

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

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## 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 prescribing malaria treatment with Artemisinin Combination Therapy (ACTs). This study explores accessibility barriers to the use of Malaria RDTs in Niger State, and formulates recommendations for improving the uptake of RDTs.

**Methods:** Three strategies were adopted: 1) Literature review (both published and grey literature); 2) Review of data from the Niger State Health Management Information System for the period January–October 2013; 3) Application of a conceptual framework (Peters et al. 2008) for assessing access to health services.

**Results:** Only 27 percent of public health facilities (HFs) implemented RDTs with the aid of donor funds. 77 percent of all fever cases presented in these HFs during January–October 2013 were tested with RDTs; 53 percent of all fever cases were confirmed cases of malaria; while 60 percent of all fever cases were treated. In 2013, 871,702 of ACTs were supplied as against 332,466 of RDTs. Private-sector presumptive treatments of malaria outnumber HFs treatment on the basis of RDT confirmation. Stockout of RDTs is the major constraint, and severe fever tends to trigger presumptive treatment.

**Conclusions:** Implementation of RDTs led to a reduction in the use of ACTs at HFs. However, more substantial ACTs reduction could be achieved if the State Government directed more resources towards the acquisition of RDTs. Additionally, accessibility of RDTs is linked to the level of awareness of potential users about the service and its availability.

**Keywords:** Accessibility, malaria, RDTs, ACTs, review, health facilities

## INTRODUCTION

### Background:

Niger State (see Figure 1) is a state in the North Central Nigeria, covering a total land mass of 76,363Km<sup>2</sup> (about 10% of Nigeria's total land mass) and possessing an estimated population of 4,372, 029 people (2,215,824 males and 2,156,206 females) (National Bureau of Statistics, 2014). It is the largest among the 36 states and the Federal Capital territory (FCT) of Nigeria, and comprises 25 Local Government areas (LGAs).

Figure 1: Map of Niger State Nigeria



Source: Zaccheus Onumba Dibiaezue Memorial Libraries (2013)

Niger State has been identified as one of the three best states in Nigeria for malaria control (NMCP, 2014). The state was recognised by The Global Fund (GF) in 2012 for malaria Round 8 implementation efforts. It is one of the states where the Support for National Malaria Programme (SuNMAP), the Department for International Development Fund (DFID), and The Global Fund AIDS, Tuberculosis and Malaria (GFATM) Round 8 are all implementing malaria project interventions (NMCP, 2014).

The Association for Reproductive and Family Health (ARFH), a sub-recipient to National Malaria Control Programme (NMCP) on GF Round 8 malaria in Niger State, was saddled with the responsibilities such as: malaria case management through supply and tracking RDTs and ACTs, advocacy communication and social mobilization; and health system strengthening through capacity building and monitoring and evaluation (ARFH, 2010). In the course of implementing the project, there were several instances in which patients demanded ACT without confirmatory tests or with negative RDT test results. Inequities in commodity procurement and distribution were also reported (Awoloye, 2011). These irregularities provided the motivation for the current study.

According to WHO's recommendation, 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 this basis, 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).

Prior to WHO's recommendation, malaria treatment in Niger State was based on clinical diagnosis (relying on signs and symptoms) instead of laboratory tests, according to the Niger State Health Management Information System (HMIS) database (NSMCP, 2013). This finding is consistent with the results of a 2009 study in Enugu State, Nigeria, that showed over 50 percent presumptive treatment of malaria (Uzochukwu et al., 2009). Due to the habitual practice of clinical diagnosis and symptomatic treatment of patients, health workers' capacity to conduct parasitological diagnosis fell below standard (SuNMAP, 2012). Symptomatic clinical diagnosis solely is not dependable, and difficulties with microscopy (both human and technical requirements) necessitated alternatives such as RDTs, which have been found to be eminently suitable (WHO, 2000).

The aforementioned study in Enugu State, which was conducted in a setting similar to Niger State, showed that the use of RDTs significantly reduced anti-malaria drug prescriptions and was more cost effective when compared to other diagnostic methods for malaria in endemic areas (Uzochukwu et al., 2009). Even in low transmission regions, RDTs have proven to be effective (Leslie et al. 2014). Studies conducted in Tanzania (Harchut et al., 2013) and Ghana (Ansah et al., 2013) showed that RDTs utilization improved correct treatment more than microscopy (microscopy led to excessive ACT prescription). Similarly, improvement was recorded in Uganda, where 39 percent reduction in ACT prescription occurred due to introduction of RDTs (Kyabayinze et al. 2010). A study in Zanzibar (Msellem et al., 2009) also showed RDTs use decreased ACT prescription.

Access to malaria confirmatory tests are seriously underutilized in more than half of endemic African nations: at least 80 percent of malaria treatments are administered without diagnostic testing (WHO 2012). RDTs are difficult to obtain, and supplies of ACTs are more than twice those of RDTs, making overuse of ACTs likely in both public and private sectors. Prices of ACTs are far beyond previously-used monotherapies, so investment in RDTs will reduce costs (Bastiaens et al. 2011).

## **Methodology**

In order to achieve the set objectives, the current study consists primarily of literature review, supported with data from the Niger State HMIS data for 375 public health facilities (January–October 2013), and analyzed within a conceptual framework for assessing access to health services (as described below).

### **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 included: Niger State, Nigeria, Sub-Saharan Africa, Rapid Diagnostic Tests, RDTs, Artemisinin Combination Therapy, ACT, acceptance, barriers, availability, willingness, perception, stock-out, guidelines, malaria, HMIS.

### **Data review**

The Global Fund commenced RDTs rollout in Niger State in 2012 with 250 public health facilities (HFs), while simultaneously providing malaria-specific HMIS training and documentation. In 2013 the number increased to 375 (15 per Local Government Area (LGA)). In the current study, review of January to October HMIS 2013 data from these supported HFs were carried out. The choice of these HFs was based on completeness of data, timeliness of submission of reports, and compliance with the data quality assessment checklist. It is important to mention that a total of 1249 HFs (994 public and 255 private HFs), 1200 registered patent medicine stores, and 70 pharmacies were excluded from the study.

