

Public Health Sector Readiness to Provide Malaria Case Management in Uganda

Muhwezi Stephen*, Marian Warsame** DrAbdisalan Noor***

*(School of public health and community medicine, University of Gothenburg, Sweden
muhwezistep@gmail.com)

** (School of public health and community medicine, University of Gothenburg, Sweden
marian.warsame@gu.se)

*** (Global Malaria Programme, WHO, Geneva, anoor@who.int)

Abstract:

Background: Malaria continues to be a global health burden, low and middle-income countries particularly in the World Health Organization Africa Region account for the highest disease burden in the Public Health Sector. Readiness to provide appropriate care and management of malaria is pivotal in malaria control and elimination however there are research gaps in understanding the degree of readiness for Public Health Sector in Uganda. The purpose of this study was to measure the readiness of the public health facilities in Uganda to provide management for malaria.

Methods: The study is a retrospective study based on health facility data available on the national health management information system; secondary data collected that is available in Ministry of health district reports; end-user verification surveys (EUV) done between 2016-2019 in collaboration with the United States President’s Malaria Initiative and Service Availability and Readiness Assessment (SARA) Uganda survey done in 2014 in collaboration with the World Health Organization. Analysis was done by region in Uganda. The indicators analysed were on treatment and availability of malaria commodities.

Results: The hospital and HC IV distribution across the regions in Uganda indicates northern region has 35 facilities compared to 51 and above facilities in other regions. The key health workers (nurses, doctors and clinical officers) approved positions filled in the different regions shows eastern region has the lowest at 68% and highest at 112% of the positions in the central region. In average, malaria treatments and diagnostics were available in 60% and 83%, respectively, in all regions. Stock out of commodities for case management (Rapid Diagnostic Tests and medicines) were the highest in 2016 and 2017. Western region has the highest malaria testing rate (90.3%).

Conclusions. The survey found that Uganda's Public Health Service is not yet at 100 percent readiness, which is the benchmark level. However, the government should put emphasis on test and treat policies and evaluating health services on a regular basis. Furthermore, more efforts are needed on reducing stock outs of malaria case management commodities, notably RDTs, which are critical for giving fast and accurate test results.

Keywords —Readiness, malaria case management, public health facilities, availability.

1. Introduction

Malaria is a vector-borne disease with an estimated 241 million cases and 627,000 deaths worldwide in 2020 (World Malaria Report, 2021). Countries in the WHO Africa region bear the largest share of the disease burden accounting for

95% of the malaria cases and deaths, with the highest burden in Nigeria (27%), Democratic Republic Congo (12%), Uganda (5%), Mozambique 4% and Niger (3%). In Uganda, malaria affects over 90% of the population, contributing to 34% of outpatient hospital visits, 37% of hospital admissions (Uganda - Malaria Operational Plan FY

2019.) and 20% of all hospital deaths. Additionally, malaria has a direct and indirect impact on the socio-economic welfare of individuals, the community and the national budget. Out of pocket expenditure towards malaria treatment reduces household income and sick leave affects productivity.

1.1 Malaria in Uganda

In 2018, there were 12.3 million malaria cases and 13,203 deaths due to malaria in Uganda (Mpimbaza et al., 2020). However, malaria prevalence across regions in Uganda varies, according to the Malaria Indicator Survey 2019 with the northern region had the highest prevalence (20%), followed by eastern (9%). Central and western had the lowest at 4% and 5% respectively (Nmcd et al., 2020). The northern region has had political instability for years that made people homeless with limited access to health care services making the prevalence of malaria high in the region. (Northern Uganda: Understanding and Solving the Conflict | Crisis Group, n.d.)

1.2 Strategies to control Malaria

Several strategies have been employed to help reduce malaria including appropriate malaria case management which involves testing and treating of all malaria cases (WHO, 2021). The malaria control strategies can be evaluated through measuring readiness of the public health sector in Uganda. This helps identify performance gaps within the health system. For policy changes to be effective towards general and specific service delivery, the health system performance needs to be monitored periodically and assessed for service availability and readiness. Uganda initiated a policy campaign of the “malaria test, treat and track”, following the WHO recommended guidelines of increased surveillance and proper case management (WHO | T3, 2010.). The new recommendations involve testing all suspected malaria cases and treating all confirmed malaria cases.

Efforts have also been made to protect the Ugandan population from the risk of malaria through universal distribution of long-lasting Insecticide mosquito Nets (LLINs), increasing

