

## Factors Associated with Successful Implementation of Test, Treat and Track strategy for Malaria by Health Workers in Public and Private Health Facilities in four Rural Districts of N. Uganda

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### Abstract

*Introduction:* World Health Organization (WHO) in 2010 recommended the malaria Test, Treat and Track (T3) policy that emphasized diagnostic confirmation of all suspected malaria cases before treatment and tracking all of them. This study assessed key influencing factor for successful implementation of T3 strategy for malaria by health workers in public and private health facilities in four districts in Northern Uganda.

*Methods and materials:* Across sectional descriptive study was conducted in 115 public and 42 private health facilities involving 489 health workers, 63 community health workers (CHWs) and seven district officials in Apac, Dokolo, Gulu and Nwoya districts. Both quantitative and qualitative data collection methods were triangulated.

*Results:* Over 85% of the health facilities had not experienced stock out of antimalarial drugs and malaria Rapid Diagnostic Tests (mRDTs) within 7 days of the study. And 97%, 84% and 54% of the health workers in public, Private Not for Profit (PNFP), Private for Profit (PFP) health facilities respectively were knowledgeable and competently practicing the T3 policy. The knowledge among health workers in PFP on T3 policy was significantly lower than that of their counterparts in the public facilities ( $P < 0.001$ ). Each health facility in the study had at least one staff trained in integrated Malaria Management (IMM) that includes parasite based Test, Treat and Track of malaria cases (T3).

*Conclusion:* The successful implementation of T3 strategy in public health facilities in the four districts was due to availability of a number of enabling factors and few constraints.

**Keywords:** Adherence, Community health Workers (CHW), Private for Profit (PFP), Private Not for Profit (PNFP), Ministry of Uganda (MOH), malaria Rapid Diagnostic Tests (mRDTs).

### Introduction

Malaria remains number one cause of morbidity and mortality globally. Sub-Saharan Africa contributes 92% (200 millions) of the total malaria cases and 93% of malaria deaths globally (1). Relatedly, five African countries contribute nearly half of all malaria cases worldwide: Nigeria (25%), the Democratic Republic of the Congo (11%), Mozambique (5%), India (4%) and Uganda (4%) (2). Complications and mortality due to malaria is highly linked to late diagnosis and inappropriate

treatment of malaria (3,4). Thus effective malaria control is dependent on early quality diagnosis and effective treatment, vector control and personal protection (5). The test-oriented prescribing practice promotes the prevention of not only the wastage of expensive artemisinin-based combination therapy (ACT) but also of the development of malaria parasite strains, which are resistant to the therapy. At international level, researchers and policy makers had numerous discussions on how the change from presumptive malaria treatment to parasite based diagnosis and treatment and

agreed that it was time for policy shift due to many reasons including the declining malaria prevalence, the invention of cheap and sensitive mRDTs and expensive ACTs (6,7). In tandem with this discussion, World Health Organization (WHO) in 2010 and 2012, recommended that all malaria cases be confirmed with a diagnostic test, provided an appropriate treatment based on result and tracked (8,9). Many Sub-Saharan countries have adopted this policy. In 2011, Uganda adopted the same policy and MOH recommended increased coverage, utilization and compliance to parasitological diagnosis using microscopy or RDTs as a basis for treatment (10). This resulted into the scale up and use of parasite-based diagnosis of malaria to lower health facilities, community-based health care programs, and private retail facilities. The parasite based diagnosis of malaria was prioritized secondary to a shift from cheap Chloroquine/SP to more expensive ACT antimalarials and introduction of (11,12). The roll out of this policy was made possible with introduction of malaria Rapid Diagnostic Tests (mRDTs) in 2009 (13). Whereas the national and district level policy makers have embraced and supported the roll out of this policy, there is little evidence that all health workers are willing to fully comply and implement it. And a number of factors have been linked to the successful implementation of this policy. For instance availability of resources such as diagnostic kits, medicines and guidelines have been earmarked as the key factors that influence health worker's compliancy to test and treat policy (14-18). While other researchers have linked this to capacity building such as training and appropriate supervision(16,17). The moderate of (25% - 35%) adherence to parasite based diagnosis in Uganda was majorly linked to lack of testing kits, training and enough experience in use of mRDTs (16,17). Some studies have showed that the knowledge of health workers in private sector on parasite-based diagnosis of malaria is limited. For example, the study (18) revealed that in Ethiopia health workers in private practices have major gaps in knowledge and practice related to malaria case management.

