 60.9 percent (n=1,268) in the urban, 41.2 percent (n=2,362) in the rural of children in Niger state age 6-59 months with fever were treated for malaria presumptively in the two weeks before the survey. A qualitative study from Enugu state Nigeria shows that age is a principal factor for adherence to RDTs in children Ughasoro et al. (2013). It is common amongst caregivers and women to insist on prescription. These shows use of RDTs for diagnosis

is limited in younger age groups. According to NMCOP (2013), as long as RDTs are available at health facility almost all adult with fever were tested with RDTs.

4.3.2 Educational level, poverty, and vulnerability

According to NPC, NMCP & ICF International (2012), educational attainment of caregivers and women correlates with their knowledge of how to care for the family and self, therefore the higher education the better for healthcare products as revealed in the uptake of contraceptives and RDTs.

Lack of Education has a relationship with poverty and poverty drives illness or healthcare seeking and level of vulnerability (Peters et al. 2008). Currently, RDTs is free at supported health facility in line with NMCOP (2013) but there are other cost that debar people at lower wealth quintile from seeking malaria confirmatory test such as transportation to health facilities and person hour lost as stated by Ajala, Sanni & Adeyinka (2005).

According to NPC, NMCP & ICF International (2012), educational attainment of caregivers and women correlates with their knowledge of how to care for the family and self, therefore the higher education the better for healthcare products. According to UNESCO (2012), literacy level for males and females in Niger state are estimated at 19.3 and 18.2 percent respectively. The currently low uptake of contraceptives and RDTs corresponds with the low level of educational attainment in the state.

Lack of Education has a relationship with poverty and poverty drives illness or healthcare seeking and level of vulnerability (Peters et al. 2008). The people of Niger state are farmers with low financial capacity according to NSMCP (2013). Currently, RDTs is free at supported health facility in line with NMCOP (2013) but there are other cost that debar people at lower wealth quintile from seeking malaria confirmatory test such as transportation to health facilities and person hour lost as stated by Ajala, Sanni & Adeyinka (2005).

4.4 Geographic Accessibility

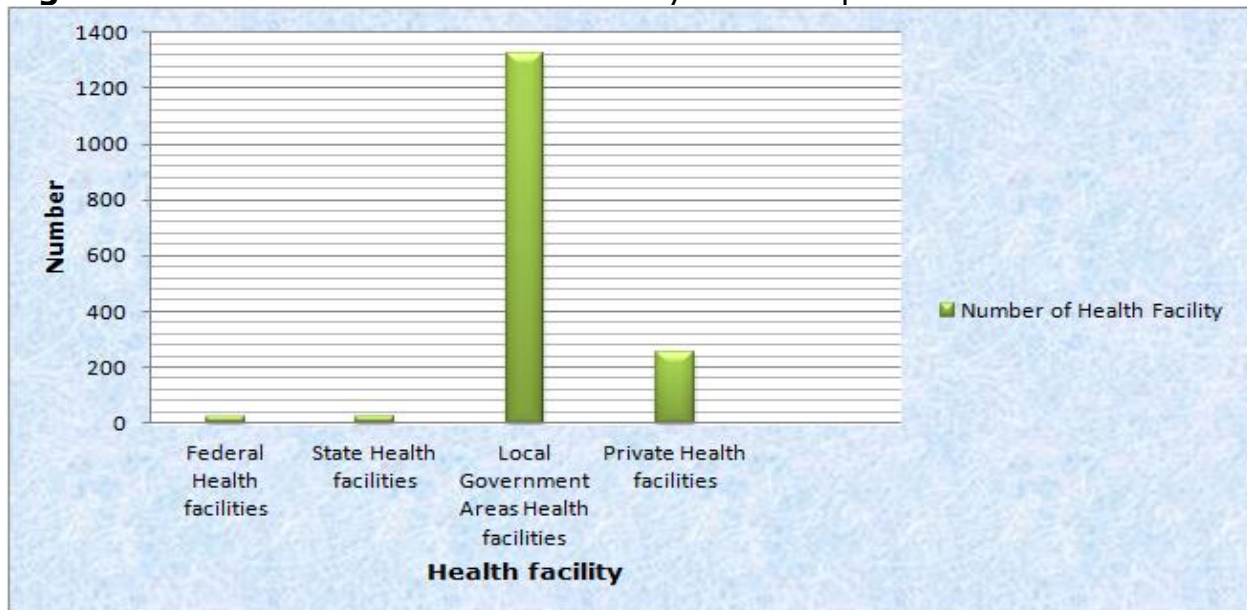
Geographic accessibility: “the physical distance or travel time from service delivery point to the user” (Peters et al. 2008:162). This section presents geographic accessibility with respect to: a) service location b) user’s location

4.4.1 Service Location

There are 1624 health facilities (HFs) in the state (see Figure 4.2). The health facilities are at 4 levels of ownership comprising: Federal (23), state (24), Local Government (1324), and private (255). They are unevenly distributed according to need. There are 40 percent health facilities in the

urban as against 30 percent expected while 60 percent HFs are located in the rural that has 70 percent of the state population figure (NSMCP, 2013).

Figure 4.2: Number of health facilities by ownership



Source: NSMCP, 2013

Service location includes health facility, home management of malaria (HMM) and private sectors (clinics, patent medicine stores (1200) and pharmacies (70)). SFH is implementing GFATM activities at private sector to social market ACTs. Implementation of RDTs and ACTs supplied by GFATM and SuNMAP is at 375 public health facilities out of 1624. The Grant is supporting 15 HFs per LGAs and located at the LGAs. There are 16 RMCs affiliated to HFs based on proximity within the LGAs. They (RMCs) are responsible for presumptive treatment of malaria at the community. They receive and replenish ACTs and report data to the HFs (ARFH, 2014).

Critical factor for malaria diagnosis and case management is where people largely visit when they perceive they have malaria. More than 60 percent of clients purchase anti-malaria in the private health facilities, in most cases (95 percent) purchase mono-therapy anti-malaria drugs (The Global Fund, 2014).

The 15 HFs per LGAs are unevenly distributed and grossly inadequate for effective coverage of service (NSMCP, 2013). The poor coverage of HFs and services is due to low political will by the state Government as this can be seen glaringly from funding of malaria case management.

According to Awoleye (2012) study shows that terrain of the project location is crucial to effective implementation of public health program like malaria. Apart from wide spread of Niger state there are some areas (15 percent) that are covered by water which inflicts hardship on program implementers and limits access to healthcare by the users.

4.4.2 User's Location

Also, to a study conducted by Awoyemi, Obayemi & Opaluwa (2011) most rural dwellers (62 percent) visit public health facility for their healthcare due to perceived lower cost of care, only 18 percent reside (0-4km) near public health facilities while a higher percentage (42 percent) of rural dwellers live within 15-19Km from traditional care centre. The study shows that utilization of health care (and by proxy, malaria diagnostics and treatment), reduces as healthcare centre is further away from people (Awoyemi, Obayemi & Opaluwa, 2011).

In most rural communities, first level of care for fever cases is home management, either through GFATM funded HMM or patent medicine vendors. Often, caregivers visit health facility when there is no improvement. And according to NSMCP (2013), RDTs result will either be invalid or negative on a patient that are already been initiated with anti-malaria.

4.5 Financial Accessibility

Financial accessibility- "the relationship between the price of services (in part affected by their costs) and the willingness of ability of users to pay for those services, as well as be protected from economic consequences of health costs" (Peters et al. 2008:162).

This section presents financial accessibility with regards to: a) User's resources and willingness to pay b) Cost and price of services

4.5.1 User's resources and willingness to pay

There are several obstacles to access to public healthcare among which is the cost of treatment (Onwujekwe et al. 2008). User's resources and willingness to pay (Peters, 2008) concept has been applied to healthcare product such as contraceptive in Nigeria (Onwujekwe et al. 2000).

There is no documented evidence on willingness to pay (WTP) for RDTs in Nigeria other than a study conducted in Enugu state Nigeria, which shows that 51 percent were willing to commit their resources into RDTs in urban while 24.7 percent in the rural.

Also, urban dwellers were ready to pay 235.49 naira while 182.05 in the rural (Uzochukwu et al. 2010). This was before implementation of RDTs in Niger state. According Sulyman (2014), Niger state is made up of over 70 percent rural communities, rural dwellers are less (24.7 percent) likely to purchase RDTs compared to urban (51.0 percent) says Uzochukwu et al. (2010).

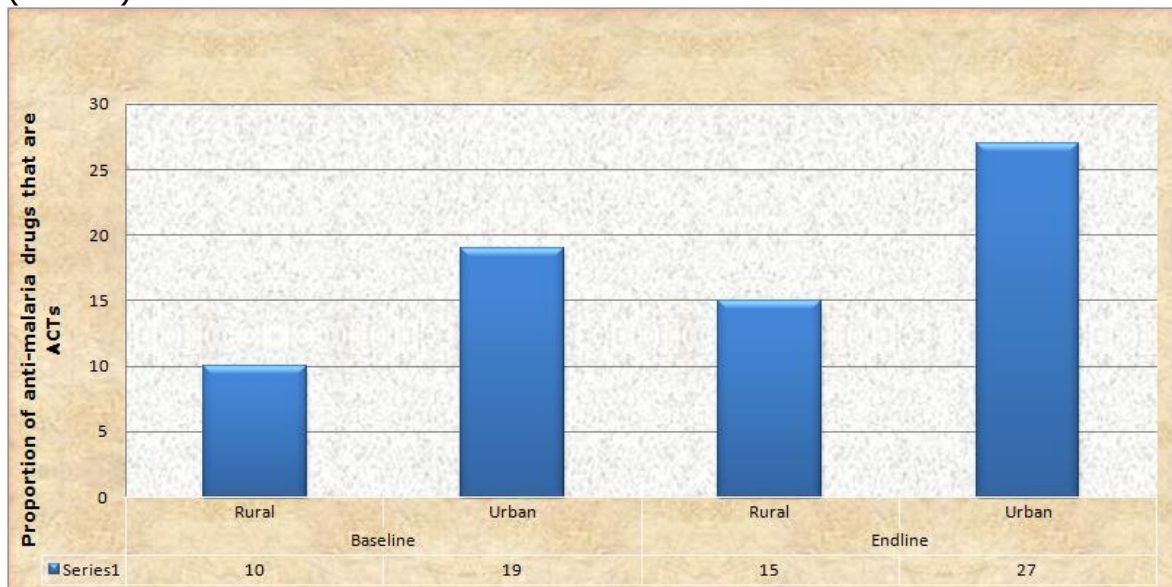
Similar study in Uganda shows that WTP is attributed to type of service; more are willing to pay for ACT at a drug shop than paying for RDT (Hansen et al. 2012)

4.5.2 Costs and price of services

RDTs implementation in Niger state is donor driven with implementation only at selected public health facilities and free to patient. If donor funds stop then access and affordability by patients to RDTs will be interrupted (Uzochukwu et al. 2010).