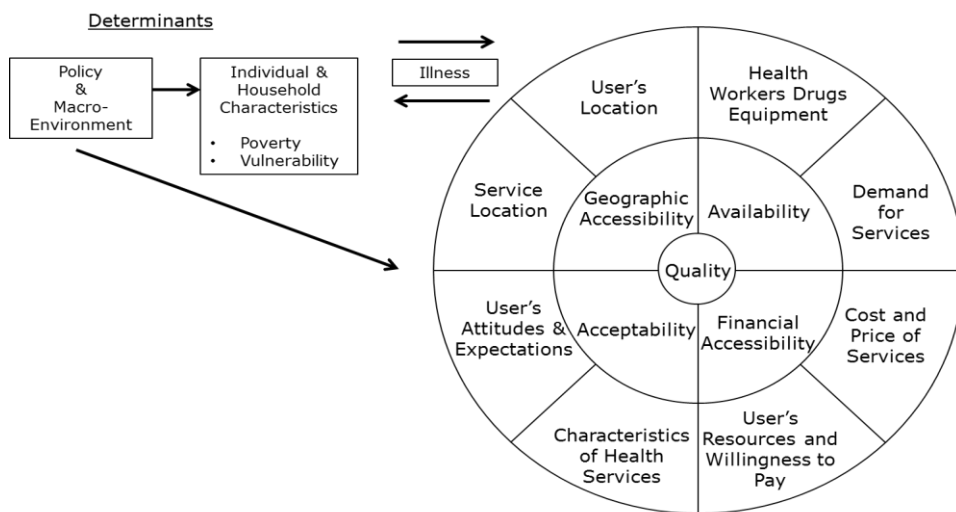
Analysis was based on key performance indicators recorded in the database, such as the numbers of persons in each the following categories: presented with fever; presented with fever and tested using RDTs; presented with fever and tested using microscopy; clinically diagnosed for malaria; confirmed for uncomplicated malaria and treated with ACT; and treated with ACTs on the basis of clinical diagnosis only (Niger State M&E database, 2013). Monthly totals for each indicator for the period under review were recorded. Several comparisons were made, including: number of patients presented with fever versus parasitological confirmed with RDTs; quantity of ACTs versus quantity of RDTs supplied in 2013; number of patients with fever versus number with positive test results; and patients with positive test results using RDTs versus number of patients treated at HFs.

### 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 supply and demand elements of healthcare delivery in Sub-Saharan Africa. Thematic areas in the framework are shown in Figure 2 below. The current paper uses these areas in the framework to address accessibility barriers to RDTs as follows:

- Policy and macro environment elements: a) Nigeria national malaria diagnosis and treatment guidelines; b) Implementation of malaria diagnosis guidelines in Niger State
- Individual and household characteristics: a) age; b) educational attainment, poverty, and vulnerability.
- Geographic accessibility: a) service location; b) user's location
- Financial accessibility: a) cost and price of services; b) user's resources and willingness to pay
- Availability: a) health workers, drugs and equipment; b) demand for services
- Acceptability: a) characteristics of health services; b) User's attitudes & expectations
- Quality: quality of care, staff, treatment, capacity building, data, and commodity supplies.

**Figure 2:** Conceptual framework for assessing access to health services (Peters et al. 2008)



Source: Peters et al. 2008

## FINDINGS

### Section layout

This section 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 utilization characteristics of RDTs to key elements of the framework: (1) policy and macro-environment; (2) individual and household characteristics; (3) geographical accessibility; (4) financial accessibility (5) availability; (6) acceptability, and (7) quality, which connects the previous four dimensions. In the following, we consider each of these elements in turn.

## 1. Policy and macro environment

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

Nigeria's National Malaria Control Programme (NMCP) Strategic Plan for 2009-2013 consists of guidelines for diagnosis and treatment of malaria (FMOH & NMCP, 2008). The plan expresses the goal of "timely and equitable access to malaria diagnosis and treatment by all sections of the population and as close to the home as possible" (FMOH & NMCP, 2008:24). It is 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.

At the national level, the expansion of access to RDTs use was aimed at increasing parasitological diagnosis to 40 percent in 2013 and 60 percent by 2014, (President's Malaria Initiative, 2013). These targets were unrealistic, as diagnosis using RDTs was limited and coverage was largely dependent on donors. The 2010 malaria indicator survey, revealed that only 9.1 percent of children under five with fever in the north central region of Nigeria (including Niger State) had parasitological confirmation using RDTs (NPC, NMCP, ICF International, 2012).

A statewide rollout of RDTs in Oyo State, Nigeria, in 2012 was followed by increased ACT prescription rather than decrease. RDTs findings were not respected, as the ratio of ACT-treated patients to RDT-positive patients was consistently greater than 1 (Ige et al., 2014). On the other hand, findings from a similar setting in Sudan showed that RDTs rollout was successful at the community through Home Management of Malaria (HMM) and led to improvement in treatment-seeking attitude of people (Elmardi et al., 2009). A similar study in Uganda concluded that implementation of RDTs through community health workers (CHWs) required acceptance by the community, which was contingent on proper training, supervision, and logistical support of the CHWs (Mukanga et al. 2010).

### **Implementation of guidelines on malaria diagnosis in Niger State**

The 2009-2013 Strategic Plan for malaria in Niger State was implemented in collaboration with NMCP through GF Round 8. 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 into routine effective use of RDTs by service providers requires clear messages and guidelines that are adapted to local settings (Rowe et al. 2005, Hamer et al. 2007). Previously, in Niger State these requirements were not met. To improve this situation, capacity buildings were conducted at all HFs (375), and 400 Role Model Caregivers (RMCs) were supported by GF. Also, monthly review meetings, supportive supervision and data collection were instituted (NMCOP, 2013).