A number of factors have been highlighted as drivers why health workers don't adhere to the test and treat guidelines including low competence levels and skills to diagnose and

treat for other non-malaria fevers, unavailability of alternative testing procedures for non-malaria fevers, practicing the ethical value of beneficence and prioritizing the life of the patients (19, 20).

At the community level studies such as (20–22) have showed that a series of factors including medicine availability, training and regular supervision impact on the performance of VHTs on use of mRDTs and overall case management of malaria.

(23), concluded that supply of drugs and other requirements to VHTs are key to improvement of their performance with management and treatment of malaria under the children aged 5 years using Malaria Rapid Diagnostic Test. In their study, (24) found that the participatory training method, support supervision, use of community data and feedback between the CHWs and community members were responsible for effective management of malaria by CHWs using Malaria Rapid Diagnostic Tests (m RDTs) (21), recommended a regular community behavioral change communication (CBCC) strategy to address program related challenges that may lead to community members' fear and stigma during the drawing of blood for mRDTs by the VHTs for the management of malaria. This study also identified the level of education as another key factor that influences the use of mRDTs. Highly educated CHWs were observed as easy to train and implement all the required information leading to high performance in the management of malaria under the children of five years using Malaria Rapid Diagnostic Tests (mRDTs).

Similar factors affect the performance of health facility-based health workers. For instance the study by Kankpetinge and others in 2016 (25) found that availability of diagnostics (mRDTs) and ACT are influencing factors for health workers in both public and private to adhere to T3 strategy. D'Acremont, et al (2011) found that the prevalence of malaria (testing rates) in an area may affect the community's acceptance of results and thus reduced demand and use of malaria diagnostics. The study demonstrated drastic reduction of use of Malaria Rapid Diagnostic Tests (mRDTs) in moderately low malaria prevalent areas which was attributed to factors such as delivering no treatment to patients with negative results.

Evidence has shown that mRDTs are a more practical option over microscopy for use in poorly resourced areas, particularly in remote and rural areas where laboratory equipment, electricity and personnel with training may be absent.

From our search we, have confirmed that the evidence available on factors responsible for successful implementation of T3 is scanty and very limited to the T2 strategy (Test and Treat) and not on the whole package of the T3 strategy. Therefore, as part of the wider study that assessed the overall implementation of the Test Treat and Track of malaria in four districts of N. Uganda, this paper assessed and will concentrate on the factors associated with successful implementation of T3 strategy. In this part, state the purpose of the study. The following should be stated clearly.

## **Materials and Methods**

### **Study setting**

A cross sectional descriptive study that triangulated quantitative and qualitative data collection methods was conducted in four high malaria burden districts in Mid-northern Uganda including Gulu, Apac, Dokolo and Nwoya with a total and children under five populations of 1,121,570 and 224,314 respectively (26). We deliberately nested in a conceptual frame work which was developed by Lani Marquez (27) to study the key factors that influence health workers in the four districts to adhere to T3 protocols that results into successful implementation of T3 strategy. The factors were categorised as either individual environmental (appendix 2).

### **Sampling**

A non-probability (convenience) sampling technique was used to select the study sites including 115 public health facilities, 22 PNFP, 20 PFP and 63 CHWs. Using Probability Proportional to size sampling strategy, distribution of the sample in each district was determined. In total 444 health workers comprising of 384 health workers (318 from public and 66 from private) and 60 community Health workers were sampled for this study. Additionally, total of 8 Key Informants interviews (4 district malaria and 4 laboratory focal persons) and 4 Focus Group Discussions (FGDs) one in each study district with in

charges of high-level health facilities and district diagnostic officers were conducted.

### **Data Collection**

Data was collected in June and July 2019. Data collection tools which included structured questionnaires, semi-structured and open-ended interview guides were developed and pre-tested at Health Centres (HCs) in one neighbouring district. Six social scientist research assistants with a range of language skills for the context were recruited and received two days training. Data collection were conducted through health workers' interviews, observation of patient-health worker interaction during suspected malaria case management, in-depth interviews with key informants, exit interviews and focus group discussions. Structured and semi-structured questionnaires were used to collect quantitative data while other study tools were used to collect majorly qualitative data.