Prices charged for RDTs in the private sector in Niger state are unknown. In Lagos Nigeria, RDTs prices range from \$2.52 – \$16.81 USD while on average it costs 5.88 USD, this includes cost of charges on services such as diagnostic test but excluding consultation charges (Albertini et al. 2012).

Figure 4.1: Changes in ACTs use in Nigeria before and after subsidy (AMFm)



Source: Morris et al. 2014

Figure 4.1 above shows changes in ACT use in Nigeria before and after introduction of subsidized ACT (Morris et al. 2014). Affordable Medicines Facility-Malaria (AMFm) was an intervention implemented at the private sector by the GFATM to increase access to ACT and reduce financial burden through subsidy (Morris et al. 2014). The result (Figure 4.1) shows significant increase in the use of ACTs by comparing before and after AMFm launch in the rural and urban areas, it shows more impact in the urban than rural. Niger state is predominantly rural and less private practitioner establish in the rural. Therefore, impact of subsidy in Niger state rural communities will be insignificant. Price is a key determinant of use of ACTs, (Morris et al. 2014). And, this will be the case should subsidized RDTs available.

4.6 Availability

Availability as “having the right type of care available to those who need it such as hours of operation and waiting times that meet demands of those who would use care, as well as having the appropriate type of service providers and materials” (Peters et al. 2008:162). This section presents availability with respect to: a) health workers, drugs equipment, b) demand for services

4.6.1 Health workers, drug equipment

The test, treat and track recommendation of WHO means that ACTs and RDTs are required and should be available at appropriate quantity (WHO 2012). When RDTs were available in Niger state, there was a greater improvement in malaria case management at the primary health care level than noticed in the secondary (NSMCP, 2013).

The number of patients that service providers have to attend to daily influences his/her performance and also determines waiting time of individual patients at the health facility. Thereby influences presumptive treatment. On the bases of available health workers in Niger state as contained in Table 4.1, access to healthcare such as RDTs is definitely limited (NMCOP, 2013).

In a similar study in Osun state in Nigeria, Ajala, Sanni & Adeyinka (2005) stressed that the outcome of sparse access to health facility on justifiable growth can be epitomized by rate of person hour loss yearly to malaria which eventually reduce output of personnel. Also in Enugu state Nigeria, Uzochukwe & Onwujekwe (2004) says poor health facility accessibility contributes to self diagnosis and medication by people at the lowest wealth quintile and some opt for patent medicine vendors for treatment.

In Lagos state Nigeria, due to poor working condition in the public service and societal expectations (Lahmayer, 2004), health workers often seek for foreign opportunity leading to attrition of skilled labour in health. This syndrome (brain drain) has not infiltrate into public service of Niger state, or may not be noticed as most of uncomplicated malaria are often handled by personnel that hardly resign appointment- the lower level health workers (CHEWS or CHO).

Niger state health workers staff strength and categories are indicated in Table 4.1 below. Definitely, there is a gross shortage of human resource for personnel in Niger state overall, and those with training on malaria control are even fewer; ARFH trained 369 for RDTs (4 percent) personnel out of 9,083 that are directly in malaria control (NMCOP, 2013).

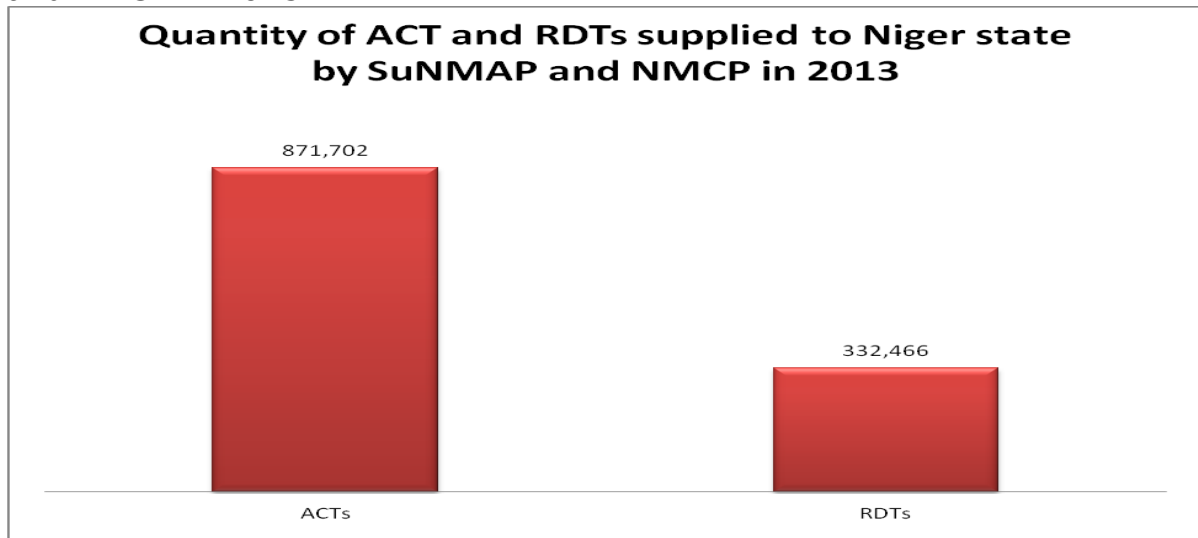
Table 4.1: Staff Strength in the state

Category	Total in the state
Doctor	235 (public = 167, private = 67)
Nurses/Midwives	2037
Pharmacists	130 (public = 49, private = 81)
Pharmacy Technicians	41
CHEWS	2779
Lab Scientists	128
Lab Technicians	43
CHOs	169
Environmental Health Officers	179
Social Welfare Workers	214
Registered PMVs	1200
Trained RMCs	400

Source: NMCOP, 2013

As shown in Figure 4.3 below, quantity of ACT and RDTs supplied by NMCP and SuNMAP in 2013 (871,702 of ACT as against 3322,466 of RDTs). This is a typical case whereby quantities of ACTs supplied are far more than accompanied RDTs to the service delivery points.

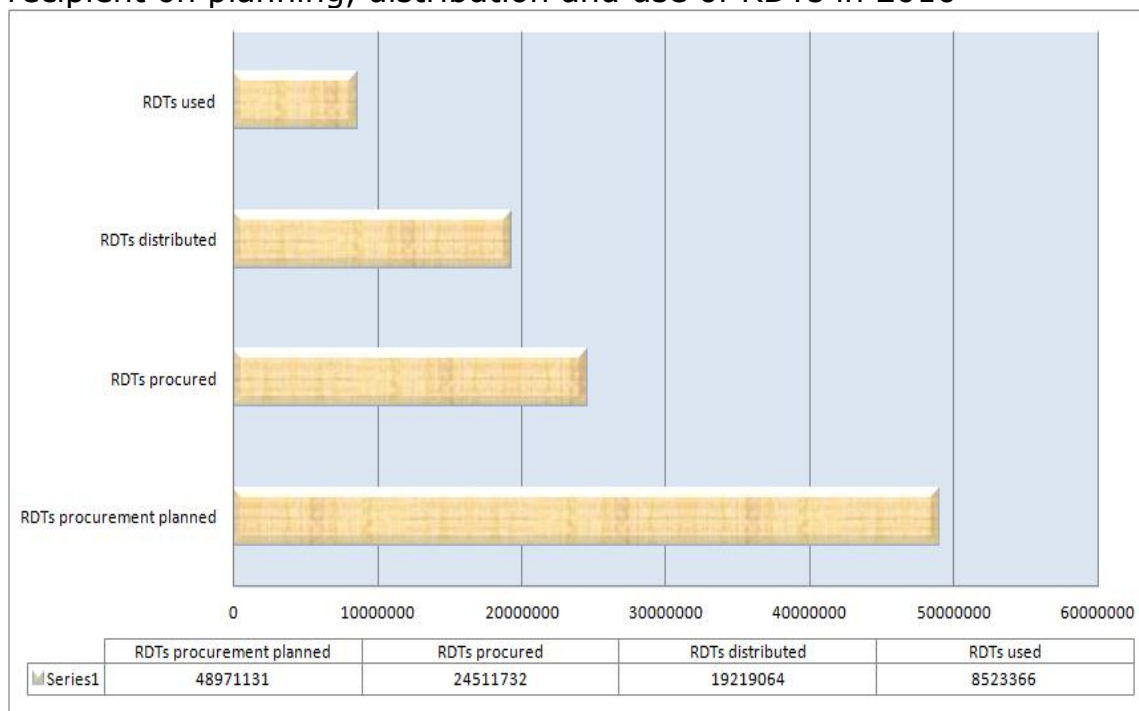
Figure 4.3: Quantity of ACTs and RDTs supplied to Niger state by SuNMAP and NMCP in 2013.



Source: NSMCP, 2013

As contained in the Figure 4.3, in an ideal situation quantity of RDTs should be more than ACTs in order to give room for wastages and invalid results. In 2010, ratio of RDTs to ACTs was approximately 1:3 by Global Fund and PMI also procured RDTs to ACTs in the ratio of 1:3 (President's Malaria Initiative, 2013). As at 2013, ratio of RDTs to ACTs procurement and distribution by major funding agencies are disproportionate.