## 2. 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).

### **Age of patient**

In Niger State, findings from analysis of state HMIS 2013 data showed that 40 percent of patients treated for malaria were children and approximately 21 percent of them were treated symptomatically through HMM (Niger State M&E database, 2013). Similarly, NDHS (2013) showed that for children age 6-59 months with fever, 60.9 percent (n=1,268) of urban children and 41.2 percent (n=2,362) of rural children were treated for malaria presumptively during the two weeks prior to the survey. A qualitative study from Enugu state Nigeria showed that RDTs were rarely used for children due to their unavailability in consulting rooms, as well as doubts about their reliability (Ughasoro et al., 2013). It is common amongst caregivers and women to insist on prescription for their children, so that the use of RDTs for diagnosis is limited in younger age groups. In accordance with the 2013 Niger State Malaria Control Operational Plan (NMCOP), as long as RDTs are available at health facility almost all adults with fever were tested with RDTs (NMCOP, 2013).

### **Educational level, poverty, and vulnerability**

A study by NPC, NMCP & ICF International (2012) showed that educational attainment of caregivers and women correlates with their knowledge of how to care for their families and themselves. It follows that the higher the level of education, the greater the receptivity to healthcare products such as long-lasting insecticidal nets (LLINs) and RDTs.

Lack of education is positively correlated with poverty, and poverty restricts access to health services (Peters et al. 2008). Currently, RDTs are free at supported health facilities in line with NMCOP 2013, but there are other costs that prevent people in the lowest wealth quintile from seeking malaria confirmatory tests, such as transportation to health facilities and lost income due to person-hours lost (Ajala, Sanni & Adeyinka, 2005).

UNESCO (2012) estimates literacy level for males and females in Niger State at 19.3 and 18.2 percent, respectively. Most of the population of Niger State consists of farmers with low financial capacity, according to NSMCP (2013). The currently low uptake of LLINs and RDTs corresponds with the low incomes and low level of educational attainment in the state.

### 3. Geographic Accessibility

Geographic accessibility is determined by “the physical distance or travel time from service delivery point to the user” (Peters et al. 2008:162).

#### Service Location

There are 1624 health facilities (HF's) in the state (see Figure 3). The health facilities are at 4 levels of ownership, comprising: federal (23), state (24), local government (1324), and private (255). They are unevenly distributed compared with need: 40 percent of HF's are in urban areas that contain 30 percent of the population, while 60 percent of HF's are in rural areas, where 70 percent of the population resides (NSMCP, 2013).

**Figure 3:** Number of health facilities by ownership



Source: NSMCP, 2013

Service locations includes health facilities, home management of malaria (HMM) and private sector (clinics, patent medicine stores (1200) and pharmacies (70)). The Society for Family Health (SFH) is implementing GFATM activities in the private sector via social marketing of ACTs. RDTs and ACTs are supplied by GFATM and SuNMAP to 375 public health facilities out of a total of 1624. The grant supports 15 HF's within each LGA. There are 16 RMCs affiliated to HF's based on proximity within the LGAs. The RMCs are responsible for presumptive treatment of malaria at the community level. They receive and replenish ACTs, and report data to the HF's (ARFH, 2014).

A critical factor for malaria diagnosis and case management is the location that people most often visit when they perceive they have malaria. More than 60 percent of clients purchase anti-malarials in private health facilities, and in most cases (95 percent) purchase mono-therapy anti-malaria drugs (The Global Fund, 2014). The 15 HF's per LGA are unevenly distributed and grossly inadequate for effective service coverage (NSMCP, 2013). The poor coverage of HF's and services is due to low political will by the state government, which is evident from its underfunding of malaria case management.

According to the study of Awolaye (2012), the terrain of the project location is crucial to effective implementation of public health programmes for malaria mitigation. For example, extensive seasonal flooding in Niger State inflicts hardship on programme implementers and limits access to healthcare by the users.

#### Users' Locations

A study conducted in Kogi State, Nigeria showed that only 18 percent of rural residents lived within 4 km of a public health center, compared to 40 percent that lived more than 10 km away from the nearest such facility. 62 percent of the close-in residents sought medical treatment (and by proxy, malaria diagnostics and treatment) from government hospitals, compared to only 32 percent of distant residents (Awoyemi, Obayemi & Opaluwa, 2011).

In most rural communities, the first level of care for fever cases is home management, either through GFATM-funded HMM or patent medicine vendors. Caregivers usually visit health facilities only when there is no improvement. However RDTs results will frequently be invalid or negative on patients that have already been treated with anti-malarial drugs (NSMCP, 2013).