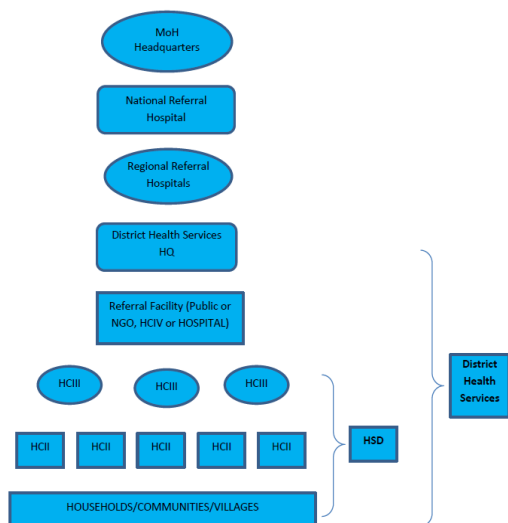
access and ownership of LLINs is at 91% (Wanzira et al., 2018). According to the national malaria control program, the Ugandan government in 2000 waived taxes on the importation the LLINs to increase coverage and use, however the coverage remained low till the government implemented universal coverage in 2009. Furthermore, scaling up of LLINs use in 2014 incorporated routine distribution to pregnant mothers through antenatal services and to children under 5 years using immunization services. (National Malaria Control Program | Ministry of Health, n.d.) Additionally, a comprehensive strategy was adopted to prevent malaria during pregnancy with intermittent preventive treatment using Sulphadoxine-Pyrimethamine (SP) that is administered orally during the antenatal visits. Malaria case management has undergone changes to improve on the effectiveness of the antimalarial drugs used. Chloroquine (CQ) and SP were the recommended first and second line treatments, respectively. However, a combination of the two (CQ and SP) was adopted in 2000 due to resistance (National Malaria Control Program | Ministry of Health, n.d.). More so, in 2004, Ministry of Health Uganda made further changes by recommending Artemether-Lumefantrine (AL) because of high failure rate of CQ and SP. In year 2007, Uganda introduced RDTs mostly in lower units to improve the malaria diagnostic capacity. In 2010 there was nationwide roll out of RDTs which led to the decline of treating presumptively.

1.3 Uganda health system

There are different levels of health care provision in the Uganda health system. At the national level, there is a national referral hospital, which is also supported by regional referral hospitals and district hospitals. At district level, there are health centre levels II, III and IV, and the lowest level is the health post, and the village health teams. Health data is reported from health facilities, mainly in paper form, to the district level which then reports data to the central health information and management system through a District Health Information System (DHIS2) based platform

(National Malaria Control Program | Ministry of Health, n.d.).

Figure 1 showing the organization structure of the Uganda health system



Source: Uganda hospital and health centre IV census survey 2014

The Uganda health system structure consists of 6,937 private and public health facilities, 45.2% of these facilities are government owned, 14.4% are private not for profit whereas 40.3% are private for profit health facilities (“Hospitals,” 2021.). In the Uganda health system structure, the health sub district or Health Centre (HC) IV offers support to the lower unit through capacity building in procurement and supply chain management. HC III also provides support to the lower unit plus providing preventive and curative care. Furthermore HC II offers the first interaction of the community to the formal health care services, in addition they also offer patient treatment and community outreach health services in coordination with Village Health Teams (VHT’s) or HC I (Uganda Health System, n.d.) Uganda has over 179,000 VHT’s whose main role is to do health promotion through increasing community participation in accessing and utilization of health services (Mays et al., 2017). Even though malaria treatment in public health facilities is completely

free (National Malaria Control Program | Ministry of Health, n.d.), due to stock outs, long lines and distance to the public HC’s communities often seek treatment services in private health facilities (Awuah et al., 2018)

1.4 Public Health Financing

Uganda health system is financed by the central government. However, management and administration of health facilities is at the district level through the decentralization system. Decentralization of health service management to districts offers opportunity to districts to ensure that resources are directed and aligned with local health priorities (“HEALTH FINANCING STRATEGY,” n.d.). The districts are grouped together to form regions that is western, eastern, northern, and central. These regions are not administrative units and have no mandate to manage hospitals and health centre IV’s. They are essential in understanding the characteristics of the area. Poverty characteristics vary between the regions with eastern Uganda having the highest poverty rate at 35.7% followed by northern Uganda at 32.5% based on poverty estimates of 2016/2017 by Uganda bureau of statistics across. Central and western Uganda had the lowest poverty rate at 12.7% and 11.4%, respectively (Poverty in Uganda, n.d.).

1.5 Malaria Global strategy

The Global Technical Strategy for malaria 2016 - 2030 target is to achieve a 90% reduction in malaria cases and malaria mortality by 2030, from a baseline of 2015 (WHO | Global Technical Strategy for Malaria 2016–2030). One of the pillars of this strategy is to ensure universal access to malaria prevention, diagnosis and prompt effective malaria case management at all health service points Similarly, Uganda Malaria Reduction and Strategic Plan 2014-2020 targeted 90% of the public and private sector provide prompt treatment of malaria cases following the national malaria treatment guidelines of test and treat (The Uganda Malaria Reduction Strategic Plan 2014-2020).

The WHO recommends universal access to quality treatment for all malaria patients with antimalarial medicines after performing a

confirmatory malaria diagnostic test. Adherence to these guidelines allows for prompt treatment of malaria and prevents the further spread of the disease in the community (WHO | Global Technical Strategy for Malaria 2016–2030). Therefore, it is important that such services are readily available at all health service points for proper malaria case management. Consequently, the purpose of this study is to measure the readiness of public health facilities in Uganda to provide appropriate malaria diagnosis and treatment.