Figure 4.4: Programmatic results reported by GFATM malaria grant recipient on planning, distribution and use of RDTs in 2010



Source: Zhao et al. 2012

Figure 4.4 above shows GFATM RDTs planned, quantity distributed and used in 2010 in all the recipient countries in African (Zhao et al. 2012). Only 9 of 19 percent distributed were used. Though this was in 2010, however, comparing Figure 4.4 with 4.3, accessibility to RDTs is still below expectation.

According to Onwujekwe et al. (2009), study conducted at hospital and non-hospital settings (Example: maternity homes) prior to the release of WHO’s guideline, diagnosis of malaria is mainly done clinically (52 percent) and use of microscopy (34.5 percent) while RDTs were not used (0 percent). Similarly, study on availability of RDTs in private facilities (clinics, pharmacies, private outlets, and laboratories) in Lagos Nigeria shows that only four out of one hundred and twenty (4/120) had RDTs in stock (Albertini et al. 2011).

According to finding from HMIS, in 375 Niger state supported health facilities with RDTs, 77 percent of patients with fever received parasitological confirmation with RDTs (NSMCP M&E database, 2013). This may be due to poor access to RDTs as shown in Figure 4.3 above, not all patient that presented fever were tested.

Irregular and disproportionate supply of RDTs and ACTs in both public supported healthcare facilities is the major constraint in the implementation of RDT and quality of care in Niger state (ARFH, 2013). Table 4.2 below shows an example.

Table 4.2: Summary of First Quarter 2012 Stock Report		
Month	Percentage of Health facility stocked out of ACT	Percentage of Health facility stocked out of RDTs
January	76%	100%
February	94%	100%
March	0%	100%

Source: ARFH, 2012

In the first quarter 2012, there were no RDTs in the public health facilities even ACT depleted until replenishment in March. Niger state stock supply pattern aligned with Zhao et al. (2012) study findings that roll out of RDTs is always behind roll out of ACTs.

ACTs and RDTs are supplied to health facility on quarterly bases in the ratio of 3:1 (217,926 of ACTs: 83,117 of RDTs). In a health facility with high patient flow, it takes RDTs only two weeks to be out of stock. While in general RDTs are out of stock by the third week of every month (ARFH, 2013).

According to supportive supervision report of ARFH (2013), stock out of HMIS tool constitutes accessibility constraint to knowing actual number of services provided and people reached. HMIS tools availability is dependent on supplies from NMCP and donors (NMCOP, 2013).

4.6.2 Demand for services

Pregnant women (PW) with confirmed malaria also demanded for ACTs. However, only PW in the second and third trimester can be issued ACTs. This practice was found in line with Mens (2013) recommendation on malaria treatment for PW. Similarly, HMM is a strategy for prompt treatment of children under five, however findings show that adults also demand for treatment from RMCs (ARFH, 2013). There is no data available on demand for RDTs, but relevant information is covered in the following section on user's attitudes and expectations.

4.7 Acceptability

Acceptability according to Peters et al. (2008:162) is defined as “the match between how responsive health service providers are to the social and cultural expectations of individual users and communities.” This section presents: a) User’s attitude and expectation, b) Characteristics of health services

4.7.1 User’s Attitude and Expectations

Qualitative study on malaria diagnosis has not been conducted in Niger state but in similar settings, these are findings: Ughasoro et al. (2013) shows that in Enugu state Nigeria, severe fever prompts caregivers and parent to pressurize health workers to treat children presumptively. It is always difficult for women to wait for test result when their child is severely sick such as vomiting and inability to eat food.

Another attitude of user is their perception about malaria; they strongly believe symptom is enough to conclude on malaria. Accessibility to RDTs at health facility also influence their behaviour, their opinion is that if test result is negative, something [drug] must be given to the sick person (Ughasoro et al. 2013). Another study in Uganda found the same: here patients believed that symptoms such as shivering, excessive body temperature, diarrhea, and vomiting were enough to detect malaria (Mukanga et al. 2010).

Another study shows that the presence of mosquitoes in patient’s room or environment influence their health seeking behaviour, such that when they are feverish they quickly conclude that mosquitoes’ bites in the previous night must have contributed to their ill health hence asked physician to prescribe anti-malaria without confirmation (Baiden et al. 2012).

Though, there was no study on RDTs perception in Niger state. However, in Africa setting especially in the rural areas, myths influence people’s behaviour and practices. According to Mukanga et al. (2010), most people are willing to confirm whether they truly have malaria but there are misconceptions about drawing blood from them or their children. Their perception is that infections such as HIV could be introduced into their body in the process of taking blood from them or their children or the same blood drawn for malaria could also be used to test for HIV (Mukanga et al. 2010).

Furthermore, often disclosed anxiety was that the blood could get into the enemy’s hands and be used for witchcraft. Blood is used for sacrifice or bewitchment if it gets to enemy’s hand (Mukanga et al. 2010).

Personal experience from my supervisory visits to HFs in Niger state indicates that expectation of patient and caregivers is that when service provider conduct RDT on them ACT should be available for treatment should incase they are positive. However, in Niger state, at times RDTs will be available while ACT will be out of stock or vice versa. So when expectation of patients is not met with regards to treatment and RDT availability, it influences subsequent acceptance of test as they are not sure if treatment will be given.

4.7.2 Characteristics of Health Services

Among other factors related to acceptability of health services are: lack of or none adherence to patient scheduled time, and patients not have been attended to in accordance with time of visit to health facility for healthcare. Another characteristic are: lack of modern equipment and short duration of consultation (Megbelayin et al. 2013).

A similar study conducted in Kano state Nigeria (setting similar to Niger state) on patients' satisfaction with healthcare services, shows that 70 percent of respondents expressed satisfaction with health workers behaviour, while 30 percent expressed dissatisfaction with long waiting time (Illiyasu et al. 2011).

As against Burkina Faso study that shows that at peripheral health facilities, health workers are faced with challenges of adhering to guidelines (Dini & Bell, 2008). In Kenya, lower level healthcare providers adhered to guidelines than the experienced staff (Zurovac et al. 2004). In Niger state, 2013 programmatic report shows that irrespective of staff cadre, adherence to guidelines was not the constraint but rather availability of guidelines and RDT (ARFH, 2013).

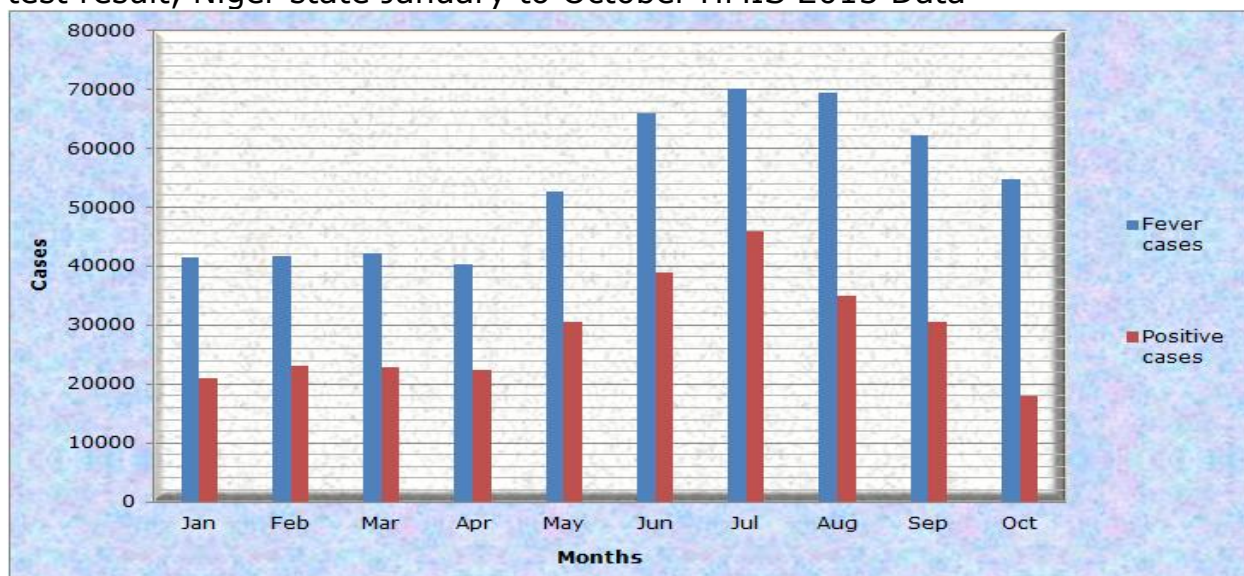
In addition, accepting RDTs result is subject to disposition of health workers Baiden et al. (2012), and patient to health workers ratio Chandler et al. (2008).

4.8 Quality

According to Peters et al. (2008:162), "quality of care is at the center of the circle of all four dimensions of access to health services, because it is an important component of each dimension and is ultimately related to the technical ability of health services to affect people's health."

This section examines quality from perspectives of four dimensions of health services, these following shall be considered: quality of data, care, staff, time it takes to access services and personnel, data collection tools, supplies and equipments.

Figure 4.5: Number of patients with fever as against number with positive test result, Niger state January to October HMIS 2013 Data



Source: NSMCP, 2013

Figure 4.5 above shows number of patients with fever cases as against number confirmed in the 375 HFs that have RDTs available. Without RDTs everyone that presented malaria symptoms would have been treated, with the use of RDTs only 53 percent required treatment. This is contrary to another study in Oyo state Nigeria by Ige & Ayandipo (2014) that says there is no difference between ACT prescription rates before and after RDTs roll out despite increased testing.