#### 4. Financial Accessibility

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

##### User’s resources and willingness to pay

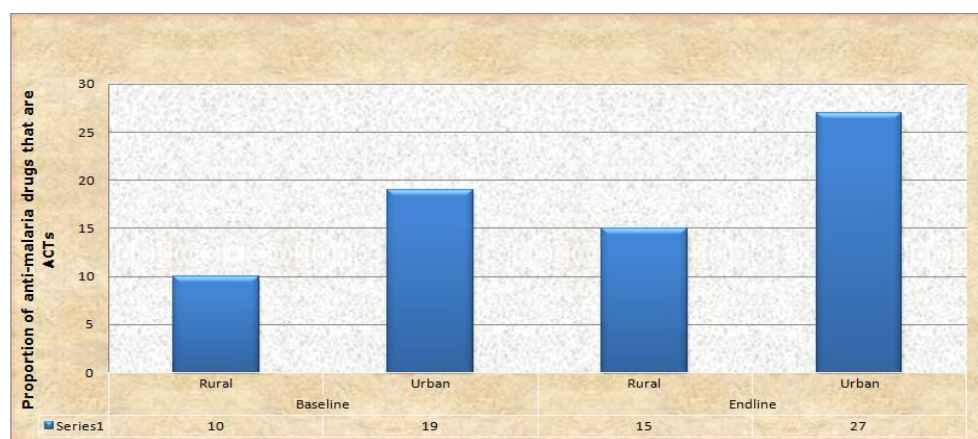
There are several obstacles to access to public healthcare, among which is the cost of treatment (Onwujekwe et al. 2008). The concept of “willingness to pay” (WTP) has been applied to healthcare products such as insecticide-treated nets in Nigeria (Onwujekwe et al. 2000). A study conducted in Enugu State, Nigeria by Uzochukwu et al. (2010) showed that 51 percent of urban respondents were willing to commit resources to RDTs, compared to only 24.7 percent of rural respondents. Also, urban dwellers were ready to pay 235.49 naira, compared to 182.05 naira for rural residents. Since Niger State is made up of over 70 percent rural communities (Sulyman, 2014), this would indicate a relatively low level of WTP . A similar study in Uganda (Hansen et al. 2012) showed that WTP for RDT in drug shops was higher for customers with higher socio-economic status, and WTP for RDT was lower than that for ACT.

##### Costs and price of services

RDTs implementation in Niger State was donor-driven, and was limited to selected public health facilities. The RDTs were free to patients. If donor funding stops, then access and affordability by patients to RDTs will be affected. 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 and average \$5.88 USD, including the cost of charges on services such as diagnostic test but excluding consultation charges (Albertini et al. 2012).

The Affordable Medicines Facility-Malaria (AMFm) was an intervention implemented at the private sector by the GFATM to increase access to ACT and reduce the financial burden through subsidy (Morris et al. 2014). Figure 4 below shows changes in ACT use in Nigeria before and after the introduction of subsidized ACT. The figure shows about 50 percent increase in ACTs following AMFm launch in both rural and urban areas. These results indicate that price is a key determinant of use of ACTs. Similar results should be expected with RDTs. However, there are relatively few private practitioners in the rural areas of Niger State, so the impact of private subsidies on such areas may be diminished.

**Figure 4:** Changes in ACTs use in Nigeria before and after subsidy (AMFm)



Source: Morris et al. 2014

#### 5. Availability

Peters characterizes 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).

## Health workers, drug equipment

The “test, treat and track” recommendation of WHO means that ACTs and RDTs are required and should be available in appropriate quantities (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 was noticed in the secondary (NSMCP, 2013).

The number of patients that service providers have to attend to daily influences their performance, and also determines waiting time of patients at health facilities. Both of these factors influence presumptive treatment. Table 1 shows the available health workers in Niger State, who serve a population of greater than 4 million. There is definitely an extreme shortage of human resources for health in Niger State overall. The shortage of personnel with training on malaria control is even more extreme: ARFH trained 369 for RDTs (4 percent) personnel out of 9,083 that are directly involved in malaria control (NMCOP, 2013).

Table 1: Staff Strength in Niger State

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

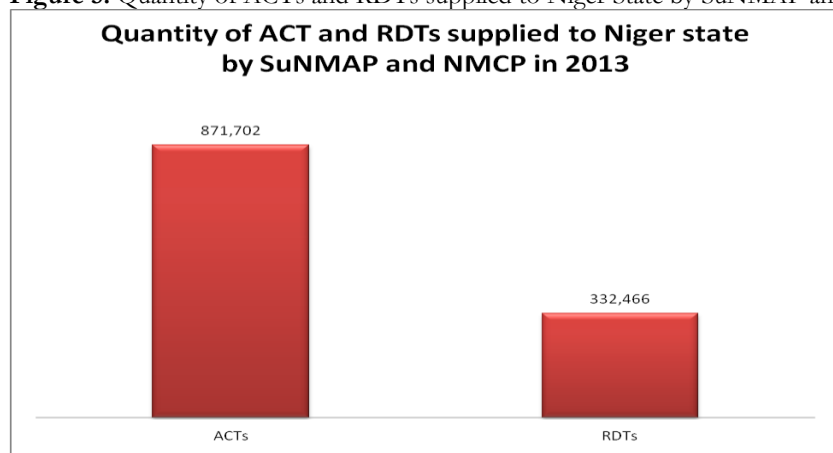
Source: NMCOP, 2013

A study in Osun State in Nigeria emphasized that sparse access to health facilities produces a serious impact on sustainable growth through reduction of the number of workers’ productive man hours (Ajala, Sanni & Adeyinka, 2005). Poor health facility accessibility in Enugu state Nigeria has contributed to self-diagnosis and medication by people in the lowest wealth quintile, and some turn to patent medicine vendors for treatment (Uzochukwe & Onwujekwe, 2004).

Due to poor working conditions in the public service and societal expectations, health workers in Lagos State Nigeria often seek opportunities abroad, leading to attrition of skilled labour in health (Lahmayer, 2004). This “brain drain” has not affected the public service of Niger State, especially because most cases of uncomplicated malaria are handled by lower-level health workers that are unlikely to resign their appointments.

Figure 5 below shows that roughly three times as many ACTs as RDTs were supplied by NMCP and SuNMAP in 2013. This is a typical case in which far more ACTs than RDTs are supplied to the service delivery points. In 2010, the ratio of RDTs to ACTs supplied by Global Fund was approximately 1:3. The Presidential Malaria Initiatives (PMI) also procured RDTs to ACTs in the ratio of 1:3 (President’s Malaria Initiative, 2013). Ideally more RDTs than ACTs should be supplied, in order to allow for wastages and invalid results.