### **Data Management and Analysis**

Quantitative data were entered and cleaned in EpiData 3.1 and analysed using Stata 12.0. Health provider's characteristics and mean performance were summarized and descriptive statistics; frequencies, percentages and graphs generated using descriptive analysis. Inferential statistics were also used to measure the study hypotheses in order to ascertain the association and strength of independent to the dependent variables. Thematic analysis of transcribed observation and interview data followed the 'framework' approach, whereby a pre-existing coding frame was developed based on the scope of enquiry to which codes were added on review of the data. All data were coded and indexed in Excel (Microsoft) and analysed according to the most salient themes.

### **Ethical Approval**

Institutional approval of the study was obtained from the supervisors and Texila American University Guyana. The Uganda National Council for Science and Technology granted ethical clearance for the study (UNCST HS2476).

### **Results and discussion**

#### **Response rate**

Overall, this study had an excellent response rate as summarized in the table below:

**Table 1.** Respondents interviewed during the study

| Response Category          | Target | Public | PNFP | PFP | Total | %    |
|----------------------------|--------|--------|------|-----|-------|------|
| Health workers             | 384    | 159    | 72   | 101 | 332   | 86.5 |
| Exit interviewees          | 236    | 98     | 21   | 51  | 170   | 72   |
| Health facility in-charges | 118    | 115    | 22   | 20  | 157   | 133  |
| CHWs                       | 60     | NA     | NA   | NA  | 63    | 105  |
| Observations               | 40     | 15     | 8    | 14  | 37    | 92.5 |
| Key Informant              | 8      | NA     | NA   | NA  | 7     | 87.5 |
| Focus group discussions    | 8      | NA     | NA   | NA  | 8     | 100  |

## Individual factors

### Gender and age of Facility Level Health Workers

As can be seen in table 2 below, we found that majority of the health workers were adult (25+) females and majority (64%) of them were certificate holders. During FGDs with them, we found that many of them were trainable, easy to supervise and were committed to comply with new policies.

**Table 2.** Characteristics of study Participants-Health workers

| Provider Characteristics     |                        | Apac | Dokolo | Gulu | Nwoya | Total |      |
|------------------------------|------------------------|------|--------|------|-------|-------|------|
|                              |                        |      |        |      |       | No.   | %    |
| <b>Gender distribution</b>   | Female                 | 40   | 31     | 98   | 25    | 194   | 58.7 |
|                              | Male                   | 34   | 22     | 64   | 18    | 138   | 41.3 |
| <b>Age distribution</b>      | 20 – 24                | 10   | 2      | 27   | 9     | 48    | 9.3  |
|                              | 25+ years              | 64   | 51     | 135  | 34    | 284   | 85.8 |
| <b>Highest qualification</b> | Post graduate          | 0    | 0      | 1    | 0     | 1     | 0.3  |
|                              | Degree                 | 2    | 0      | 8    | 0     | 10    | 3.0  |
|                              | Diploma                | 22   | 17     | 55   | 12    | 106   | 31.9 |
|                              | Certificate            | 49   | 35     | 100  | 30    | 213   | 63.6 |
|                              | Other                  | 1    | 0      | 0    | 1     | 2     | 0.6  |
| <b>Health worker cadre</b>   | Medical doctor         | 3    | 0      | 4    | 0     | 7     | 2.1  |
|                              | Clinical officer       | 4    | 14     | 22   | 3     | 43    | 9.9  |
|                              | Midwife                | 6    | 6      | 32   | 3     | 48    | 14.5 |
|                              | Enrolled Comprehensive | 10   | 12     | 7    | 3     | 66    | 6.6  |
|                              | Enrolled Nurse         | 10   | 10     | 20   | 4     | 44    | 13.3 |
|                              | Nursing Assistant      | 12   | 11     | 24   | 10    | 57    | 17.2 |
|                              | Laboratory staff       | 7    | 7      | 35   | 7     | 56    | 16.9 |
|                              | Other                  | 11   | 0      | 0    | 0     | 11    | 0.3  |