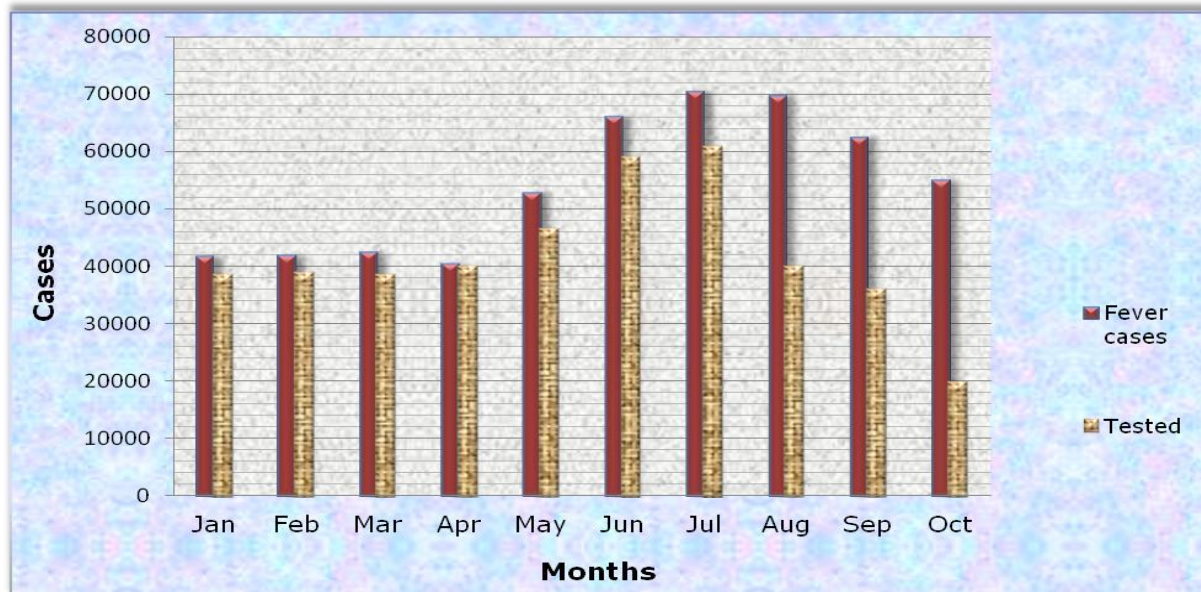
To improve quality of data the state in collaboration with implementing partners (IPs) conducted training at all supported HFs on malaria case management, logistics and health management information System (HMIS) tools. This training helps service providers to understand indicators such as: persons presenting with fever and tested using RDTs, persons tested positive for malaria using RDTs and so on. At the private sector, SFH also built capacity of personnel responsible for data management (NMCOP, 2013).

In addition to number of staff trained as explained earlier, HMIS data capturing tools were also procured. In order to facilitate reporting on services such as diagnosis and treatment, nearly one million of malaria reporting (HMIS) and Logistic Management Information System (LMIS) tools were produced and distributed by the state government and implementing partners (NMCOP, 2013).

Accessibility to RDTs from service provider’s perspective is subject to a number of factors such as: knowledge and availability of the guidelines at the point of use. It was discovered by national M&E team that treatment guidelines are scarcely available at the service delivery points or at times, it is been kept at home by the head of the health facility or locked up at the health facility. The guidelines language (English) may require interpretation to some providers at lower and private healthcare of which there is no provision currently (NMCOP, 2013).

To improve quality of case management, supportive supervisions was initiated and conducted on monthly and quarterly bases by ARFH, SuNMAP, NMCP, and the state malaria control team. The LGA routinely support health facilities while the state team visits LGA and HFs monthly. NMCP and IPs visit the state and HFs on quarterly bases (NMCOP, 2013).

Figure 4.6: Number of patients with fever versus parasitological confirmation of malaria with RDTs, Niger state, January to October 2013 HMIS



Source: NSMCP, 2013

As shown in Figure 4.6 above, not all patients with fever that attended the 375 supported HFs received test from January to October, although this is

contrary to WHO diagnosis and treatment guidelines and it is a quality issue for malaria case management. It also reflects malaria seasonal pattern of Niger state as more cases were recorded in the months of May to September. There was a drop in testing rate from August to October due to depletion in RDTs stock (NSMCP, 2013).

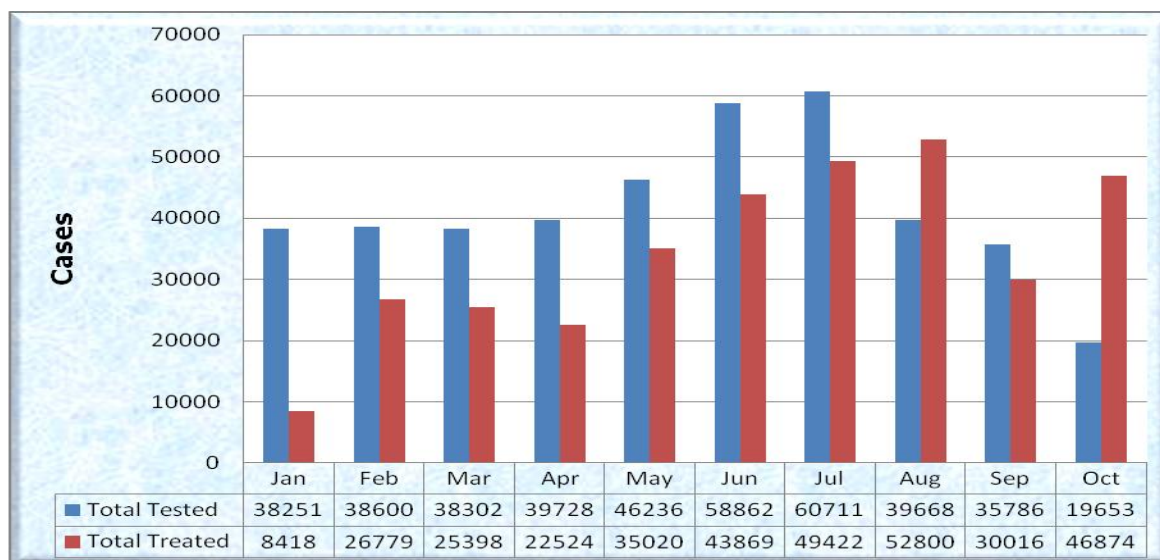
Figure 4.7: Patients tested Positive using RDTs as against number of patient treated at health facility, Niger state January to October, 2013 HMIS



Source: NSMCP, 2013

Figure 4.7 shows inherent quality issue with treatment and diagnosis. As number of patients treated in the months of May to August and in October are more than patients tested positive even when HMM data was excluded.

Figure 4.8: Total patients tested with RDTs as against total patients treated at health facility, Niger state January to October 2013 HMIS



Source: NSMCP, 2013

As shown in Figure 4.8, in the months of August and October, number of patient treated are more than tested. It reveals presumptive treatment and same time shows RDTs stock pattern. Further investigation shows depletion of RDTs at the central store (NSMCP, 2013).

Another factor that affects quality healthcare delivery is the inability of Niger state malaria control programme and partner to quantify accurately actual commodity required by the state which is as a result of inconsistent consumption data. Commodity management including tracking of ACT and RDTs; and appropriate use of bin card, request and requisition form are difficult to handle by the peripherals health facilities (NMCOP, 2013).

Time interval between training of health worker for RDTs and actual implementation contributes immensely to quality of testing, in Niger state, RDTs training was conducted in July 2011 while implementation commenced in June 2012 (ARFH, 2013).

4.9 Best practices that enhance the use of RDTs

4.9.1 Using Community Health Worker (CHWs) to implement RDTs

In Living Stone District of Southern Province Zambia, 2007 to 2008, Community health workers (CHWs) were trained to use RDTs and reading of slides correctly based on training guidelines. They were supplied with job aids, RDTs, consumables, and were supervised. Paracetamol was supplied for fever cases but negative RDTs result. Follow-up visits were paid to CHWs at 3rd, 6th and 12th months (Counihan et al. 2012).

Uses of photographs that display RDTs with positive test result, negative and invalid were used to examine if CHWs can correctly identify results accurately. Findings show that CHWs correctly identify results at 3rd months (87.7 percent) and at 12th months (100 percent). Also, interpretation of faint positive result drops to 76.7 percent at 12th months. The study summarized that: training, supplies (RDTs, job aids, consumables) and supervision can increase correct use of RDTs (Counihan et al. 2012).

4.9.2 Regular supply of ACT and RDT

In a qualitative study conducted in Ghana in 2010, health worker (H/W) narrated her experience with how patient rated her health facility higher than others due to presence of RDTs and ACT. It increases confidence of patients including acceptance of RDT results and judgment of health workers on patients' condition. Another health worker said that the availability of RDTs makes patients think the health facility has been upgraded with new technology and thereby increase patient turn out for services (Chandler, Whitty & Ansah, 2010).

The study further explains how only availability of commodity will not sustain adherence but should be combined with effective communication and respect for patient. Another study shows that patients perceived accessibility of RDT ("Machine") as advancement in the malaria case management with regards to diagnosis and treatment (Baiden et al. 2012). In order to achieve and sustain this confidence, a regular supply of ACTs and RDTs is required.

4.9.3 Stock monitoring

In South Africa, study shows that healthcare providers routinely carryout stock monitoring such as stock card (bin card, request and requisition forms) and electronic such as logistic management information system (LMIS). Commodity room temperature was monitored with thermometer, and regularly update temperature chart. Where possible RDTs were air-conditioned, and ensured that RDTs kit that arrived first was used before new ones. The study showed that this measure influence appropriate use of RDTs (Moonasar et al. 2007).

4.9.4 Education

Study conducted in Southeast Nigeria shows that willingness to pay for RDTs increased with education of healthcare users, so more patients in the urban (who are overall better educated) are willing to pay for RDTs more than patients in the rural settings (Uzochukwu et al. 2010). This aligned with NDHS 2013 that shows increase in educational status of women correlate with increased antenatal care by skilled providers and health facility delivery

(NDHS, 2013). Though, in Niger state RDTs and ACTs are free, increased knowledge of people on RDTs will facilitate accessibility (ARFH, 2013).