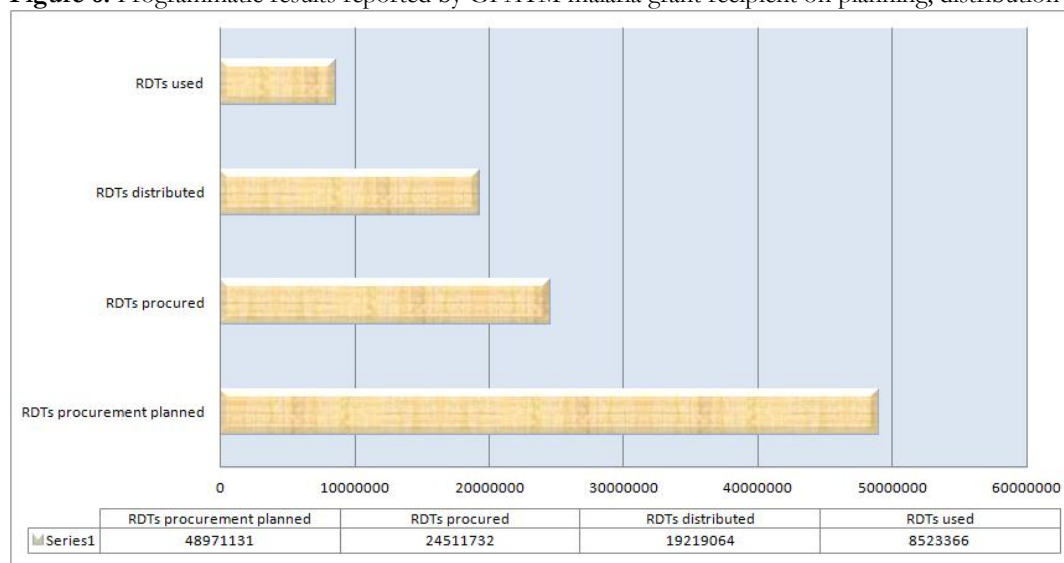
**Figure 5:** Quantity of ACTs and RDTs supplied to Niger State by SuNMAP and NMCP in 2013.



Source: NSMCP, 2013

Figure 6 below shows the total GFATM RDTs planned, quantity distributed and used in 2010 for all African recipient countries (Zhao et al. 2012). Less than half of all RDTs distributed were actually used. These figures are for 2010; but Figure 5 shows that accessibility to RDTs remained a concern in 2013.

**Figure 6:** Programmatic results reported by GFATM malaria grant recipient on planning, distribution and use of RDTs in 2010



Source: Zhao et al. 2012

A study conducted in south-east Nigeria prior to the release of WHO’s guideline showed that 0 percent of non-hospital treatment providers and 6 percent of hospitals used RDTs (Onwujekwe et al., 2009). The study showed that providers’ level of knowledge was poor: only 34.5 percent (respectively 73.5 percent) of non-hospital (respectively hospital) providers said that microscopy could be used to diagnose malaria. A 2012 study on the availability of RDTs in private facilities (clinics, pharmacies, private outlets, and laboratories) showed that only five out of one hundred and twenty (4.2 percent) such facilities in Lagos, Nigeria had RDTs in stock (Albertini et al. 2012).

According to finding from HMIS, in the 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 7 below, not all patient that presented fever were tested.

Irregular and disproportionate supply of RDTs and ACTs in publically-supported healthcare facilities is a major constraint in the implementation of RDT and quality of care in Niger State (ARFH, 2013). Table 2 shows an example from 2012.



Month	Percentage of public health facilities stocked out of ACT	Percentage of public health facilities stocked out of RDTs
January	76%	100%
February	94%	100%
March	0%	100%

Source: ARFH, 2012

In the first quarter of 2012, there were no RDTs in any public health facilities, even after ACTs were replenished in March. The Niger State stock supply pattern aligned with the findings of Zhao et al. (2012) that rollout of RDTs always lags behind rollout of ACTs. ACTs and RDTs are supplied to health facility on a quarterly basis, typically in the ratio of 3:1 (as shown in Figure 5). In a health facility with high patient flow, it takes RDTs only two weeks to be out of stock. In most facilities, RDTs are out of stock by the third week of every month (ARFH, 2013).

According to the supportive supervision report of ARFH (2013), stockout of HMIS tools (data collection forms) 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).

### **Demand for services**

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

## **6. Acceptability**

According to Peters et al. (2008:162), acceptability is defined as "the match between how responsive health service providers are to the social and cultural expectations of individual users and communities."

### **Users' Attitudes and Expectations**

No qualitative study on malaria diagnosis has been conducted in Niger State. A study in a similar situation in Enugu State, Nigeria, found that severe fever in children prompts their caregivers and parents to pressure health workers to treat children presumptively. (Ughasoro et al., 2013). It is always difficult for women to wait for test results when their children exhibit serious symptoms such as vomiting and inability to eat food.

Patients often expect treatment based on symptoms alone, because of their belief that symptoms shivering, excessive body temperature, diarrhea, and vomiting are sufficient to prove malaria (Mukanga et al. 2010). Because of the cost and inconvenience involved in coming to the hospital, patients are unwilling to leave the hospital without some type of medication (Ughasoro et al. 2013).

A study in Ghana showed that the presence of mosquitoes in patients' homes or environment influences their health-seeking behaviour. When they are feverish, they quickly conclude that mosquito bites were responsible, and ask physician to prescribe anti-malaria medication without further confirmation (Baiden et al., 2012).

As far as patients' specific perceptions of RDTs, no study has been conducted in Niger State. However, studies elsewhere in Africa have shown that especially in the rural areas, myths influence users' behaviour and practices. A study in Uganda found that some users were afraid that the drawing of blood from them or their children might cause HIV infections, or be used for HIV testing. Some expressed anxiety that the blood could get into an enemy's hands and be used for witchcraft (Mukanga et al., 2010).

One author's (OJA) personal experience from supervisory visits to HFs in Niger State revealed that patients and caregivers expect that when the service provider conducts RDTs, then ACT should be available for treatment in case results are positive. However, in Niger State, at times RDTs were available while ACT was out of stock, or vice versa. When these patients' expectations were not met, it influenced subsequent acceptance of tests because of uncertainty whether treatment would be given.