### Competences on the Test, Treat and Track

As seen in table 6 below, 97%, 84% and 54% of the health workers in public, PNFP and PFP health facilities respectively were

knowledgeable and competently practicing the recommended parasite-based diagnosis of malaria. However, we found a significant low knowledge on the “Track” component among all health workers e.g. 26% (Public), 15% (PNFP) and 8% (PFP). Overall, 55% of all respondents during the FGD and KIs didn’t know at all what

tracking involves while 45% confuse it with patient follow-up not the context of surveillance. Key to note was that the knowledge among health workers in PFP was significantly lower than that of their counterparts in the public facilities ( $P < 0.001$ ).

**Table 3.** Study respondents' knowledge on components of T3 strategy

| <b>Ownership</b> | <b>Knowledge Test &amp; Treat</b> | <b>Knowledge Track</b> | <b>P-value for TT</b> | <b>P-value for Track</b> |
|------------------|-----------------------------------|------------------------|-----------------------|--------------------------|
| Public           | 97%                               | 26%                    | -                     | -                        |
| PNFP             | 84%                               | 15%                    | <b>0.011</b>          | <b>0.270</b>             |
| PFP              | 54%                               | 5%                     | <b>&lt;0.001</b>      | <b>0.039</b>             |

*“Not all fevers are malaria so there is this new initiative from the ministry of health that is you are supposed to test, treat and track on malaria because there are other conditions that present with fevers also so if you don’t test, you start treating on AMDs will not be good (FGD HW Nwoya).*

*“RDT is what is used to confirm malaria parasite in the blood before treatment is administered. I am actually appreciating the use of RDT in the community since it is actually eliminating the wastage of anti-malarial drugs (FGD VHTS Awach HCIII Gulu).”*

*“Then also about the T3’s, I think some health workers they still lack knowledge gap there. At the hospital here what is more prominence is the first 2T’s i.e. (Test and Treat) the third one to me it only stops at the ward “Tracking only stop at the ward” where after administering the three doses of IV Artsunate somebody is reset to see the amount of parasites which is still remaining but at the community component is still very weak that is what I see”. (FGD, HW Apac Hospital).”*

*“To me I haven’t heard but what we are doing is related to the strategy (CHW Anak Hospital).”*

*“Is my first time to hear about the Test, Treat and Track” (HW Apac Hospital).”*

*“Tract is to follow up the child you have treated to find whether there is improvement or not mainly after three days of treatment; if there is improvement, you thank the patient for responding to treatment but in case there is no improvement, you refer the patient for more examination at the health facility where there*

*are more machine for examination (HW, Apac Hospital).”*

As can be deduced from the above quotes, many health workers do not know about the third ‘T’. This could be attributed to the fact that the third ‘T’ was introduced later into the strategy.

### **Attitudes of health workers towards the T3 policy**

In line with the definition of attitude “An expression of favor or disfavor a person has, for example towards a service or policy”, we applied Likert scales to assess the attitude of health workers towards the implementation of T3 strategy. Health workers were asked to rate their level of agreement or disagreement with the statements pertaining to motivation on a scale of 1 to 5. Where 5 represents “strongly agree” and 1 “strongly disagree”. The variable, attitude was measured based on 11 questions. The results in table (appendix1) below present the descriptive findings. The results show that the overall aggregate mean score for attitude stands at 4.5 and the standard deviation at 0.82. This implies that, on average, health workers who participated in the study had good attitude towards the T3 strategy.

### **Environmental/organizational factors**

#### **Medical commodities, supplies and equipment**

During the health facility assessment, we found that over 85% of the health facilities were well stocked with ACTs and mRDTs and had not experienced stock outs of these commodities within 7 days of the study. This could have

contributed to the adherence, (testing rate and adherence to test results) seen in majority of health facilities especially the public. The improvements in stock status of ACTs and mRDTs were attributed to different factors, including the on-going efforts to undertake quantification of drug demand and consumption at health facility level. Districts with recent experience of IRS such as Dokolo also reported over-stocking of anti-malarials, to the extent that they were donating the anti-malarial medicines to other districts. Also, we found that most (87%) high level health facilities (HIIs, HCIVs and hospitals) had adequate stocks of other laboratory commodities including reagents, microscope slides and drying racks.