4.9.5 Social marketing increases RDTs utilization

A study conducted in Uganda from March 2011 to April 2012, showed an increase in RDTs utilization with social marketing strategy. Uganda benefits from AMfm since 2011. The study took place in 67 villages and in 108 registered shops. The shop owners were trained for RDTs administration, through them data such as: RDTs purchases, sales, number of patient positive, negative and fee charging per patient for RDTs were retrieved.

Monitoring checklist for shop owners was applied to ascertain that RDTs were administered appropriately, handle sharps and other waste accordingly; and how shops integrate RDTs in their sales. The procedure involves training identified shops owner, equipped them with 40 RDTs, and sharps disposal box at the end of the training. At the end of the training, the shop owners were given free gloves for every RDT purchased. And, they were attached with RDTs wholesaler who subsequently supplies them with RDTs. The result showed that approximately over 2,200 RDTs were sold monthly (Cohen et al. 2012).

5 CHAPTER FIVE: DISCUSSION

This chapter presents discussions on the studies in chapter 3 and 4 vis-à-vis objectives 3 and 4 in the order of key elements of Peters et al. (2008) conceptual framework and best practices in optimizing malaria RDTs and treatment.

5.1 Policy and macro environment

The framework was adapted and not adopted because Peter et al. (2008) used 'policy' but WHO 2010 on diagnosis says 'guidelines' and so also Nigeria NMCP.

The study reveals that Nigeria NMCP five years strategic plan that contains diagnosis and treatment guidelines partly aligned with WHO 2010 guidelines on diagnostic and treatment. It is important to mention that the guidelines are embedded in strategy plan FMOH & NMCP (2008) and adopted by Niger state.

The guidelines was extracted from the strategic plan and produced for service providers. It is partly aligned because on children under five, clinical approach is allowed where RDTs is not readily available. However, in practice even when RDTs are available, children are still diagnosed clinically in Niger state, whereas WHO 2010 guidelines says confirmatory test in all age groups.

GFATM strategy on HMM is similar to presumptive treatment of children at home as contained in the NMCP's strategic plan. This involves case management without parasitological confirmation. RDT implementation has not been included in HMM in Niger state unlike in Sudan where RDTs roll out improved case management. A study in Uganda on HMM and RDTs concluded that implementation at community will require community acceptance.

Also, the guidelines is currently been observed in donor funded health facilities whereas the guidelines (NMCP) says should be in all section of the population (private and public HFs).

Accessibility to test (RDTs) and inadequate availability of diagnosis and treatment guidelines at service delivery points has been the major challenge. In Niger state, awareness of diagnosis and treatment guidelines at the health facility with evidence of the presence of guidelines is hardly obtainable except in a donor funded health facility.

Since Niger state Government has not been able to cover its HFs, to expand RDTs utilization to private sector, will require social marketing strategy as described by a study in Uganda under best practices section.

5.2 Individual and household characteristics

There is a relationship between literacy and education, and uptake of healthcare services are influenced by higher education. Literacy level of Niger state could constitute access barrier to implementation of RDTs.

Caregiver with low level of education is characterized by inability to handle childhood fever. This reflects in delay healthcare seeking at HFs and eventual aggravate severe fever that prompt them to pressurize physician to initiate treatment without parasitological confirmation.

Age on the other hand, tends to limit roll out of RDTs in Niger state as children under five are not completely covered. As when fever becomes severe (at the state of convulsion, vomiting and weakness), parasitological confirmation is often waved. Whereas in adult irrespective of the severity of fever and in as long as RDTs is available test often done.

5.3 Geographical accessibility

According to demographic profile mentioned in chapter 1 and available HFs where RDTs is been implemented, it is obvious that access is a serious challenge to many people. Besides the limited implementation HFs, Niger state wideness and areas covered by water can impede RDT implementation.

Religious practice such as purdah in the predominant Muslim Niger state has the capacity to limit women from accessing malaria RDTs (Hugo, 2012). Although this practice contradicts WHO view of access to healthcare as human right (WHO, 2005). But on ethical grand and according to Nigeria constitution that allows freedom of religious, purdah cannot be challenged.

Access to RDTs has not been extended to malaria management at the community through HMM. As long as treatment of the most vulnerable group of the population such as children continues to be presumptive, there will be setback to WHO' diagnosis and treatment guidelines. If Sudan can implement RDT successfully at the community level then it can be done in Nigeria.

Similarly, access to RDTs at the private sector in Niger state is neglected. There is need for collaboration such as public and private partnership in order to expand RDTs implementation without which improving access to RDTs will be difficult to achieve.

In most rural communities, first level of care for fever cases is home management, either through GFATM HMM strategy or patent medicine

vendors. Often, caregivers visit health facility when there is no improvement in fever. Problems with RDTs result occurs when patient who should be tested before treatment decides to initiate anti-malaria drug (NSMCP, 2013).

5.4 Financial accessibility

Willingness to pay (WTP) is subject to availability of fund and type of service. In Enugu state study, response to WTP in the rural is poor compared to urban. 70 percent of Niger state people live in the rural area and are predominantly farmers of subsistence scope; in this case their WTP will be similar to Enugu. WTP is also attributable to type of service, from study conducted in Uganda; patients are willing to pay for ACT than RDTs.

WTP is also attributable to knowledge of the product and knowledge is linked to public awareness. In Niger state, awareness is still poor due to inadequate funding from the state Government.

Patient Level of knowledge of testing before treatment is also manifest in their willingness to pay for health care products, patients are willing to pay for ACTs in private health facilities than paying for RDTs. Simply because they know ACTs cures malaria but awareness on importance of testing with RDTs is still low.

Children are the most vulnerable to malaria and are largely left out in the implementation of RDTs with increasing home management of malaria. Since not all fever is malaria in Niger state; therefore investment in RDTs will be a worthwhile venture.

5.5 Availability

One of the key evidence of service delivery is the record of services provided and documented in the HMIS tools (registers, forms, bin cards). As these constitute vital documents for planning and commodity forecasting including RDTs. Findings indicate that inability of service providers to document appropriately negatively influences requisition. This is a common phenomenon in peripheral HFs in Niger state.

On several occasions ACTs are supplied to Niger state from NMCP before arrival of RDTs. The quantity of ACTs are far beyond RDTs, this is quite worrisome, as if the agency supplying ACTs is different from the one supplying RDTs. In an ideal situation, RDTs quantity should outnumber ACTs due to likelihood of invalid result and damages.

In Niger state, findings from 2013 HMIS data (January to October) analyzed show that 53 percent of patients with fever are positive of malaria (see Figure 4.5 above), thereby reduced ACT prescription. Therefore, availability of RDTs influences ACTs prescription patterns. This is in line with similar studies in Uganda and Zanzibar; there is a growing evidence that availability of RDTs reduce ACT prescription.

Availability of qualified personnel was an issue in healthcare delivery in Niger state. On malaria diagnosis, one person per health facility was trained, which means that during annual leave or sick leave of trained staff, diagnosis using RDTs will be put on hold. Training manual contains information that enables trained person to step down the training to his/her colleagues at health facility for purpose of continuity of service. However, due to fear of job insecurity they hold on their knowledge which exacerbates RDTs implementation.

5.6 Acceptability

Emotion could be very difficult to manage when things get bad with infant especially to parents who had lost a baby or witnessed one. Waiting for a test result or believe a negative test result when an infant is weak, and cannot drink or eat can be easy said than done.

Due to inability of some caregivers and parents to differentiate symptoms of malaria from other childhood sickness prompt them to conclude on every feverish condition as malaria. To the extent that if a child has cough they initiate malaria treatment. In a qualitative study as mentioned earlier, respondents opined that something [drug] must be given to a sick child. Most of health facilities (85 percent) in Niger state are primary health centers whereby further investigation of the cause of ill health cannot be performed. In a situation like this, there is only one option for fever cases in children which is treatment whether the patient is positive or negative of using RDTs.

Also accepting test result is also dependent on disposition of the healthcare providers as some attribute ill health to carelessness on the part of the patient. Some care providers insult patient or accuse them of negligence. This attitude is more towards the poor patient at the health facility.

Also to some health care providers, symptoms outweigh test result which drives them to prescribe anti-malaria even with negative RDTs result.

In Niger state, donors and partners are at the driver's seat in the implementation of RDT and ACT such as: (procurement, distribution, capacity building and program management). Though, there are efforts

made by the state government however rolling out diagnosis and treatment according to WHO's guidelines may be herculean task without donor's support. External funding is not sustainable, therefore price and cost of complete malaria treatment course will continue to inhibit RDTs acceptance.

5.7 Quality

Quality with respect to accessibility to RDTs in Niger state cannot be guaranteed as long as state government investment is low, poor political will and supplies by donors are not regular. As shown in Figure 4.3 above, ACTs are given more priority than RDTs in terms of procurement and distribution patterns. Though, it is freely supplied to 375 health facilities, accessibility by users is dependent on availability at the point of need. When there is no supply from donor then the health facilities return to presumptive treatment or few ones that have microscopic laboratory.

High Patients health facility attendance for malaria and related illness compare to number of available health workers has the capacity to negatively influence decision on diagnosis. Quality issue includes proportion of patient treated as against confirmed cases, it was discovered that even when there is RDTs, there are cases of presumptive treatment. Approximately 9 percent cases of presumptive treatment are recorded, though this could be due to stock out of RDTs or pressure from patients.

Caregivers' knowledge of malaria symptoms and fever influence their decision on the outcome of RDTs negative result as patients still request for anti-malaria prescription. Pressure from caregivers and parents especially when their child is severely sick affect quality of care and health worker's decision on test result. This attitude is common in women with low level of education. As it has been documented that uptake of contraceptive, vaccination, antenatal care are positively influenced by high educational achievement of women.

Quality of RDTs result (positive, negative, invalid) are subject to fever case management. If patient decides to commence treatment before confirmation, quality of test will be altered. This is a common occurrence in the rural communities; they turned to health facility when all efforts had failed. They value their time and occupation than time visiting health facility.