## Characteristics of Health Services

An important factor in user satisfaction with health services is pre-consultation waiting times. A study of ophthalmological patients in southern Nigeria showed that long wait times was a major cause of patient dissatisfaction. Causes for long waits included non-adherence to appointment times, patients not seen in order of arrival, and lack of modern equipment that could shorten consultation time (Megbelayin et al. 2013). A study conducted in Kano state Nigeria (a setting similar to Niger State) on patients' satisfaction with healthcare services, showed that 70 percent of respondents expressed satisfaction with health workers' behaviour, while 30 percent expressed dissatisfaction with long waiting times (Iliyasu et al. 2011).

Health workers' adherence to guidelines reflects their responsiveness to users' expectations. In Kenya, lower-level healthcare providers such as nursing aides actually adhered to guidelines more closely than the higher-level staff such as clinical officers and nurses. Possible reasons for this included socialization effects (higher-level staff coming to view their own clinical judgment as superior to guidelines) and increased susceptibility to inappropriately prescribe second-line drugs. (Zurovac et al. 2004). In Niger State, 2013 programmatic report showed that irrespective of staff cadre, willingness and ability to adhere to guidelines was not the constraint, but rather availability of guidelines and RDTs (ARFH, 2013).

Poor attitude among health workers may pose a major obstacle to acceptance of RDTs results by caregivers (Baiden et al., 2012). Additionally, rather than following treatment guidelines based on RDTs results, health workers may tend to follow "mindlines" that are shaped by poor diagnostic support, pressure from peers, perceptions of patient preferences and from training emphasis of malaria as the most important disease (Chandler et al. (2008).

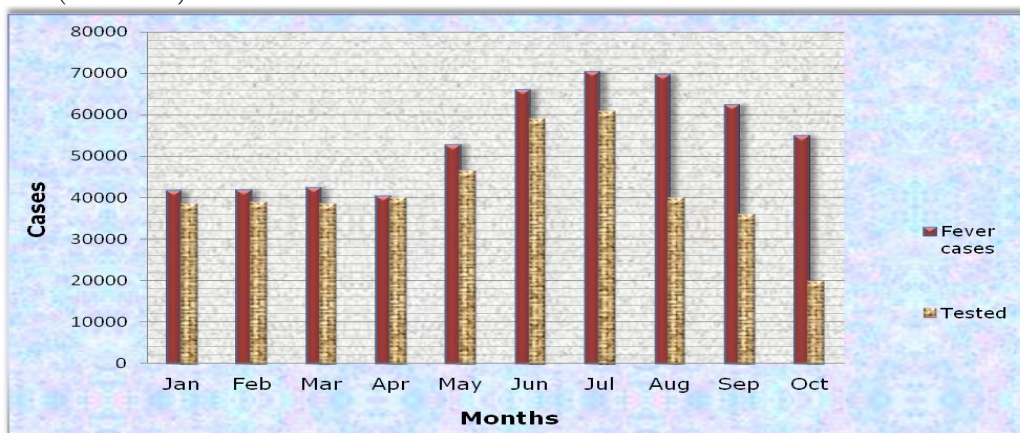
## 7. Quality

Peters et al. (2008:162) state that "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."

In the following, we present HMIS data that quantifies the quality of care of malaria patients at the 375 supported HF's in Niger State from January to October, 2013.

Figure 7 shows the level of RDT testing on patients with fever. The rise in fever cases from May through October reflects the seasonal malaria pattern of Niger State. The drop in testing rate from August to October was due to depletion of RDTs stock (NSMCP, 2013). The figure shows that not all patients with fever that attended received tests, although this is contrary to WHO diagnosis and treatment guidelines and is a serious quality issue for malaria case management.

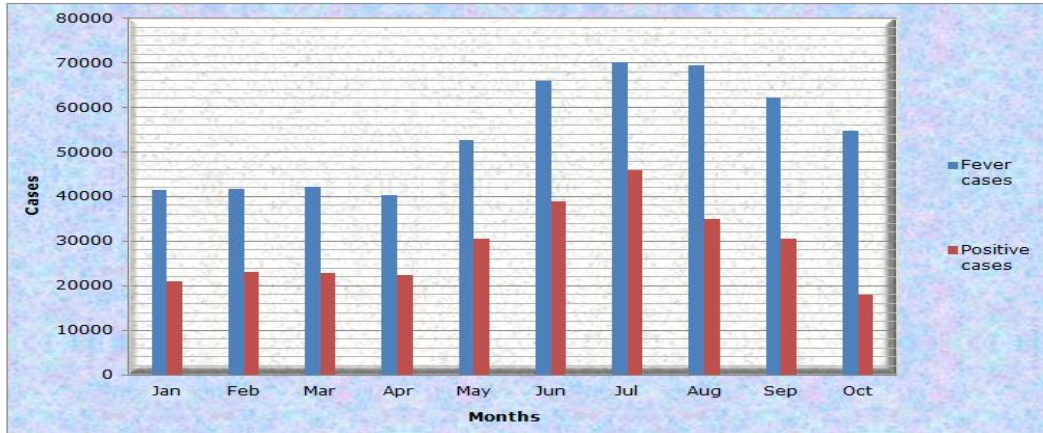
**Figure 7:** Number of patients with fever versus parasitological confirmation of malaria with RDTs, Niger State, January to October 2013 (HMIS data)



Source: NSMCP, 2013

Figure 8 shows the number of patients with fever cases as against number confirmed in the 375 HF's that had RDTs available. RDTs identified a significant proportion of fever cases that did not require malaria treatment, especially during the first seven months of the period before RDTs stock became depleted. Altogether, 53 percent of fever cases tested positive with RDTs (but it should be noted that the percentage would have been higher if the RDTs stockout had not occurred).

