Drivers of Tracking Administration of Malaria Drugs in Health Units in Uganda. A Descriptive and Correlational Study.

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Abstract

Background:
This study aimed at examining malaria intrinsic factors and technology controls as drivers of tracking the administration of malaria drugs focusing on the roles of both health workers and health units.

Methodology:
Descriptive and research designs were employed upon 465 health workers from 564 health units in the central districts of Uganda for which randomization techniques were used.

Results:
8.5% of health workers don't test blood in hospitals, HC III, and clinics majorly private facilities that have existed between 5-9 years, nurses noticeably base on just their own experience to examine malaria patients. 11.8% don't use slides to examine blood, health units that have existed below five years fall suit. Difficulty in electronic data exchange (26.7%), lack of freedom to use electronic systems to access information on malaria drugs (41.9%), poor networks connectivity (60.0%) and poor response time (50.5%) are prominent. Perceptions, attitudes, knowledge, and skills of use of affect tracking administration of malaria drugs.

Conclusion:
Parasites' identification, quantification, and concerns decrease in hospitals, clinics, HC III to IV in public health units that existed for 15 and below 5 years. Junior nurses with certificates and diplomas with work experience of 1-5 years mostly in general, pediatrics and "others" departments manage malaria issues with minimum guidance and supervision. Engagement of Rapid Diagnostic Test kits is higher in hospitals, clinics, pharmacies, HC III, and IV.

Recommendations:[a]
MoH should improve on planning, surveillance, and supervision of health facilities to enforce diagnosis for malaria cases management and reduction drug resistance. Regulate a holistic policy on diagnosis, treatment (drugs), and control of malaria and emphasized balanced, effective, and sustainable results. , training malaria cases regardless of whether the facility is public or privately be prioritized for good tracking administration of malaria drugs.

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1 INTRODUCTION

Malaria a disease that claims many lives of people is the leading cause of morbidity and mortality. It is the leading cause of maternal complications (abortion, miscarriages, and most pre-natal, neonatal, and post-natal) complications in pregnant mothers [16] including mental health issues. It is responsible for low birth weights, epilepsy, convulsions, and mental retardation in children below the age of five years, thus putting a big burden on the family and national budget, and the economy at large [19], [17],[21] because harmful and ineffective healthcare practices and quality deficiencies waste up to 40% of the health budget of which 80% maternal/neonatal complications not well managed to induce 50% deficiency of the required drugs [1], thus reducing the medical and healthcare service delivery. Through the adoption of various interventions, a considerable level of reduction of morbidity and mortality [9], [18] has been realized, therefore, tracking the administration of malaria drugs can lead to commendable levels of success in pursuit of further reduction of this disease burden [13]. This study, therefore, is aimed at examining malaria intrinsic factors and technology controls as drivers of tracking the administration of malaria drugs in health units during the fight against malaria in Uganda. The controls in this study were conceptualized to mean the factors affecting the tracking administration of malaria drugs (restraints) which are directly linked with processes that are involved in the actual administration of drugs in general, but in particular, limited to the management of malaria drugs. These controls were perceived as: i) Malaria intrinsic control factors (clinical practices), which are conceived as the native practices performed by health workers during malaria management. These act as methods that are used as precursor activities to professionally inform and drive the drugs administered during the treatment of malaria patients. These activities included diagnosis (clinical testing and examination) [7], treatment, and prevention.
ii) Technology, as a matter of how something is done or an approach of doing something the best way using best practices. This method suggests a lot towards the successful and effective tracking of malaria drugs in the fight to roll back malaria in the country. Therefore, the implied technology controls included accessibility, availability, reliability, speed (response time), and usability of technological resources. However other technology facilitating factors that were perceived to take a central role in affecting the technology to track malaria drugs were conceived to include perceptions and attitudes, knowledge, and skills in the use of ICT.