1.6 Relevance to Global Health

Malaria a threat to global health and threatens the lives of millions. Adequate malaria case management is a fundamental pillar of the malaria interventions for reducing malaria burden. Therefore measuring the readiness of public health facilities in Uganda will identify the gaps in the provision of the effective malaria case management and generate data to inform actions to improve malaria diagnosis and treatment in Uganda. Under the Sustainable Development Goal (SDG), target 3 is good health and well-being, which prompts quality malaria service delivery and care (Goal 3 | Department of Economic and Social Affairs, n.d.). Malaria cases that are promptly diagnosed and properly treated with effective antimalarial medicines reduce the rate of onward malaria transmission in the community (WHO | Overview of Malaria Elimination, n.d.). Such efforts promote good health for all. The aim of the SDGs Vision 2030 is leaving no one behind. Therefore, assessing the quality of services delivered by the public health facilities in Uganda ensures that communities receive adequate care of malaria case management. It is, thus, important to ensure that public health facilities provide quality health care services. Assessing the management of malaria at health services fosters monitoring and surveillance services at all levels of service delivery. Such efforts have global and national benefits, as malaria substantially affects economic development.

2. Aim and specific objectives.

2.1 Main Aim

To assess the public health sector readiness in providing malaria diagnosis and treatment in Uganda, a low-income setting.

1) 2.2 Specific objectives

1. To measure malaria diagnostic capacity i.e., the availability of testing and diagnostic facilities (rapid diagnostic and microscopy).
2. To assess availability of the recommended antimalarial treatment at public health facilities

2.3 Research question

1. Do the public health facilities in Uganda have sufficient capacity to diagnose malaria (with RDT or microscopy).
2. Do the public health facilities in Uganda have sufficient capacity to treat malaria patients?

3. Readiness of primary care public health facilities in Africa

A study measuring the readiness of public health facilities in Uganda found that the readiness of health facilities depended on the location and level of the facility (Ssempiira et al. 2018). The study also indicated an unequal distribution of readiness among health facilities depending on the region in which they are located. For example, facilities in the central and southern regions of Uganda had higher scores for readiness compared to the northern region. Similarly, another study conducted in Angola revealed the differences in public health facility readiness scores by province (Plucinski et al., 2017).

Ssempiira et al. (2018) further noted that public health facilities in urban areas, health facilities close to district and sub-county headquarters, plus health facilities IV's, III's and hospitals were better in general and specific readiness for case management. Most of the facilities that scored high in readiness have basic amenities such as uninterrupted power sources, good infrastructure, water sources, and good transportation. In addition, because of their location near the district headquarters, health facilities were constantly monitored and supervised by politicians and

technical personnel, which often leads to better performance. The presence of basic amenities also attracts skilled health workers to work in the facilities, allowing the facilities to operate longer hours. The specific readiness of public health facilities to manage malaria was high across the country especially with the availability of rapid diagnostic test (RDT) kits, which is attributed to the adoption of the WHO guidelines for test and treat (Ssempiira et al., 2018).

The availability of specific readiness with malaria commodities in the study conducted in Angola was at average 78% availability of RDTs and microscopes. However, the general health facility readiness was 28% due to stock-outs of ArtemetherLumefantrine and lack of training of health workers, which led to incorrect malaria case management and treatment (Plucinski et al., 2017). In another aspect, a cross sectional study in Mozambique found that the availability of RDTs and microscopes was high in the three provinces where the study was conducted. However, clinicians made less effort to treat suspected malaria cases (Candrinho et al., 2019), leading to an interruption in the quality of malaria case management.

Monitoring health facility readiness in Kenya indicated that RDTs were available in sufficient quantity, especially in lower-level facilities without microscopes, increasing the possibilities of testing for all suspected cases (Zurovac et al., 2018). Similarly, a cross-sectional study on malaria endemicity and readiness of the health system in Kenya, Senegal and Namibia indicated that facility performance was high in terms of availability of RDTs and microscopes (Lee et al., 2017). Assessing health workers' knowledge of malaria case management is also a critical area in measuring health facility readiness. For example, a study in Sudan, which aimed at evaluating a hospital readiness found that 55.4% of health workers had and average knowledge on microscopy and 75% had an average knowledge of RDTs (Elnour et al., 2019).

A cross-sectional assessment of adherence to malaria guidelines in Uganda revealed very low (3.1%) adherence to the stipulated guidelines. Only

8% of the patients had medical history and physical examinations taken. Furthermore, 18.6% of patients who tested negative received artemisinin- based combination therapy (ACT), while 10.1% of those who tested positive did not receive ACT treatment (Kaula et al., 2018). In addition, a study monitoring the health system in Kenya reported that 38% of cases with negative results were treated with antimalarial medicines (Zurovac et al., 2018). Such health worker practises might contribute to stock-outs in the health system and increase costs to national health budgets. A study in Kano state in Nigeria, measuring health system readiness reported that compliance with the test and treat guidelines was low, citing lack of laboratory services and work overload among other factors (Ojo et al., 2020),

Malaria treatment guidelines, Malawi showed that one in three malaria cases were not tested. The study noted that this was due to lack of RDT's, for facilities that lacked electricity could not use microscopes and some cases trained laboratory technicians were not present at the time of the survey, citing a gap needing improvement in health practice in terms of availability of malaria testing equipment (Shah et al., 2016).