Quality is influenced by knowledge of diagnosis and treatment guidelines, findings shows that access to guidelines are limited to public health facilities that are supported by the donors. Also, after five years of the existence of

the guidelines not up to half of the personnel at the public HFs have been trained on the use of RDTs and most them are through external funding.

Findings show that when HMIS tools (register, forms, cards) are out of stock, health workers use exercise notes to record services provided and sometimes use attendance to health facility or previous record to estimate. There is no way exercise note will be able to capture accurately all indicators and other data elements in the HMIS. Estimation or use of past record for present case management record cannot give accurate Figure. These are all quality issues.

Niger state is a state to showcase in home management of malaria intervention courtesy of Association for Reproductive and Family Health (GFATM sub-recipient). But treatment without testing contradicts WHO guidelines. If RDTs' roll-out can be integrated into community case management as it has been done in a similar setting like Sudan, Nigeria and Niger state can do same with her HMM intervention efforts.

6 CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

With support from NMCP, donors and implementing agencies, Niger state is progressing in malaria control. However, to have the state free of malaria by year 2020 as enshrined in the state governors vision 3-20:20 according to State of service address, (2008), concerted efforts and commitment will be required by the state government.

There is a general acceptance among the population of finger prick for RDTs. However, acceptance of result is an issue, especially when fever is severe. Associated factors that influence acceptance are lagging behind, such as availability of RDTs and ACT.

Commodity stock outages are a common occurrence at health facility supported due to irregular supply. Consumption rate per facility has not been established, and stock management is weak at the peripheral level due to poor adherence to logistic management information systems. Although the state government procures ACTs, the supply is like a drop in the ocean.

When ACT is out of stock, patients see no reason for testing without treatment. Therefore, acceptance of diagnosis using RDT is dependent on availability of RDTs Kits and ACTs.

If parasitological confirmation (using RDTs) of malaria has been adopted in Niger state, after almost half a decade, why then is that Niger state Government has not procured RDTs?

On the part of donors, it is necessary to find out if they understand programmatic implications of irregular and disproportionate supply of ACTs and RDTs. Or there is a need to understand memorandum of understanding that the state Government signed with donor.

Accessibility to RDTs result is motivated by perception of both patients and health care workers. When patient perceived that his/her fever is due to previous mosquitoes bites, negative RDT result will not be sufficient to convince the patient. Also, to some healthcare providers, patient symptoms outweigh negative RDT result.

The profit motive of registered private pharmacies (70) and patent medicine vendors (1200) in the state is a force that must be taken into consideration. With them, anti-malaria drugs are rarely out of stock, and they are often the

patient's first point of contact even before visiting a health facility. Although SFH is implementing GFATM activities at the private sector, still RDTs have not been integrated. This is a major barrier to RDTs implementation in Niger state, as well as other African settings.

Investment in RDTs by the state Government will be a worthwhile venture as it has been shown that only 53 percent of fever cases presented require ACTs.

The need for personnel, commodities and available health facilities is definitely reduced for healthcare services that include RDTs.

Supply in terms of personnel, commodity and available health facilities are definitely less than demand for healthcare services including RDTs.

Malaria case management data are often from public health facilities. Much activity within the private sector is not captured; the few instances reported are donor funded (GFATM/SFH). Private sector actors that are not been supported or recognized will not see the need to report data to the state government. Niger state can do simple things like letter of recognition to private health facilities (PMVs, pharmacies), invitation to stakeholders meeting, capacity building, and distribution of HMIS tools. These will motivate them to report on their activities.

6.2 Recommendations

- Health workers from non donor funded HFs should be trained on diagnosis using RDTs and be supplied with diagnosis and treatment guidelines.
- Expand access to malaria RDTs to HMM through awareness campaign to the community this should include education, training of RMCs and equipped them with RTDs.
- The diagnosis and treatment guidelines are in English language, considering health workers at lower levels such as health post and RMCs, the guidelines should be translated into local languages for easy understanding.
- Establish consumption data on RDTs and ACTs that will inform quantity of commodity required at each level of healthcare and number required for procurement.
- Invest in the procurement and proportionate distribution of RDTs to the HFs especially non-funded HFs and provide for donor funded during stock outages.
- The state government in collaboration with donors should support capacity building for private HFs on malaria diagnosis using RDTs and cascade RDTs use through social marketing strategy at the private sectors.
- Use existing platform (media, health systems, Community based organizations, etc) to increase awareness and importance of RDTs in the case management of malaria.
- Continuous supportive supervision such as visit to health facilities, phone calls, and institutionalized feedbacks mechanism to increase data quality and malaria case management. Quality data will support RDTs and ACTs forecasting.
- Increase information, education and communication messages to the general public (especially caregivers/women) on prompt response to childhood fever.

- Sustainability plan should be put in place should the donor decides to withdraw or reduce support to the state.
- Procurement and distribution of RDTs should accompany ACTs and should be in proportion that will allow invalid results, breakages and re-testing using RDTs.
- Donors supporting Niger state should be reminded of WHO and NMCP's guidelines on diagnosis and treatment. Therefore, their commodity should be supplied in a proportionate quantity, bearing in mind invalid, and damages of RDTs.

REFERENCES

Ajala, OA, Sanni, L, Adeyinka, SA, 2005 'Accessibility to health care facilities: A panacea for sustainable rural development in Osun State Southwestern, Nigeria' *J. Hum. Ecol.*, 18(2): 121-128 (2005).

Albertini, A, Djalle, D, Faye, B, Gamboa, D, Luchavez, J, Mationg, ML, Mwangoka, G, Oyibo, W, Bennet, J, Incardona, S, Lee, E 2012 'Preliminary enquiries into availability, price and quality of malaria rapid diagnostic tests in the private health sector of six malaria-endemic countries' *Tropical medicine and International Health*, vol. 17, No. 2, pp 147-152. doi:10.1111/j.1365-3156.2011.02904.x,

Ansah, E, Epokor, M, Whitty, CJ, Yeung, S, Hansan, KS 2013 'Cost-effectiveness analysis of introducing RDTs for malaria diagnosis as compared to microscopy and presumptive diagnosis in central and peripheral public facilities in Ghana.' *Am J Trop Med Hyg* 89: 724-736.

Association for Reproductive and Family Health 2010, 'Narrative report of activities by Association for Reproductive and Family Health (ARFH)-Sub-recipient to NMCP on the Global Fund (GF) Round 8 Malaria Project': Period of Reporting- March-2010, Central Area, Abuja, Nigeria

Association for Reproductive and Family Health 2010, 'Narrative report of activities by Association for Reproductive and Family Health (ARFH)-Sub-recipient to NMCP on the Global Fund (GF) Round 8 Malaria Project': Period of Reporting April to June 2010, Central Area, Abuja, Nigeria.

Association for Reproductive and Family Health 2012, 'Narrative report of activities by Association for Reproductive and Family Health (ARFH)-Sub-recipient to NMCP on the Global Fund (GF) Round 8 Malaria Project': Period of Reporting- March-2012, Central Area, Abuja, Nigeria.

Association for Reproductive and Family Health 2013, 'Narrative report of activities by Association for Reproductive and Family Health (ARFH)-Sub-recipient to NMCP on the Global Fund (GF) Round 8 Malaria Project': Period of Reporting- March-2013, Central Area, Abuja, Nigeria.

Association for Reproductive and Family Health 2014, *Role Model Caregivers: The Real Heroes of Community Management of Malaria in Northern Nigeria*, Viewed 19 May 2014, < <http://reliefweb.int/report/nigeria/role-model-caregivers-real-heroes-community-management-malaria-northern-nigeria>>

Awoleye, JO 2011 'Trip report of supportive supervision to Bayelsa, Kaduna, Niger and River state health facilities' Association for Reproductive and Family Health, Abuja, Nigeria.

Awoleye, JO 2012 'Monitoring and evaluation of malaria in the riverine communities of Bayelsa state of Nigeria' <<https://www.usaidassist.org/resources/monitoring-and-evaluation-malaria-riverine-communities-bayelsa-state-nigeria>>

Awoyemi, TT, Obayemi, OA, Opaluwa, HI, 2011 'Effect of Distance on Utilization of Health Care Services in Rural' *J Hum Ecol*, 35(1):1-9 (2011)

Baiden, F, Owusu-Agyei, S, Okyere, E, Tivura, M, Adjei, G, Chandramohan, D, Webster, J, 2012 'Acceptability of Rapid Test-Based Management of Malaria among Caregivers of Under-Five Children in Rural Ghana' *PLoS ONE* 7(9): e45556. Doi: 10.1371/journal.pone.0045556.

Bastiaens, GJ, Schaftenaar, E, Ndarro, A, Keuter, M, Bousema, T, Shekaleghe, S 2011 'Malaria diagnostic testing and treatment practices in three different Plasmodium falciparum transmission settings in Tanzania: before and after a government policy change.' *Malar J* 2011, 10:76.

Chandler, CI, Jones, C, Boniface, G, Juma, K, Boniface, G, Juma, K, Reyburn, H Whitty, CJM 2008 'Guidelines and mindlines: Why do clinical staff over-diagnose malaria in Tanzania?' A qualitative study. *Malar J*, 7. P. 53 ISSN 1475-2875

Chandler, CI, Whitty, CJM, Ansah, EK, 2010 'How can malaria rapid diagnostic tests achieve their potential? A qualitative study of a trial at health facilities in Ghana' *Malaria Journal* 2010, 9:95.

Cohen, J, Dupas, P, Shaner, S 2012' Price Subsidies, Diagnostic Tests, and Targeting of Malaria Treatment: Evidence from a Randomized Controlled Trial' Viewed 12 June 2014, <<http://www.povertyactionlab.org/publication/price-subsidies-diagnostic-tests-and-targeting-malaria-treatment-evidence-randomized-con>>

Cohen, J, Fink, G, Berg, K, Aber, F, Jordan, M, Maloney, K, Dickens, W 2012 'Feasibility of distributing RDTs for malaria in the retail sector: Evidence from an implementation study in Uganda' <<http://www.plosone.org/article/fetchObject.action?uri=info%3Adoi%2F10.1371%2Fjournal.pone.0048296&representation=PDF>>

Comoe, CCC, Ouattara, AF, Raso, G, Tanner, M, Utzinger, J, Koudou, BG, 2012 'Willingness to use a rapid diagnosis test for malaria in a rural area of central Cote d'Ivoire' *BMC Public Health* 2012, 12:1089.