2 METHODOLOGY

Descriptive and correlational research designs were used. A sample of 393 respondents from a total population of 465 medical doctors, nurses, midwives, laboratory assistants, and clinicians from 564 health units in the central districts of Uganda *(*Masaka, Rakai, Kalungu, and Kampala) of which six were referral facilities, 101 were HC III, 112 HC II and the rest being private owned were considered using clustering, simple random sampling, and purposive sampling method. The sample size was calculated using Solvin's formula. The formula was operationalized to the individual qualified totals of the sub-populations of the respondents that were targeted to make the overall population which in totality made a sample size of 393. To avoid bias in this study, therefore, other than the targeted health units in each district, non - mainstream health units were included while the visiting health workers were excluded to cause an intermediary balance of opinion between the hesitant respondents and those with an open welcome of the study. In the field survey, the actual participants were those respondents that were purposefully selected by using set inclusion criteria, "only health workers who are still in active service can participate in the study", after which the qualified participants were randomly selected to avoid biased selection. Data were analyzed using SPSS 25. The research instrument was reliable at 0.9 and a CVI of 0.66. Descriptive statistics was engaged to establish the extent of the variables for both health workers and health units, and multiple regression analyses were used to establish the relationships between the controls Malaria Intrinsic Controls (MIC)

1.1 Diagnostic Testing as a means of clinical examination of the blood samples of malaria patients informs the nature of treatment that is likely to be administered to them within the health units. Health units are described as either urban, peri-urban or rural in terms of status, in each case generally, Rapid Diagnostic Test (RDT) is highly used (mean = 1.33) in carrying out blood testing than using slides to examine blood samples (mean =1.21)

where urban ones took lead followed by rural ones. However, 8.5% of health workers don't carry out blood testing, as exhibited in a reducing order from hospitals, HC III to clinics mostly in private health units that have existed between 5-9 years in which nurses are most noticeable. It is further revealed that 20.7% of health workers don't use blood testing kits hinging to the fact that they have experience in malaria patient cross-examination, especially in private facilities that have existed for 15 years and above including those between 5-9 years. 11.8% don't use slides to examine blood samples (HC II, clinic to hospital) in private health units that have existed for as below as five years old, where nurses and midwives are prominent. 37.8% don't use thick or thin smears for parasite identification, quantification, and speciation, especially in public health units that existed for 15 above and below 5, where nurses and clinicians are more responsible. Although RDTs are highly used in urban and rural areas, the situation does not give a clear representation as revealed that health workers base on observations of the manifested symptoms during diagnosis (mean = 1.72) as compared to urban (mean = 1.63), it therefore possible that the RDTs kits used are not good (don't work well). The contradiction appears in the fact that rural health facilities lead in the use of thick blood (Mean = 1.33) trailed by peri-urban (mean = 1.26, coefficient of variation = 35.6%). It is not good as applicable knowledge that RDT foils can be engaged for thin or thick blood smear to direct the form of treatment of malaria as a benchmark of good practice to reduce the malaria burden. The peri-urban (mean = 1.85) health workers appreciate that they need blood testing kits during diagnosis more than urban (mean = 1.79) and rural. (Mean = 1.77). However, therefore, 19.6% don't use Rapid Diagnostic Test (RDT) to examine blood samples in a decreasing trend from hospitals to health center IV, more in private health units that have existed below five, 15+ and 5-9 years in which nurses, midwives, and laboratory assistants are key, instead of depending on observations of the manifested symptoms (36.7%) which lead to confusion more especially in public health facilities where junior nurses in the age brackets of 20-30 and 31- 40 with certificate and diploma of work experience of 1-5 years are noted mostly in the general, pediatrics and "others" departments. Generally the sig values in each diagnostic practice ($p<0.005$) suggest that the status of health units considers all the diagnostic practices as significant, however, health workers' experience inhibiting the need for blood testing kits was rated not significant in all the categories of health units (Sig value = 0.586).

Health units in the categories of hospitals, HC IV, III, II, clinics and nursing homes carry out blood tests using slides to examine blood samples, Rapid Diagnostic Test is more frequent in HC III, however, the rest don't use it. Health center IVs rely on observation of manifested symptoms (mean = 1.53) and their inherent experience to diagnose malaria patients. This suggests the possibility of such facilities administering anti-malarial drugs without enough evidence of the presence of malaria parasites, hence increasing their resistance. Health centers three (HC III) use blood smear which helps to specify the quantity and species of malaria parasites for the right drugs (mean = 1.48). It is further revealed that blood testing using slides in health units is done by the majority of both private and public health units. Public health units' use of the Rapid Diagnostic Test (RDT) is rated significantly low (mean = 1.10). Private health units carry out blood tests using slides to examine blood samples by engaging use of thick blood smear more than thin smear during malaria diagnostic tests. Nevertheless public and private health equally implied that the experience they have plays a lesser significant part in determining the use of blood testing kits during diagnosis of malaria (Sig value = 0.653). Health units that have existed for more than 15 years of age lead in all the clinical practices in a bid to respond to malaria, but fluctuate in the three practices, i.e. carry out blood tests during diagnosis of malaria (mean = 1.03), use slides to examine blood samples during diagnosis of malaria (mean = 1.03) and use Rapid Diagnostic Test (RDT) during diagnosis of malaria (mean = 1.11). The sig value for the mentioned practices being $P < 0.05$ suggests that these practices are significant with the age of the health units/hospital. On the other hand, they don't use thick blood smears more than thin ones (mean = 1.42, sig value = 0.417) and don't use the experience to void the use of blood testing kits during the diagnosis of malaria (sig value = 0.590).