Appropriate malaria case management is critical for disease management and prevention of malaria progression to severe form of disease and reducing mortalities. This study aimed at assessing the readiness of health facilities to malaria case management, furthermore, to identify gaps in the health system. Strengthening health system involves constant monitoring and assessing the readiness of provision of health services. More so, the health system structures in the management of malaria combines health professional knowledge, stock status of anti-malarial medicines, laboratory services and adherence to treatment guidelines. This study assessed these factors to determine the readiness of health services in Uganda public health facilities.

4. Conceptual framework

This study employed parts of the Anderson and Newman's behavioural model of health services use as a guide, which has been applied to assess the

readiness of health services, including drugs and medicine (Andersen & Newman, 2005). Given that the readiness of public health sector affects the whole population, it is suitable for this study. The Health Believe Model (HBM) demonstrates the effect of a combination of factors on public health sector readiness in providing malaria diagnosis and treatment. These factors are classified into: (1) Intuitive factors, (2) Justifying factors, and (3) sickness factors.

The intuitive factors deal with everything related to how health facilities are affected by social, cultural and traditional elements such as political instabilities in the north region of Uganda. These factors primarily include socio-demographic characteristics of individuals, such as income levels, education, and customs, as well as their health beliefs. The HBM illustrates the importance of social trust and the location of a health facility in relation to the practices and attitudes of health care providers and even the availability of health care services. Areas with political instabilities result to high poverty levels. Such communities tend to use public health facilities compared to communities whose income levels are high. There is overwhelming evidence of the wide income disparities with its negative impact on the availability and usability of different health services in Uganda (Dowhaniuk, 2021).

The justifying factors are the main drivers of demand for antimalarial medicines and malaria-related services, and these factors can be either individual or communal. Individual level factors mainly deal with accessibility—affordability, availability and ease of access to the antimalarial drugs and services. The government is essentially in charge of communal factors like setting up the needed infrastructure, including roads, electricity, well-equipped hospitals, and health facilities, as well as paying the salaries of medical personnel. Given the regional imbalance and its impact in Uganda, it is evident that these factors prevent health workers to work in areas that are hard to reach where infrastructure such as roads, water and electricity are lacking thus affecting the readiness of health facilities to manage malaria (Awuah et al., 2018). Malaria treatment services are free in

Uganda public health facilities creating a high demand, however, due to constant stockouts of medicines in these facilities communities tend to loose trust opting to seek health care services elsewhere.

The HBM illustrates that most people seek health services when they get sick, which means that they are not interested in seeking malaria and testing services until someone is affected by malaria. Once the number of reported malaria cases decreases, most health facilities tend to reduce the readiness, which can cause problems when cases are reported at the same time - putting constant pressure on the entire health system. In addition, most people visit medical facilities once signs and symptoms of malaria have manifested, which hampers the readiness of health facilities towards malaria testing and treatment. (The Health Belief Model, n.d.)

The following diagram illustrates the importance of intuitive, justifying and sickness factors in the public health sector readiness in providing malaria diagnosis and treatment, as seen in Anderson and Newman’s HBM model (Andersen & Newman, 2005)

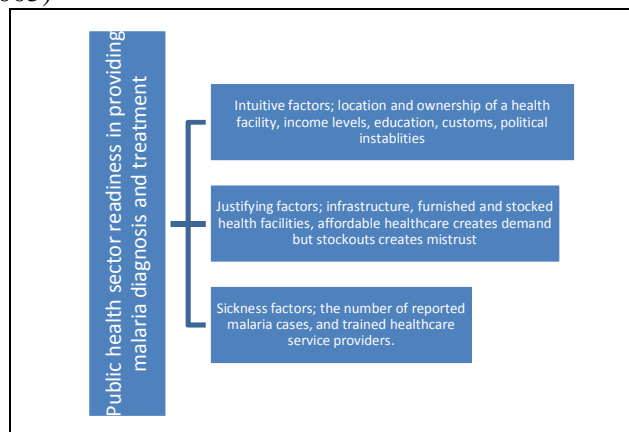


Figure 2: Conceptual framework; adopted and modified from Anderson and Newman (Andersen & Newman, 2005)

5. Methods

5.1 Study design and setting

The study is a retrospective study based on secondary data that was available in the Ministry of Health district reports; end-user verification surveys (EUV) done between 2016-2019 in collaboration

with the United States President's Malaria Initiative and Service Availability and Readiness Assessment (SARA) Uganda survey done in 2014 in collaboration with the World Health Organization. Analysis was done by region in Uganda. The indicators analysed were diagnosis, treatment, and availability of malaria commodities.