Counihan, H, Harvey, SA, Sekeseke-Chinyama, M, Hamainza, B, Banda, R, Malambo, T, Masaninga, F, Bell, D 2012 'Community health workers use malaria rapid diagnostic test (RDTs) safely and accurately: Results of a longitudinal study in Zambia' *Am J Trop Med Hyg.* Jul 1, 2012; 87(1): 57-63.

Dhacko, I 2012 Nigeria: Babangida Aliyu- *Actualizing the vision 3- 20:20*, leadership, Abuja, viewed 10 July 2014 <<http://allafrica.com/stories/201211010190.html>>

Dini, L, Bell, D 2008 'Malaria rapid diagnostic tests: A revolution and challenge for management of febrile disease' *CME* 2008, vol.26, No.6 : 297-298.

Dixon, T, Ezeenduka C, Saleheen, S, Watson M 2012 *Human development resource centre: 4th Annual Review of the DFID Support to the National Malaria Programme SuNMAP.* Viewed 27 July 2014, <iati.dfid.gov.uk/iati_documents/4184434.doc>

Elmardi, A, Malik, M, Abdelgadir, T, Ali, SH, Elsyed, AH, Mudather, MA, Elhassan, AH, Adam, I 2009 'Feasibility and acceptability of home-based management of malaria strategy adapted to Sudan's conditions using artemisinin-based combination therapy and rapid diagnostic test' *Malar J* 2009, 8:39.

Encyclopedia Britannica 2014 'Purdah' Viewed 12 July 2014, <<http://www.britannica.com/EBchecked/topic/483829/purdah>>

Ezeoke, OP, Ezumah, NN, Chandler, CC, Mangham-Jefferies, LJ, Onwujekwe, OE, Wiseman, V, Uzochukwu BS, 2012 'Exploring health providers' and community perceptions and experience with malaria tests in South-East Nigeria: a critical step towards appropriate treatment' *Malaria Journal* 2012, 11:368.

Federal Ministry of Health, National Malaria Control Programme 2008, *A road map for malaria control in Nigeria: Strategic plan*, Viewed 12 May 2014, <http://www.nationalplanningcycles.org/sites/default/files/country_docs/Nigeria/nigeria_draft_malaria_strategic_plan_2009-2013.pdf>

Federal Ministry of Health, National malaria control programme 2009, *A road map for malaria in Nigeria, Strategic plan 2009-2013*, Viewed 10 June 2014, <http://www.pmi.gov/docs/default-source/default-document-library/malaria-operational-plans/fy14/nigeria_mop_fy14.pdf?sfvrsn=8>

George, S, Dada, J, Kolawole, M, Olayinka, F 2014, 'Building capacity for creating demand in support of malaria prevention and control', *Malaria Consortium Learning Paper Series*, viewed 27 June 2014, <<http://www.malariaconsortium.org/media-downloads/312/>>

Hamer, DH, Ndhlovu, M, Zurovac, D, Fox, M, Yeboah-Antwi, K, 2007 'Improve diagnostic testing and malaria treatment practices in Zambia' *JAMA* 297: 2227-2231.

Hansen, KS, Pedrazzoli, D, Mbonye, A, Clarke, S, Cundil, I B, Magnussen, P, Yeung, S 2012 'Willingness-to-pay for a rapid malaria diagnostic test and artemisinin-based combination therapy from private drug shops in Mukono district, Uganda', *Health policy plan* 28: 185–196

Harchut, K, Standley, C, Dobson, A, Klaassen, B, Rambaud-Althaus C, Althaus F, Nowak, K 2013 'Over-diagnosis of malaria by microscopy in the Kilombero Valley, Southern Tanzania: an evaluation of the utility and cost-effectiveness of rapid diagnostic tests' *Malaria Journal* 2013, 12:159.

Hugo, N 2012 'Purdah: separation of the sexes in northern Nigeria' Viewed 12 June 2014, <http://www.consultancyafrica.com/index.php?option=com_content&view=article&id=1035:purdah-separation-of-the-sexes-in-northern-nigeria-&catid=59:gender-issues-discussion-papers&Itemid=267>

Ige, OK, Ayandipo, EO 2014 'Impact of malaria rapid diagnostic tests on prescription patterns of artemisinin based combination therapy in Oyo State, Nigeria' *MWJ* 2014, 5:2

Iliyasu, Z, Abubakar, IS, Abubakar, S, Lawan, UM, Gajida, AU 2011 'Patients' satisfaction with services obtained from Aminu Kano Teaching Hospital, Kano, Northern Nigeria, *Niger J Clin Pract* 2010; 13:371-8.

Kyabayinze, DJ, Asiimwe, C, Nakanjako, D, Nabakooza, J, Counihan, H, Tibenderana, JK, 2010 'Use of RDTs to improve malaria diagnosis and fever

case management at primary health care facilities in Uganda' Viewed 10 June 2014, <<http://www.malariajournal.com/content/9/1/200>>

Lahmayer, L 2004 'General data of the country' Viewed 12 June 2014, <<http://www.populstat.info/Africa/nigeriag.htm>>

Malaria Consortium 2014, *Project brief: Seasonal malaria chemoprevention*, Viewed 20 April 2014, <www.malariaconsortium.org>

Map of Niger state 2013, *Zaccheus Onumba Dibiaezue memorial libraries*, Viewed 22 July 2014, <<http://zodml.org/Nigeria/Geography/Niger%20State/>>

Megbelayin, EO, Ibeinmo, O, Kurawa, MS, Babalola, YO 2013 'Pre-consultation waiting time in a Nigeria public eye facility- a source of patient dissatisfaction' Viewed 10 July 2014, <https://www.academia.edu/4033799/Pre-consultation_waiting_time_in_a_Nigeria_public_eye_health_facility-_a_source_of_patient_dissatisfaction>

Mens, P 2013 'KIT Dossier Malaria in Pregnancy 2013' Viewed 26 July 2014, <<http://www.kit.nl/kit/Malaria-in-pregnancy?tab=2>>

Moonasar, D, Goga, AE, Freaan, J, Kruger, P, Chandramohan, D 2007 'An exploratory study of factors that affect the performance and usage of rapid diagnostic tests for malaria in the Limpopo Province South Africa' *Malaria Journal* :74 doi:10.1186/1475-2875-6-74.

Morris, A, Cohen, JM, Ward, A, Moonen, B, Sabot, O 2014 'Price subsidies increase the use of private sector ACTs: evidence from a systematic review' *Health Policy and Planning* 2014: 1-9. Doi:10.1093/heapol/czu013.

Msellem, MI, Martensson, A, Rotllant, G, Bhattarai, A, Stromberg, J, Kahigwa, E, Garcia, M, Petzold, M, Olumese, P, Ali, A, Bjorkman, J 2009 'Influence of rapid malaria diagnostic tests on treatment and health outcome in fever patients, Zanzibar: a crossover validation study' *PLoS Med* 2009, 6:e1000070.

Mukanga, D, Tibenderana, J, Kiguli, J, Pariyo, GW, Waiswa, P, Bajunirwe, F, Ojiambo, G, Counihan, H, Kallander, K 2010 'Community acceptability of use of rapid diagnostic tests for malaria by community health workers in Uganda' *Malaria Journal* 2010, 9:203

National Agency for the Control of Aids (NACA) 2012, *Federal Republic of Nigeria Global Aids Response Country Progress Report Nigeria GARPR 2012*, Viewed 11 May 2014, <<http://www.unaids.org/en/dataanalysis/knowyourresponse/countryprogressreports/2012countries/Nigeria%202012%20GARPR%20Report%20Revised.pdf>>

National Bureau of Statistics 2010, *Nigeria Economy-Nigeria Bureau of statistics*, Viewed 22 June 2014' <nigerianstat.gov.ng/pages/download/61>

National bureau of statistics 2014, *Nigeria: geohive*, Viewed 10 June 2014, <http://www.geohive.com/cntry/nigeria.aspx>

National malaria control programme 2014, *Welcome to National malaria control programme 2014*, Viewed 11 June 2014, <http://www.nmcp.gov.ng/>
National Population Commission & Measure/DHS 2013, *Nigeria Demographic and Health Survey*, Viewed 10 July 2014, <<http://dhsprogram.com/pubs/pdf/PR41/PR41.pdf>>

National Population Commission (NPC) [Nigeria] and ICF Macro 2009, *Nigeria Demographic and health Survey 2008. Abuja, Nigeria: National Population Commission and ICF Macro*, viewed 12 July 2014, <<http://nigeria.unfpa.org/pdf/nigeriadhs2008.pdf>>

National Population Commission (NPC) [Nigeria], National Malaria Control Programme (NMCP) [Nigeria], and ICF International 2012, *Nigeria Malaria Indicator Survey 2010. Abuja, Nigeria: NPC, NMCP, and ICF International*, Viewed 10 May 2014, <<http://dhsprogram.com/pubs/pdf/MIS8/MIS8.pdf>>

National Population Commission (NPC), 2010 National Malaria Control Programme (NMCP, 'Nigeria Malaria Indicator Survey (NMIS) Report' Secondary analysis of data set summary tables.