*“Yes, we have enough medicines and testing kits and I can say that even other facilities are over stocked as far as malaria testing kits is concerned (KII DLFP Dakolo)”.*

*“Currently there has been no stock out, they are testing properly and also with the training we have conducted with those facility in-charge plus some other staffs: people are aware except may be the VHTs that we did not teach and we need to call them and teach them (KII DLFP Nwoya).”*

*“For me the testing and trusting to mRDTs has increased since introduction of testing services in the lower health facilities and integrated community case management in the community with testing services for malaria and pneumonia (KII District Laboratory focal person Apac).”*

The key challenges with regard to medical commodities, supplies and equipment were found to include: lack of storage facilities for medicines; lack of transport means to transport medicines within districts and mismatch between needed medicines and what is supplied due the use of the ‘push’ system (by which supplies of medicines from the National Medical

Stores (NMS) to health facilities are based on estimated needs of health facilities rather than orders of what they actually need.

### **Training and Support supervision**

As shown in figure 9 below, the study findings showed that each health facility in each district had at least one staff trained in integrated Malaria Management (IMM) that includes parasite-based diagnosis, treatment and tracking of malaria cases (T3). However, the findings further showed that health facilities were getting sub-optimal levels of support supervision on IMM by district and national supervisors. For instance, in the month before the study only 26 of the 89; 07 of 20 and 09 of 29 health facilities in Gulu, Dokolo and Apac respectively had been supervised. Detailed analysis shows that the supervisions were received more in public health facilities and almost none in PNF and PFP facilities. For instance, none of the facilities were supervised in PFPs in Apac, Gulu and Nwoya districts.

*“Mine is making sure that the testing is accurate because we are participating in the External Quality Assurance both with MOH and malaria Consortium. I always collect slides from various H/CIIs and then I bring and make sure that they are analyzed and I always supervise to ensure that the testing is totally done (KII laboratory focal person Nwoya).”*

### **Inventory of key malaria guidelines**

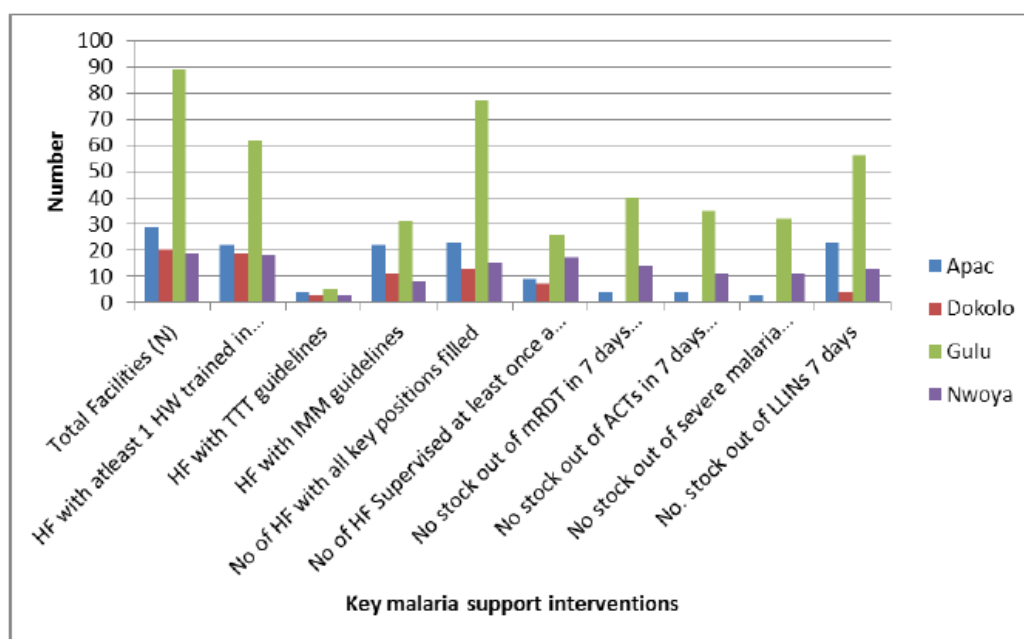
Other than National treatment guidelines which are not specific to malaria, very few health facilities had important guidelines on malaria interventions (table 5). For instance, only 9.5% and 32% of facilities had Parasite Based Diagnosis Guidelines (T3) and IMM guidelines.