The information was collected from the health care delivery points in the Ugandan health system structures. The Ugandan health system is guided by the Ministry of Health whose role is to formulate policies, collect resources, provide technical support through health research, coordination, and capacity development. Health service delivery in the Ugandan health system takes place at different levels, which provide services for malaria case management. At national referral hospital, which is also supported by regional referral and district hospitals. In addition, the districts have health centres IV's, health centres III's, health centres II's and the community arm the community health teams. The administrative units report to the Ministry of Health through DHIS2. Health centre I is the first point of contact, which is led by village health team or community drug distributors.

5.2 Sampling

The surveys in the study used different sampling methods as described below:

- o SARA survey which is the census of hospitals and health IV to determine service availability and readiness assessment (Uganda Hospital and Health Centre IV Census Survey | Ministry of Health Knowledge Management Portal, 2014.). The sample size was 159 hospitals and 193 health centres IV, however not all surveys reached these facilities due to seasonal changes and administrative issues.

- o The End-User Verification survey (EUV) survey used a multistage random sample based on the DHIS2 data reporting period being analysed. EUV are done 4 times a year to assess the malaria case management by looking at the stock status of malaria medicines. The malaria case load led to the ranking of districts putting them into categories highest, medium, and lowest strata. Five districts were randomly selected from each of the stratum

resulting in a total of 15 districts. In each district, 5 health facilities representing all levels of health care were randomly selected. Data is collected by trained field staff through health facility visits and facility staff interviews.

- o The DHIS2 data was available for all regions for the period 2018-2020. These data are not based on sampling as they capture all health facilities that report to the DHIS2 platform. However, the reporting rates varied by region.

5.3 Data Collection

All pertinent information used in this study were obtained from the Uganda Ministry of Health Data Tools and survey reports (2014-2020).

SARA surveys used both interviews and facility-based visits to collect data. In addition to General Service Availability (health infrastructure, health workforce, service utilization), SARA measures general service readiness focusing basic amenities, basic equipment, standard precautions for infection prevention, diagnostic capacity, and essential medicines. Furthermore, SARA tool also measures the availability and readiness of health facilities to offer specific health interventions, including malaria, through consideration of tracer items that include trained staff and guidelines, equipment, diagnostic capacity, and medicines and commodities. The study used malaria specific components of SARA 2014 including availability of hospitals and health centre IV with their distribution across the country, availability of malaria diagnostics and antimalarial commodities in the public health facilities and the health workers available in the facilities.

The End User Verification surveys are done quarterly to examine malaria case management including malaria supply chain, diagnosis, and treatment at health facilities across the country. For the study, commodities for malaria case management that were out of stock in facilities in the years of 2016 -2019 ssuchartemetherlumefantrine, sulfadoxinepyrimethamine, malaria rapid diagnostic test and artesunate injection were extracted from EUV survey data.

DHIS2 health management information system has aggregated data and information on the stock

status of malaria tracer medicines. The health facility quality of care assessment tool collects information on human resource for health at the facilities. Furthermore, the tool also assesses staffing levels at the facility through verifying current staffing levels. The assessment tool specifies job descriptions of the staff at the facility and availability of trained staff. Likewise, the health facility quality of care assessment tool also establishes the stock status of the tracer medicines equipment’s and availability of malaria diagnostics services at the facility. In the DHIS routine data the study extracted information on suspected fevers tested at the health facilities by regions in Uganda

5.4 Study outcomes

The main study outcome was the readiness of the public health sector in providing appropriate malaria diagnosis and treatment. This was measured based on the availability of malaria diagnostic facilities (RDTs and microscopy), treatment, and the testing rates by region.

Measuring service availability and readiness assessment studies considers percentage scores alongside the benchmark percentages set by WHO (Service Availability and Readiness Assessment (SARA): An Annual Monitoring System for Service Delivery Reference Manual, Version 2.2 | Quality of Care Network, n.d.). The benchmark percentages (Box below) were used to determine how ready the public health facilities were in providing malaria case management services.

Table 1. Showing benchmark score for service availability and readiness assessment

Domain	Indicator	Target/Benchmark
Health infrastructure	Facility density	100%
Health workforce	Core health worker density	100%
Service utilization	Average score outpatient visits	100%

5.5 Data management

2) 5.5.1 Independent

These variables were treated as continuous variables, with malaria cases measured as the number of malaria cases confirmed by the microscopy or RDTs, while testing rate was measured by the number of suspected malaria-related fever over cases tested with RDT and microscopy.

3) 5.5.2 Dependent

The main predictor variables were the region of the facility (Central, Eastern, Western and Northern), stock status and annual period of the survey (2018, 2019 and 2020).

5.6 Data analysis

Information was extracted from the different source of secondary i.e., DHIS2, SARA and EUV. The different data sets were put into excel. Data was managed and analysed using both descriptive and analytical statistics to describe the study results.

Descriptive statistics were used to describe the basic structures of the data in the study. These were through summaries about the data and later used to inform graphics analysis.

Comparisons were made between the different variables and regions and calculating proportions of different variables.

Tables of means of malaria case management commodities were formulated by regions to illustrate important differences across regions

Univariate analysis was used to examine variables. This analysis focused on distribution of items across the regions. Frequency of individual variables was later summarised into percentages.