Ndagi, MU 2012 'Muslims in Niger state: A survey', Viewed 23 July 2013, <<http://www3.qeh.ox.ac.uk/pdf/nrn/BP6Ndagi.pdf>

Niger state Government 2007, *Niger state*, Viewed 22 July 2014, <<http://www.nigerstate.gov.ng/>>

Niger state Government 2011 'About Niger state' Viewed 15 June 2014, <<http://www.nigerstate.gov.ng/rvision.org/about-niger.html>>

Niger State M&E database 2013 'health management information system' Minna, Niger state, Nigeria

Nigeria Demographic Health Survey 2013, *Nigeria Demographic and Health survey 2013: Preliminary report* National Population Commission (NPC) [Nigeria] and ICF International 2012, viewed 12 July 2014, <<http://dhsprogram.com/pubs/pdf/PR41/PR41.pdf>>

NMCOP 2013, *Niger state Malaria Control operational plan 2013*, Minna, North Central, Nigeria

NSMCP 2006, Niger state Ministry of health: state malaria control program 2006 annual report, Minna, Niger state, Nigeria

NSMCP, 2013 *'Niger state malaria control programme health management information system*, Minna, Niger state, Nigeria

NSMOH, 2006, *State ministry of health: Epidemiology of malaria in Niger state*, Minna, Niger state, Nigeria

Onwujekwe O, Uzochukwu B, Eze S, Obikeze E, Okoli C, Ochonma O 2008 'Improving equity in malaria treatment: relationship of socio-economic status with health seeking as well as with perceptions of ease of using the services of different providers for the treatment of malaria in Nigeria' *Malar J* 2008, 7:5.

Onwujekwe, O, Shu, E, Chima, R, Onyido, A, Okonkwo, P 2000 'Willingness to pay for the retreatment of mosquito nets with insecticide in four communities of south-eastern Nigeria' *Tropical Medicine and International Health* 2000, 5(5):370-376.

Onwujekwe, O, Uzochukwu, B, Dike, N, Uguru, N, Nwobi, E, Shu, E 2009 'Malaria treatment perceptions, practices and influences on provider behaviour: comparing hospitals and non-hospitals in south-east Nigeria'. *Malaria Journal* 8, 246.

Peters, D.H, Garg, A, Bloom, G, Walker, D.G, Brieger, W.G, Rahman, M.H 2008 'Poverty and access to health in developing countries' *Annals of New York Academy of Sciences*. 1136: pp 161-171.

President's Malaria Initiative Nigeria 2013, *Malaria Plan FY 2013*, Viewed 13 July 2014, <http://www.pmi.gov/docs/default-source/default-document-library/malaria-operational-plans/fy13/nigeria_mop_fy13.pdf?sfvrsn=6>

RBM 2000 'What is malaria?' Viewed 20 March 2014, http://www.rbm.who.int/cmc_upload/0/000/015/372/RBMInfosheet_1.htm

Roll Back Malaria 2012, *Progress & Impact Series. Focus on Nigeria. Country Reports*, Viewed 10 April 2014, <<http://www.rbm.who.int/ProgressImpactSeries/docs/report11-en.pdf>>

Rowe, AK, De Savigny, D, Lanata, CF, Victoria, CG, 2005 'How can we achieve and maintain high-quality performance of health workers in low resource settings?' *Lancet* 366; 1026-1035.

Senyo, I 2014 'Niger state loses N5.2 Billion annually to malaria – commissioner' *Worldstage Newsonline* Viewed 20 June 2014, <<http://worldstagegroup.com/index.php?active=news&newscid=15194&catid=10>>

Shillcut, S, Morel, C, Goodman, C, Coleman, P, Bell, D, Whitty, CJM, Mills, A 2008 'Cost effectiveness of malaria diagnosis methods in Sub-Saharan Africa in an era of combination therapy.' *Bull World Health organ* 86: 101-110.

State Bureau of Statistics & Niger state planning commission 2011, *Facts and figures about Niger state*, Viewed 11 June 2014, <<http://www.nigerstate.gov.ng/epubl/Facts%20and%20Figures%20about%20Niger%20State1.pdf>>

State of service address by The Chief Servant, Dr. Muazu Babangida Aliyu, OON (Taliban Minna), The Governor of Niger State at the Niger State house of Assembly Chambers, Minna; on Tuesday July 15, 2008. Viewed 10 July 2014, < http://www.nigerstateonline.com/state_service_address_0708.pdf >

Sulyman, AO 2014 'Infrastructure provision and classification of rural settlements in Niger state Nigeria' *AFRREV STECH*, Vol. 3(1) ISSN 2227-5444, Viewed 10 May 2014, <http://afrrrevjo.net/journals/stech/vol_3_no_1_art_2.pdf>

Support to Nigeria Malaria Programme 2012, *Context and an overview of the programme achievements, experiences and lesson*, viewed 12 July 2014, < <http://www.malariaconsortium.org/media-downloads/156>>

The Global Fund 2014, *The Global Fund to Fight AIDS, Tuberculosis and Malaria: Affordable Medicines Facility – Malaria Frequently Asked Questions*, Viewed 13 July 2014, < <http://www.theglobalfund.org/en/amfm/>>

The Johns Hopkins University 2011, *Support to national malaria programme (SuNMAP)*, Viewed 12 July 2009, <https://www.jhuccp.org/whatwedo/projects/support-national-malaria-programme-sunmap>

Leslie, T, Amy, M, Ismail, M, Bonnie, C, Mohammed, Z, Whitty, C, J, M, Rowland, M 2014 'Rapid diagnostic Tests to improve treatment of malaria and other febrile illnesses: Patient randomized effectiveness trial in primary care clinics in Afghanistan' <
<http://researchonline.lshtm.ac.uk/1785959/1/1785959.pdf>>

Ughasoro, MD, Okoli, C, Uzochukwu , BSC 2013 'Qualitative study of presumptive treatment of childhood malaria in third tier tertiary hospitals in southeast Nigeria: a focus group and in-depth study', *Malaria Journal* 2013, 12:436.

United Nations Educational, Scientific and Cultural Organization 2012, *High level International Round Table on Literacy 2012 Reaching the 2015 Literacy Target: Delivery on the promise UNESCO, Paris 6-7 September 2012*, Viewed 22 June 2014, <
<http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/ED/pdf/Nigeria.pdf>>

Uzochukwe, BSC, Onwujekwe, OE 2004 Socio-economic differences and health seeking behavior for the diagnosis and treatment of malaria: A case study of four Local Government Areas operating the Bamako Initiative Program in South-east Nigeria. *International Journal for Equity in Health*, 3:6. Doi: 10.1186/1475-9276-3-6.

Uzochukwu, BSC, Obikeze, EN, Onwujekwe, OE, Onoka, CA, Griffiths, UK 2009 'Cost-effectiveness analysis of rapid diagnostic test, microscopy and syndromic approach in the diagnosis of malaria in Nigeria: implications for scaling-up deployment of ACT' *Malar J* 2009, 8:265.

Uzochukwu, BSC, Onwujekwe, OE, Uguru, NP, Ughasoro, M, Ezeoke, O 2010 'Willingness to pay for rapid diagnostic tests for the diagnosis and treatment of malaria in southeast Nigeria: ex post and ex ante', *International Journal of equity in Health* 2010, 9:1, pp.4

World Health Organization 2000, *New perspectives malaria diagnosis*, Viewed 10 May 2014, <
<http://www.who.int/tdr/publications/documents/malaria-diagnosis.pdf>>

World Health Organization 2005, *Health and human rights*, Viewed 11 June 2014, <<http://www.who.int/hhr/en/>>

World Health Organization 2008, *Human Resource for health country profile Nigeria*, Viewed 23 July 2014' <http://www.unfpa.org/sowmy/resources/docs/library/R050_AHWO_2008_Nigeria_HRHProfile.pdf>

World Health Organization 2009, *World Health Organization; Malaria case management operations manual World Health Organization*, Viewed 20 May 2014, <http://whqlibdoc.who.int/publications/2009/9789241598088_eng.pdf >.

World Health Organization 2010, *Guidelines for the treatment of malaria, second edition*, Viewed 20 April 2014, http://whqlibdoc.who.int/publications/2010/9789241547925_eng.pdf?ua=1

World Health Organization 2010, *World malaria report 2010*, Viewed 15 July 2014, <http://www.who.int/malaria/world_malaria_report_2010/worldmaliareport2010.pdf?ua=1>

World Health Organization 2011, *Universal access to malaria diagnostic testing an operational manual*, Viewed 20 June 2014, <http://whqlibdoc.who.int/publications/2011/9789241502092_eng.pdf?ua=1>

World Health Organization 2012 'Global Partnership to Roll back malaria.III.Series' Viewed 10 June 2014, <<http://www.rbm.who.int/ProgressImpactSeries/docs/report11-en.pdf>>

World Health Organization 2012, *Test. Treat. Track. Scaling up diagnostic testing, treatment and surveillance for malaria*, Viewed 15 July 2014, <http://www.who.int/malaria/publications/atoz/test_treat_track_brochure.pdf?ua=1>

World Health Organization 2014, *Country health profile of Nigeria*, Viewed 20 July 2014, <<http://www.afro.who.int/en/nigeria/country-health-profile.html>>

Zhao, J, Lama, M, Korenrompe, E, Aylward, P, Shargie, E, Filler, S, Komatsu, R, Atun, R. 2012 'Adoption of Rapid Diagnostic Test for the diagnosis of

Global Fund program data 2005 to 2010' Viewed 14 July 2014, <
<http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0043549>>

Zurovac, D, Rowe, AK, Ochola, SA, Noor, AM, Midia, B, 2004 'English M, Snow RW: Predictors at government health facilities in Kenya' *Int J Epidemiol* 2004, 33:1080-1091.

ANNEX 1: Stakeholder Analysis

Stakeholder	Primary Purpose	Potential Role	Available Resources	Constraints
FMOH/SMOH	Policy formulation	Provide platform for implementation	Infrastructure, personnel, commodity, institutional knowledge	Funding, bureaucracy
ARFH/GFATM	Implement malaria	Technical skill	Global Fund Round 8 grant (Sub-recipient to NMCP)	Delay in fund release and commodity
SFH/GFATM	Management and implementation of project	Technical skill	Global Fund Round 8 grant (Principal recipient)	Coverage at private sector
SuNMAP/DfID	Health system strengthening	Technical skill	DfID	
WHO/UNICEF	Leadership on Health	Administrative and Technical skill	WHO	Do not implement
Beneficiary/Community	Consume service	Provide security of product and service, create awareness for service	Gate keeping	Poor health seeking behavior