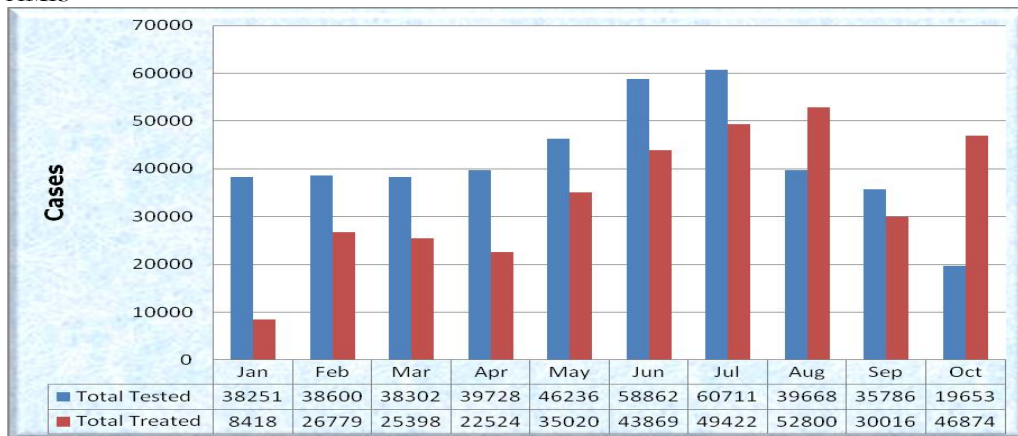
**Figure 8:** Number of patients at supported HFs with fever compared to number with positive test results, Niger State January to October



Source: NSMCP, 2013

Figure 9 shows that in the months of August and October, the number of patient treated was greater than the number tested positive. This evidences presumptive treatment, and at the same time reflects the depletion of RDTs in the latter part of the year, as mentioned above.

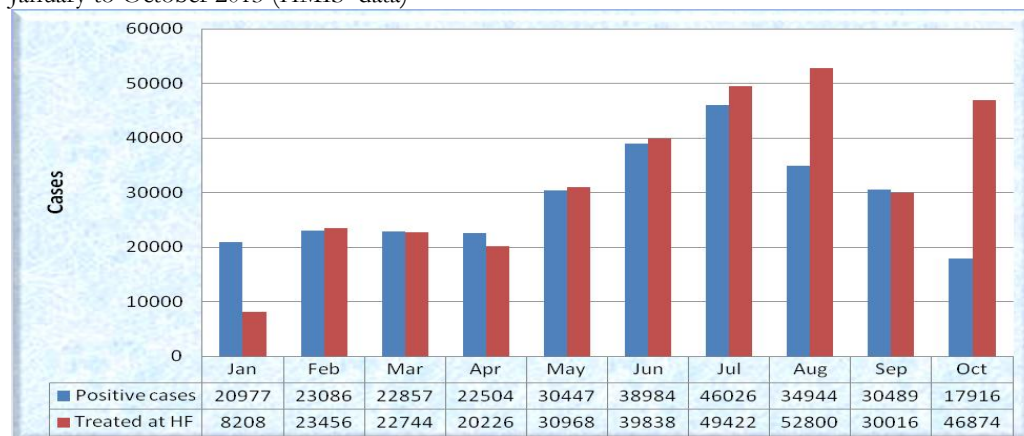
**Figure 9:** Total patients tested with RDTs as against total patients treated at health facility, Niger State January to October 2013 HMIS



Source: NSMCP, 2013

Figure 10 shows that in the early part of the year, the ratio of treated patients to RDTs-positive patients to was typically close to one. This would indicate that guidelines for treatment and diagnosis were followed rather closely, and ACT prescription was reduced as a result of the use of RDTs.. These findings agree with those of Uzochukwu et al., (2009) in Enugu State, but differ from those of Ige & Ayandipo (2014) in Oyo State that showed increased ACT prescription rates after RDTs rollout. However, the stock outages later in the year made it impossible to continue to follow guidelines, and ACT prescription rates increased.

**Figure 10:** Patients tested positive using RDTs as against number of patient treated at supported health facilities in Niger State, January to October 2013 (HMIS data)



Source: NSMCP, 2013

To improve the quality of data, the state in collaboration with implementing partners (IPs) conducted training at all supported HF on malaria case management, logistics and Health Management Information System (HMIS) tools. This training helped 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. In addition the training, HMIS data-capturing tools were also procured: in order to facilitate reporting on services such as diagnosis and treatment, nearly one million malaria reporting (HMIS) and Logistic Management Information System (LMIS) tools were produced and distributed by the state government and implementing partners (NMCOP, 2013). Within the private sector, SFH also built capacity of personnel responsible for data management (NMCOP, 2013).

Accessibility to RDTs from the service provider’s perspective is subject to knowledge and availability of the guidelines at the point of use. It was observed by the national monitoring and evaluation team that treatment guidelines were frequently unavailable at the service delivery points: for example, in some cases, the guidelines were locked up, or were kept at home by the head of the HF. In addition, there was no provision for translation of the guidelines from English into local languages, which may be a significant obstacle for some lower-level providers and for private healthcare (NMCOP, 2013).

To improve quality of case management, supportive supervisions was initiated and conducted on monthly or quarterly bases by ARFH, SuNMAP, NMCP, and the state malaria control team. The LGA routinely supported health facilities, while the state team visited LGA and HF’s monthly. NMCP and IPs visited the state and HF’s on a quarterly basis (NMCOP, 2013).

Another factor that affected the quality of healthcare delivery was the inability of the Niger State malaria control program and partners to quantify accurately the actual commodity required by the state, which resulted from inconsistent consumption data. Commodity management (including tracking of ACT and RDTs) and appropriate usage of bin card, request and requisition forms was not adequately handled by the peripherals HF’s (NMCOP, 2013).