5.7 Ethical considerations

The study is retrospective based on the national DHIS2 data, Ministry of health survey reports that is SARA 2014 and EUV available in public domain. Therefore, it does not carry any risk at individual level.

5.8 Declaration of conflict of interest

The team involved in this study have no conflict of interest and are not being funded by a private or governmental company.

6. RESULTS

The results section composes of three sub-sections according to the secondary data source. First section is the results from the Uganda SARA 2014. The second section represents the results from the EUV survey 2016 – 2019. The third section shows results from the DHIS2 2020. Data was analysed at regional level.

Uganda Service Availability and Readiness Assessment (SARA) 2014

Figure 2 shows distribution of hospitals (National and regional referral hospitals) and HC IV across regions in Uganda. In central region there are 5 hospitals and 49 HC IV serving 9,529,227 population of the area. In Northern region there were 4 hospitals and 31 HC IV: providing services to 7,188,139 people. In Western region there are 4 hospitals and 60 HC IV serving a population of 8,875,000. Three hospitals and 48 HC IVs catering for a population of 9,042,422 existed in the Eastern region.

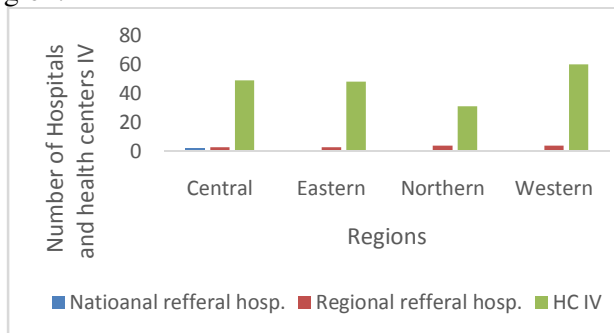


Figure 2. The availability of hospitals (n=16) and HC IV (188) in Uganda in 2014.

Figure 3 presents the outpatient service utilisation rates in Hospitals and HC IVs between June 2013 – July 2014 by region. The outpatient service

utilization was lowest in the northern and eastern regions whose regional malaria prevalence was at 20% and 9% respectively. Whereas the central and western regions had malaria prevalence of 4% and 5% correspondingly

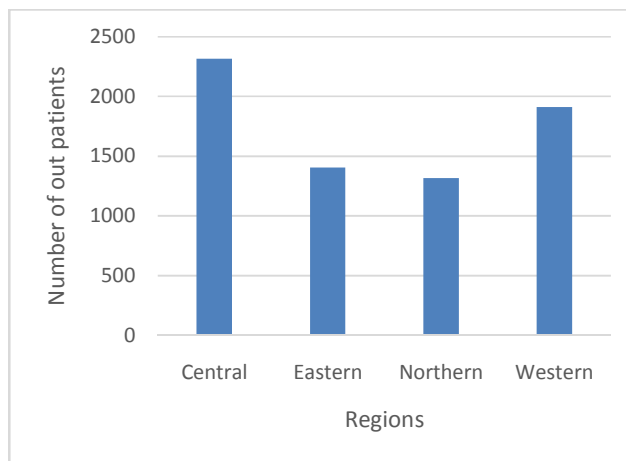


Figure 3. Outpatient service utilisation rates in Hospitals/HC IVs June 2013 – July 2014 by region

Figure 4 shows hospital and HC IV admissions across the regions. Western Uganda with a malaria of 5% had a higher number of admissions compared to other regions. However, Northern region whose malaria prevalence is at 20% the hospital admissions are far less that western region. Furthermore, Eastern Uganda had lower inpatient admissions with malaria prevalence at 9%.

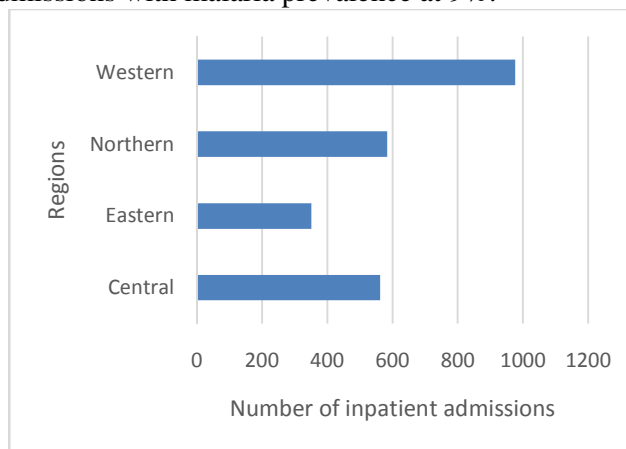


Figure 4. Inpatient admission rates in Hospitals and HC IVs June 2013 – July 2014 by region

Figure 5 shows availability of malaria diagnostic and treatment commodities that were found at the facilities during hospital and HC IV SARA survey in 2014. The medicines assessed were chloroquine and quinine tablets, availability of artemisinin-based combination therapies and artesunate injections. About 60% and above of hospitals and HC IVs had at least half of the antimalarial medicines while almost 80% and above had malaria diagnostic. Northern region ranks the highest at malaria diagnostics. However, the region has low outpatient services and hospital admissions utilization which implies the low usage of malaria diagnostics