3 FINDINGS:

Malaria Intrinsic Controls (MIC)

Diagnostic Testing as a means of clinical examination of the blood samples of malaria patients informs the nature of treatment that is likely to be administered to them within the health units. Health units are described as either urban, peri-urban or rural in terms of status, in each case generally, Rapid Diagnostic Test (RDT) is highly used (mean = 1.33) in carrying out blood testing than using slides to examine blood samples (mean =1.21) where urban ones took lead followed by rural ones. However, 8.5% of health workers don't carry out blood testing, as exhibited in a reducing order from hospitals, HC III to clinics mostly in private health units that have existed between 5-9 years in which nurses are most noticeable. It is further revealed that 20.7% of health workers don't use blood testing kits hinging to the fact that they have experience in malaria patient cross-examination, especially in private facilities that have existed for 15 years and above including those between 5-9 years. 11.8% don't use slides to examine blood samples (HC II, clinic to hospital) in private health units that have existed for as below as five years old, where nurses and midwives are prominent. 37.8% don't use thick or thin smear for parasite identification, quantification, and speciation, especially in public health units that existed for 15 above and below 5, where nurses and clinicians are more responsible. Although RDTs are highly used in urban and rural areas, the situation does not give a clear representation as revealed that health workers base on observations of the manifested symptoms during diagnosis (mean = 1.72) as compared to urban (mean = 1.63), it therefore possible that the RDTs kits used are not good (don't work well). The contradiction appears in the fact that rural health facilities lead in the use of thick blood (Mean = 1.33) trailed by peri-urban (mean = 1.26, coefficient of variation = 35.6%). It is not good as applicable knowledge that RDT foils can be engaged for thin or thick blood smear to direct the form of treatment of malaria as a benchmark of good practice to reduce the malaria burden. The peri-urban (mean = 1.85) health workers appreciate that they need blood testing kits during diagnosis more than urban (mean = 1.79) and rural. (Mean = 1.77). However, therefore, 19.6% don't use Rapid Diagnostic Test (RDT) to examine blood samples in a decreasing trend from hospitals to health center IV, more in private health units that have existed below five, 15+ and 5-9 years in which nurses, midwives, and laboratory assistants are key, instead of depending on observations of the manifested symptoms (36.7%) which lead to confusion more especially in public health facilities where junior nurses in the age brackets of 20-30 and 31- 40 with certificate and diploma of work experience of 1-5 years are noted mostly in the general, pediatrics and "others" departments. Generally the sig values in each diagnostic practice ($p<0.005$) suggest that the status of health units considers all the diagnostic practices as significant, however health workers' experience inhibit the need for blood testing kits was rated not significant in all the categories of health units (Sig value = 0.586).

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= 1.42, sig value = 0.417) and don't use the experience to void the use of blood testing kits during diagnosis of malaria (sig value = 0.590).