The long time interval between training of health workers for RDTs and actual implementation may have had an adverse effect on the quality of testing. In Niger State, RDTs training was conducted in July 2011 while implementation commenced in June 2012 (ARFH, 2013).

## DISCUSSION

### Best practices that enhance the use of RDTs

#### Using Community Health Workers (CHWs) to implement RDTs

In a study conducted from 2007-2008 in Livingstone District of Southern Province, Zambia by Counihan et al. (2012), community health workers (CHWs) received a half-day training on RDT use and interpretation, and were then sent out with job aids, a supplies of RDTs and paracetamol to treat RDT-negative patients. Follow-up visits were paid to CHWs after 3,6, and 12 months. Photographs of RDTs with positive, negative and invalid test results were used to determine whether CHWs could identify results accurately. Findings showed that CHWs correctly identified results at 3<sup>rd</sup> months (87.7 percent) and at 12<sup>th</sup> months (100 percent). Also, interpretation of faint positive result drops to 76.7 percent at 12<sup>th</sup> months. The study concluded that: training, supplies (RDTs, job aids, consumables) and supervision can increase correct use of RDTs (Counihan et al. 2012).

## **Regular supply of ACT and RDT**

In a qualitative study conducted in Ghana (Chandler, Whitty & Ansah, 2010), one health worker expressed that patients rated her health facility higher than others due to presence of RDTs and ACT, which improved patients' acceptance of RDT results and their confidence in the judgment of health workers on patients' conditions. Another health worker in the same study said that the availability of RDTs makes patients think the health facility has been upgraded with new technology, thereby increasing patient turnout for services. 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 in Ghana showed that patients perceived accessibility of RDT kits as an advancement in malaria case management with regards to diagnosis and treatment. In order to achieve and sustain this confidence, a regular supply of ACTs and RDTs is required (Baiden, 2012).

## **Stock monitoring**

A study in South Africa highlighted the following factors as having a positive influence on the appropriate use of RDTs: routine stock monitoring such using stock cards (bin cards, request and requisition forms) and/or electronic means such as logistic management information system (LMIS); and air-conditioning and monitoring of commodity room temperature with thermometers and regularly updated temperature charts (Moonasar et al. 2007).

## **Education**

A study conducted in Southeast Nigeria showed that willingness to pay for RDTs increased with education of healthcare users, so that urban patients (who tend to be better educated) were more willing to pay for RDTs more than rural patients (Uzochukwu et al. 2010). This finding aligns with NDHS 2013, which showed that increased in educational status of women correlate with increased antenatal care by skilled providers and health facility delivery (NDHS, 2013). Although RDTs and ACTs are free in Niger State, increased knowledge of RDTs among the population will facilitate accessibility (ARFH, 2013).

## **Social marketing increases RDTs utilization**

A study conducted in Uganda from March 2011 to April 2012 demonstrated how a social marketing strategy can be used to increase RDTs utilization. The study took place in 67 villages and involved 92 registered shops. The identified shop owners were trained for RDTs administration, and were also tasked with supplying data such as RDTs sales, numbers of positive and negative patients, and fees charged per patient. Monitoring checklists were furnished to shop owners to ensure that RDTs were administered appropriately, sharps and other wastes were handled appropriately; and RDTs were properly integrated in their sales. Following training, each shop owner was equipped with 40 RDTs, a sharps disposal box, and free gloves for every RDT purchased. They were also connected with an RDTs wholesaler who subsequently supplied them with RDTs. The result showed that over 2,200 RDTs were sold monthly by trained shop owners over the 6-month period from July–December 2012 (Cohen et al. 2012).

## **CONCLUSIONS**

With support from NMCP, donors and implementing agencies, Niger State has made significant progress in malaria control. However, to have the state free of malaria by year 2020 as enshrined in the state governor's "Niger State Vision 3:2020" (Aliyu, 2008), concerted efforts and commitment will be required by the state government. Although parasitological confirmation (using RDTs) of malaria has been officially adopted by Niger State, after almost half a decade the Niger State Government still has not procured RDTs. Although the state government does procure ACTs, its supply is like a drop in the ocean.

Reliable availability of RDTs and ACTs also impacts acceptance. 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. When ACT is out of stock, patients see no reason for testing without treatment.

On the part of donors, it is necessary to find out if they understand the programmatic implications of irregular and disproportionate supply of ACTs and RDTs. There may be a need for a formal memorandum of understanding between the state Government and donors.

There is a general acceptance among the population of finger pricks for RDTs. However, acceptance of the result is an issue, especially when fever is severe.

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 mosquito bites, a negative RDT result will not be sufficient to convince the patient. Also, to some healthcare providers, patient symptoms outweigh a 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 a large fraction of fever cases presented do not require ACTs.

Supply in terms of personnel, commodities, 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/SuMAP). 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 such as providing letters of recognition to private health facilities (PMVs and pharmacies), inviting them to stakeholders meetings, capacity building, and distribution of HMIS tools. These will motivate them to report on their activities.

## **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 campaigns to the community. This should include education, and training of RMCs as well as supplying them with RDTs.
- To effectively accommodate 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 amount required for procurement.
- Invest in the procurement and proportionate distribution of RDTs to HFs (especially non-funded HFs) and provide donor-funded RDTs during stock outages.
- The state government in collaboration with donors should support capacity-building for private HFs' malaria diagnosis using RDTs and cascade RDTs' use through social marketing strategies in the private sector.
- 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 forecasting of RDTs and ACTs usage.
- Increase information, education and communication messages to the general public (especially caregivers/women) on prompt response to childhood fever.
- A sustainability plan should be put in place, should the donors decide to withdraw or reduce support to the state.
- Procurement and distribution of RDTs should accompany ACTs and should be in a 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, so that their commodities should be supplied in proportionate quantity.

## **Conflict of interest**

The authors declare no conflict of interest

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