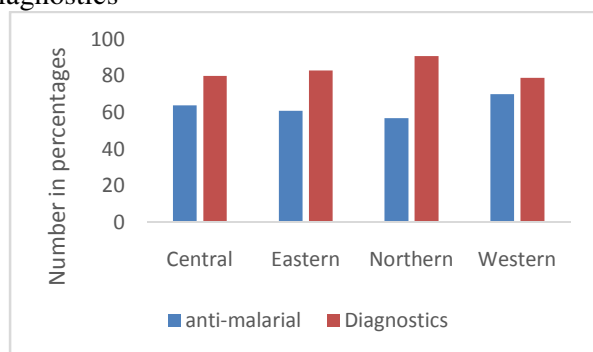


Figure 5. Percentage of hospitals/ HC IV's that were found to malaria diagnostic and with at least half of treatment commodities per region according to SARA results of 2014

Figure 6 shows the percentage of the key health worker category (doctors, nurses, and clinical officers) filled, by region. The Central part of Uganda had more health workers than the approved positions (112%). The Eastern part had the lowest distribution with 68% of approved positions filled, while Western had 87% and Northern had 83% of the health worker category filled.

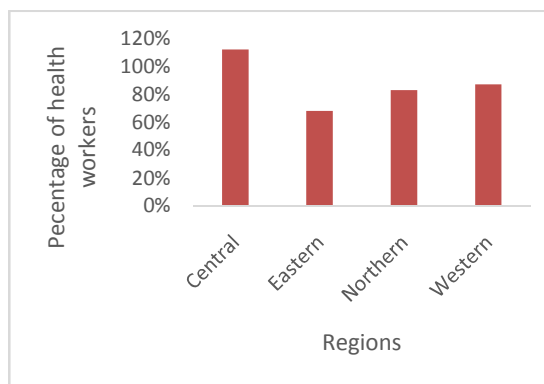


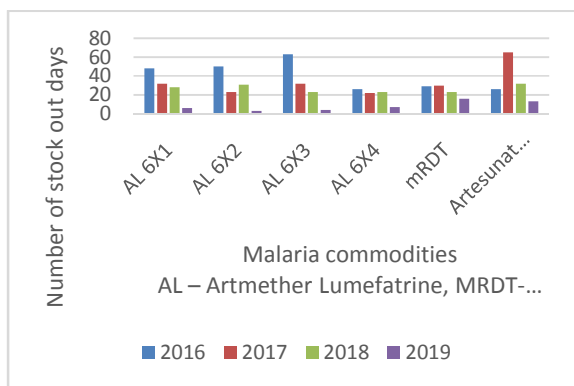
Figure 6. Percentage of filled positions that are approved for health workers (doctors, clinical officers and nurses).

End User Verification data

Figure 7 shows the National data for malaria commodities that were out of stock for facilities according to End use Verification Survey reports 2016 – 2019. The data collected from the surveyed health facilities indicated that in 2016 facilities had plenty of stock outs of malaria commodities of case management compared to other years. Artesunate injection stock out was very high in 2017 comparing to other years. Overall stock out of malaria commodities improved over the years with 2019 stock outs being very low across all malaria commodities for malaria case management due to the improvements done by the government to monitors drugs through the DHIS2 platform with all facilities reporting the stock status of drugs in the stores

AL – ArtmetheryLumefatrine, MRDT- malaria Rapid Diagnostic Test

Figure 7. Commodities for malaria case management with 3 or more days of stock out within 3 months



District Health Information System routine data

Figure 8 shows the percentage of malaria suspected febrile cases which were tested in 2020 by region. The testing rates were 80% to 84%. However, according to the service availability benchmark testing rates should be 100% of all suspected fevers. More is still desired

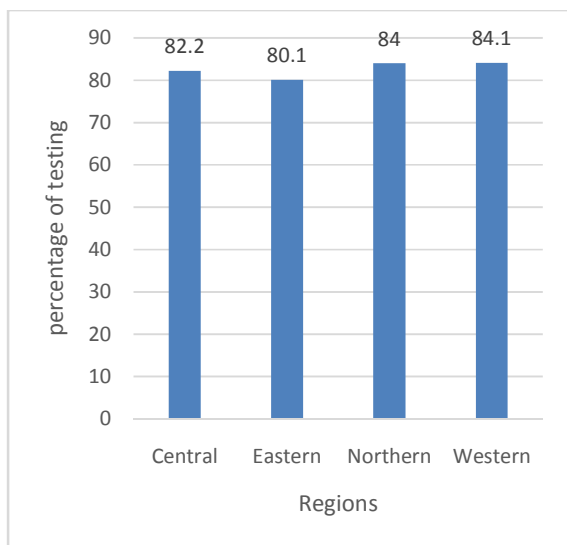


Figure 8. Percentage of malaria suspected febrile cases tested by region in 2020.

7. Discussion of the findings

This section will discuss firstly, results from the analysis in relation to findings from other studies and thereafter a discussion on methodological considerations, The findings from this study provide an insight on the readiness of public health facilities in Uganda to provide malaria case management.