Table 1 Showing Proportion of facilities with the different malaria guidelines.

**Table 4.** Showing Proportion of facilities with the different malaria guidelines

|  | <b>Apac</b> | <b>Dokolo</b> | <b>Gulu</b> | <b>Nwoya</b> |
|--|-------------|---------------|-------------|--------------|
| Percentage of health facilities with ALL the recommended malaria management guidelines | 3.0         | 2.7           | 2.7         | 4.7          |
| National Treatment Guidelines on Treatment of severe and complicated malaria           | 43.4        | 37.8          | 41.8        | 53.8         |
| Uganda Clinical Guideline 2016   | 84.5        | 84.4          | 78.1        | 91.5         |
| Integrated Malaria Management (IMM) Guidelines   | 30.3        | 26.2          | 28.1        | 42.5         |

|   |      |      |      |      |
|---|------|------|------|------|
| Malaria in Pregnancy guidelines 2014?   | 14.9 | 7.6  | 10.3 | 13.2 |
| Parasite Based Diagnosis Guidelines (T3)  | 12.8 | 7.6  | 8.2  | 9.4  |
| External Quality Assurance Guidelines   | 11.7 | 8.9  | 8.2  | 19.8 |
| Percentage of facilities that offer antenatal services that have an IPTp protocol available and displayed on site | 20.7 | 14.9 | 22.2 | 32.9 |



**Figure 1.** Inventory of key malaria resources and actions

### Other enabling factors

Community/caregiver acceptance and demand for malaria testing before treatment: As already stated in table 11 above, majority of patients and care givers know that it was important to test before treatment and demanded health workers to them or their children for malaria before antimalarial medicines were prescribed.

*“No. I can’t allow either my child or myself to start taking drugs before I confirm the disease I am or my child is suffering. This is done by testing. Testing is very good but it pains (Care giver, Awach HCIII Gulu).”*

### Constraints and challenges for successful implementation of T3 strategy

Negative attitude of health workers: Findings of the KIIs showed that some health workers lacked clinical experience and had bad attitude towards the T3 strategy.

*“Bad attitude of health workers: You know sometimes with work with clinicians who are not experienced and have bad attitude, they do things in any way and it cannot change in one*

*day all but we believe their attitude will change you know with human beings. (DLFP Dokolo)”*

*“Some health workers still do not believe that the patient with many clinical signs and symptoms of malaria can still have no malaria and they proceed to give antimalarial treatment. (DLFP Gulu).”*

### Inadequate training

*“I still think there is a gap capacity-wise and we have been recruiting more new health workers so some of them came from the private practice and may not be having the knowledge on the government policy of test and treat, so that should be worked on through training them. (MFP Nwoya).”*

### Stock out of key malaria commodities

Our health facility assessment on stock levels of key malaria commodities showed that 50% of the health facilities in Nwoya had stock out of ACTs and mRDTs at the time of the visit. This was more in private facilities in that 82% of the private sector we visited had stock outs of mRDTs. This was also confirmed by some key informants:

*“The challenges sometimes are in the equipment that is used in treating like gloves has always been a problem when giving Atesunate (DLFP DOKOLO)”* Workload and under staffing: The survey also revealed that some health facilities are understaffed with very many patients. Interviews with district leaders and health workers confirmed that some facilities are manned by one staff.

*“Workload is too high most especially at health centre II where health workers are few (MFP Dokolo).”*

*“On the side of antenatal the rise in malaria is too high and it’s making us get problems of diagnosing this mother’s because you may send the mother to the laboratory and she will get a long line then in the end she will go back without the results so diagnosing them whether they have server or uncomplicated malaria it become a big problem so it takes a lot of time for us to diagnose them yet there is a big workload in the laboratory (FGD health worker Apac Hospital).”*

*“The challenges like for H/C II looking at the number of staffs that are there, according to one or two who are trained and when one goes out for a workshop only one remain and he has to clerk, give them drugs. Now they have to give VHTs to help them (Biostat Apac).”*

### **Poor patient compliance**

The study findings also showed that some patients refuse to accept that they are negative.