3.1 Diagnostic testing methods for malaria patients

The use of the Rapid Diagnostic Test (RDT) is a popular practice as the overall percentage of use exceeds 19.6% of those who don't use it. It is demonstrated further that there are unsatisfactory levels of application (low) of this clinical practice even for those who use it (mean = 1.26). Although RDTs have some levels of accuracy, have incidents of giving false results because they have variable heat stability, and since less training and skills are required thus may not be used correctly, they are not quantitative and do not give as much information as microscopy, do not indicate the stages of the parasite present in the blood, therefore there is a high possibility of failing to predict the magnitude of malaria levels in the blood (parasite count per cm3), thus resulting into either over or under dosage hence poor drug administration [15]. This may explain why the method is more unpopular in mainstream hospitals than the use of slides for testing blood samples of patients. In this case, however, the calculated t – value (male = -1.599 and female = -1.525) being far less than the sig value (0.05) suggests that the RDT method is a very significant method for health workers in the health units and is used to generate quick malaria results. The 36.7% depending on the observation of the manifested symptoms during diagnosis pauses a big difference from the normal way of handling malaria cases in the patients by the health workers, and this represents a situation that the drugs administered in such a manner/situation may not be the right drugs for the right cause because similar symptoms can represent different causes of disease, therefore, bringing about an increase in the parasite resistance to malaria regimes thus suggesting malaria recurrences in the affected patient(s). The drug administration roles of both male and female health workers based on observable symptoms without carrying out testing is not considered good (sig value (0.364).

Using thick and or / thin blood smear, as an approach intended to detect and quantify the presence or absence of malaria parasites, thin blood smear allows for naming the types or species of parasites (speciation) in that blood sample [2], [10], [9], [11]. This determines the choices and quantity of medicines and or / drugs that must be used for effective malaria management. The majority of the health workers (62.2%) apply this method while 37.8% don't. The apparent expression of a big number of health workers agreeable to using the method does not represent the real truth as the mean (1.23 and 1.45 respectively) of usage is rated unsatisfactory (low) and the standard deviation from the mean (0.425 and 0.499) being high, suggest that carrying out blood testing may not necessarily mean specification and quantification of parasites in the blood. A mere presence of parasites in blood alone may not justify the quantity and choice of malaria drugs to be administered to the patient as most health workers may suggest. This causes a lot of wastage of medicines and drugs leading to stockouts and mistreatment [12], high costs of treatment, and eventually, patients desist from going to health units for treatment, self-medication increases, drug resistance increases, and thus high levels of malaria prevalence, hence, a very big burden to the people and nation. The computed t-value of using a thick bold smear as depicted by both male (3.497) and female (3.675) health workers with significant values (0.000) suggests health workers significantly apply this method, but don't use a thin blood smear that would act as a key factor to specify the right malaria drug for administration as it helps to isolate the speciation of malaria parasites. This is supported by the fact that most health units handle malaria cases in situations where hospitals are inaccessible and don't have laboratories for testing the blood samples of patients. [9] ascends to [2], [10], [11] contributions that among other techniques used, thick and thin blood smears remain the most widely and commonly available tests, suggesting that the same should be used in Ugandan health units. This will enhance greatly tracking administration of malaria drugs in the country, however, 20.7% of health workers don't need them much to examine a malaria patient in the guise that they have the experience, whereas they significantly (sig value = 0.01) need the kits to handle malaria patients so that they can establish the actual content of the sickness for the right drug administration. The overall average mean (1.37) for diagnosis as a means to identify the malaria drugs to be administered to patients represents an unsatisfactory (low) level, implying that some of the methods employed during diagnosis in health units are not the best to

facilitate easy tracking of administration of malaria drugs in the country.

Blood testing during diagnosis of malaria **(**91.5%) before administering the anti-malarial drugs implies an understanding of the extent of malaria parasites in the blood thus, furnishes decisions on whether the case is mild or complicated which eventually determines the type of drugs to be administered, that is to say, either first-line or second depending on policy framework [20], [16] available. Noticeable difference in the drug administration roles between male and female health workers in hospitals and other health units indicate malaria administration role skewing on the side of females than the males as depicted by the percentages in terms of gender where the female made the majority of about 64.1% while males with 35.9%. Although that is true, however, the practice was unsatisfactorily low (mean = 1.08) suggesting that malaria drugs administration is still wanting. In the same perspective, it can be argued that blood testing is not restricted to gender (both female and male health workers) and it may not advisable to enforce tracing administered malaria drugs based on the same. In general terms, therefore, nurses as a medical title, form the majority in response to blood testing (freq. = 112). Although health workers' medical title is not a significant parameter in undertaking slides to examine blood samples (sig value = 0.171), they use slides more to examine blood samples followed by laboratory assistants. It is also revealed that nurses have steadily taken the lead in all practices, especially in the age bracket between 20-30 and 31-40. This implies that the majority of the health workers are junior staff projecting a bright future for medical practices in the diagnosis of malaria patients. The clinical practices which are not indented much with the age bracket include the use of slides to examine blood samples during diagnosis of malaria (sig value = 0.228), use of Rapid Diagnostic Test (RDT) during diagnosis (sig value = 0.178), and having experience in that they need blood testing kits less to diagnose malaria (sig value = 0.812).