7.1 General service readiness

According to the benchmarks used to measure SARA, it was shown that the western region had the highest number of facilities at 64 compared to the northern region at 35 and respectively relate. However, western region with a population estimates of 8,875,862 has 64 facilities while central and eastern regions with over 9 million population each (2014 Census – Uganda Bureau of Statistics, n.d.) had 54 and 51 facilities, respectively. Furthermore, considering the staffing levels in the different regions, central region has 112% more than approved health workers in the public health facilities comparing to eastern region with 68% positions of health filled. The central region having the major capital city of Uganda, with quick and easy transport network, shopping malls and basic infrastructure present influences job seeking leading to more health workers seeking for jobs in the region

From a policy perspective, Service delivery is an important aspect in determining the readiness of a health system, study findings show distribution of hospitals and health centre IVs across regions in Uganda. The availability of health facilities relates to the availability of services to provide malaria case management. The distribution of the facilities puts into account the population estimates.

7.2 Availability of malaria case management commodities

According to SARA survey 2014, the availability of malaria diagnostics (RDT and microscopes) at the surveyed health facilities was 80% and above. Comparably study in Uganda measuring the readiness of public health facilities III's and II's (Ssempiira et al., 2018) found that the availability of rapid diagnostic test (RDT) kits was high. There other studies that agree with current study namely: the study conducted in Angola was at average of 78% availability of RDTs and microscopes (Plucinski et al., 2017). Another study to monitor readiness of health facilities in Kenya found sufficient quantity of RDTs and microscopes (Zurovac et al., 2018) that led to the increase in testing suspected malaria cases. Similarly, a cross-sectional study on malaria endemicity and readiness of the health system in Kenya, Senegal and Namibia indicated that facility

performance was high in terms of availability of RDTs and microscopes (Lee et al., 2017).

Stock-outs for malaria case management commodities was high in 2016 and 2017 with artemetherlumefantrine and artesunate injection to have been out stock for more than 3 days in 3 months period. Comparably Plucinski et al., (2017), a health facility readiness study in Angola sited artemetherlumefantrine being at 28% out of stock. The out of stock for malaria case management commodities is attributed to poor record management. However, in 2019 there was an improvement with less stock outs. Ministry of Health Uganda instructed all facilities to be reporting the stock status of drugs into the DHIS2 platform which helped in reducing stock out rates. With the introduction of national medical stores and computerising acquisition of supplies at the health facilities. This helped on improving the stock trends at public health facilities.

7.3 Utilization of health facility services

The results show a high utilization of outpatient services across the regions, with central region having the highest and the northern having the least. However, the northern region had 7,188,139 population which was smaller compared to other regions with 35 health facilities which could have contributed to the low outpatient visits. Additionally northern region suffered with political insecurities making it a war zone which destabilised the health service utilization. Hospital and HC IV admissions across the regions, western Uganda had a higher number of admissions compared to other regions (figure 4). Western region has the highest number of public health facilities comparing to other regions with a population of 8,875,862.

Secondly, testing of malaria suspected febrile cases was on an average of 83% across regions in 2020. These results agree with several studies in the literature which found a similar trend, studies of public health facilities readiness in managing malaria Uganda and Angola (Ssempiira et al., 2018; Plucinski et al., 2017) reported high testing rates of suspected malaria cases. Another study in Kenya that monitored health facility readiness by Zurovac et al (2018) found that high testing rates improved

with different years. However, a study in Mozambique by Candrinho et al. (2019), found a high availability of RDTs, but the testing rate was low due to health workers making less efforts to test suspected fever.

8. Methodological considerations.

8.1 Study limitations

The study used secondary data with limited information on geographical characteristics of the health facilities i.e., whether the facilities were urban or rural based. This would have created a more comprehensive understanding on the readiness of public facilities in the different settings.

Data available was on hospitals and health facility HV leaving a big number of lower health facilities uncounted for. To clearly measure the readiness of health system in a country, all levels in the health service delivery need to be accounted for.

The study lacked data on the health workers practices and knowledge on the recommended guidelines by ministry of health. With the test and treat policy of malaria it would have been important to understand the practices at the health facility in relation to treating malaria cases with a positive malaria test result.

Data that was available through the Uganda Service Availability and Readiness Assessment survey was last collected in 2014. A lot has changed from the point of data collection thus making it hard to track changes in service delivery using this national survey

Another limitation is that the surveys were conducted in different time periods and the findings from one cannot be related to the other

9. CONCLUSIONS

The study has demonstrated that the readiness of Public Health Service of Uganda is not yet at 100% which is the benchmark level. This can be attributed to the interplay of multiple factors including management of malaria commodities.

Reducing stock outs for malaria diagnostic commodities particularly RDT's that necessary for providing quick and reliable test results. Ensuring constant and stable supply of these commodities

will improve on the readiness of public health facilities to test and manage malaria cases.

Uganda National Malaria Control program to continue monitoring health facilities so ensure the availability of malarial recommended treatments items at all health facilities.

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