*“Some patients can reject results but what you can do you reassure them, counsel them and tell those more of the benefit of testing. (FGD health worker Nwoya).”*

### **Conclusion**

The good performance of T3 in majority of public health facilities was attributed to existence of a number of individual and environmental enabling factors such as good stock of diagnostic kits and antimalarial medicines, availability of motivated and competent health workers with good attitude, existence of test and treat at community level. On the other hand, the study found some constraints that have led some facilities in specific districts such as Nwoya and private health facilities. They include poor attitude of health workers, poor patient compliance, low

staffing levels and frequent stock out of key commodities due to high malaria burden

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**Appendix 1: Attitudes of health workers towards the T3 policy**

| S/No | Measurement Statement  | N   | Strongly disagree (SD) | Disagree (D) | Neither agree nor Disagree (NS) | Agree (A) | Strongly Agree (SA) | Measures of Central Tendency |     |      |      | Interpreting the Mean |
|------|--|-----|------------------------|--------------|---------------------------------|-----------|---------------------|------------------------------|-----|------|------|-----------------------|
|      |  |     | %                      | %            | %                               | %         | %                   | Min                          | Max | Mean | SD   |                       |
| 1    | Overall, you are satisfied with your role as a health worker?                    | 510 | 0.6                    | 0.8          | 1.5                             | 17.7      | 79.4                | 1                            | 5   | 4.74 | 0.59 | Strongly agree        |
| 2    | The work you are asked to do is worthwhile/ has value                            | 510 | 0.8                    | 2.3          | 3.3                             | 26.3      | 67.3                | 1                            | 5   | 4.57 | 0.74 | Strongly agree        |
| 3    | Malaria is not the only cause of fever   | 510 | 0                      | 0            | 1.7                             | 22.1      | 76.3                | 3                            | 5   | 4.75 | 0.47 | Strongly agree        |
| 4    | It's important to test all fever cases before you treat                          | 510 | 0                      | 0.8          | 2.7                             | 17.9      | 79.2                | 2                            | 5   | 4.75 | 0.54 | Strongly agree        |
| 5    | Testing improves the management of patients with fever                           | 510 | 13.3                   | 7.5          | 5.6                             | 20.8      | 52.7                | 1                            | 5   | 3.92 | 1.44 | Agree                 |
| 6    | Confirmed malaria is best treated with ACTs as recommended by WHO and MOH Uganda | 510 | 0.4                    | 1            | 2.1                             | 19        | 77.5                | 1                            | 5   | 4.72 | 0.6  | Strongly agree        |
| 7    | Confirmed negative cases should never be treated with antimalarial medicines     | 510 | 1.3                    | 2.1          | 3.5                             | 34.4      | 58.8                | 1                            | 5   | 4.47 | 0.77 | Strongly agree        |
| 8    | Sometimes as a CBD you asked to do work which doesn't make sense                 | 510 | 10.8                   | 10.8         | 11.7                            | 31.5      | 35.2                | 1                            | 5   | 3.69 | 1.34 | Agree                 |
| 9    | All patients tested and treated for malaria should be registered well            | 510 | 1.9                    | 5.8          | 7.3                             | 25.6      | 59.4                | 1                            | 5   | 4.35 | 0.98 | Strongly agree        |

|   |  |     |     |     |     |      |      |   |   |      |      |                |
|---|--|-----|-----|-----|-----|------|------|---|---|------|------|----------------|
| <b>10</b>   | Tracking is very key component of malaria care and all patients should tracked | 510 | 1.5 | 2.1 | 5.4 | 28.1 | 62.9 | 1 | 5 | 4.49 | 0.81 | Strongly agree |
| <b>11</b>   |  | 510 | 0.8 | 1.3 | 7.5 | 20.8 | 69.6 | 1 | 5 | 4.57 | 0.76 | Strongly agree |
| <b>Global Mean and Average Standard Deviation</b> |  |     |     |     |     |      |      |   |   | 4.5  | 0.82 | Strongly agree |

**Appendix 2: Study conceptual frame work**