Health workers with diplomas and certificates dominated conducting clinical practices and were rated positively for using slides to examine blood samples and using Rapid Diagnostic Test (RDT) in that order. Academic qualification is not significant in carrying out blood tests (sig value = 0.469), using slides to examine blood samples (sig value = 0.455), and having experience (sig value = 0.072) as depicted by sig value respectively, but an observation based on the manifested symptoms during diagnosis of malaria and use thick blood smear more than thin smear during malaria diagnostic tests have a significant a positive relationship (sig values = 0.000). The health workers with 1-5 years of worker experience dominated other categories in executing the clinical practices, followed by 6-10 and trailed by 11-15 years. There is a noticeable variation in the way the health workers conduct the clinical practices with 36% as the highest and 18.0% as the lowest. Nevertheless, the results suggest that the work experience of the health workers is not a significant factor to adopt a clinical practice during diagnosis as the sig value is (0.263).

3.2 Treatment of malaria

It was revealed that urban and rural health units give curative malaria drugs during malaria management by giving single therapy drugs (50.4%), this is more visible in private health units and public HC IIs. However, 49.6% of the health units are seen to administer combination therapy regimens, observable in public health units in urban and peri-urban areas. The significant interpolation of these two vices suggests proceeding in each case reversibly, in this case, the effect is highly felt by the malaria patients in terms of drug resistance, recurrences, and high cost of malaria management, thus directly affecting the incomes of these health units for their sustainability and continuity. [5] Suggests that numerous factors contribute to the advent, spread, and intensification of malarial drug resistance. Although the contribution to the actual resistance is known, it is also believed that desperate issues such as human behavior, vector and parasites' biology, pharmacokinetics, and economic factors including other conditions leading to failure of malaria treatment are key issues. He further explains that the solution and or / method for preventing malaria drug resistance is to administer combination therapy such as combining Sulfadoxine-Pyrimethamine (SP), mefloquine, or amodiaquine with any other artemisinin derivative [16]. Urban health units consent that single therapy agents are easily accessible and are also effective during treatment, whereas others in strong terms indicate that they are not easily accessible, nor effective, therefore this poses a pull up of ropes situation, thus, the basis for such positions is another area for fur-

ther examination. There is a very wide variance in the mode of administration of these regimens. HC II depicted the highest coefficient of variation of 32.3%, HC III by (28.6%) and pharmacies with 21.4%. The variations are higher in health centers (HC) generally than in the mainstream hospitals. This poses a very big dilemma against the reasons for bringing medical services near the people as an instrument for good healthcare services [4] as propounded by the government. The administration of such drug regimen to malaria patients is not based on the type of health facility (sig value = 0.079) and not whether is accessible or not, but the duration the health unit has spent in operation as age has a significant and positive correlation with medical treatment.

3.2.1 Treatment practices of malaria patients

Treatment practices for malaria patients follow planned and conventional clinical principles but vary from one health unit to another for the total management of the malaria burden in the country. In this case, these practices are organized in periodical schedules depending on the inherent program of the health unit.

Periodical clinical practices and drug Administration

By district**,** Masaka health units and hospitals test blood samples more for every single visit of malaria patients weekly (mean = 1.29) than Rakai and Kalungu. Kampala health units engage both for every patients' single visit and weekly (mean = 1.52). The practice in these time schedules was revealed significant (sig value = 0.000) as a clinical process for confirming the presence of parasites for the suspected malaria before treatment is started. Many health units and hospitals based on this policy to provide a parasitological diagnosis for all age groups [17] and hinges government policy restraints on private health establishments from having certain medicines and equipment, for example, Coartem and second-line drugs must only be in government hospitals because some private health units are assumed not to have these facilities. This suggests the use of majorly two testing schedules (i.e. every single patient's visit and weekly schedules) in these districts. This is likely to cause an increase in malaria prevalence because government hospitals are spread far apart and cannot be reached by every malaria sick person nationwide. Therefore the most common methods used to treat children with malaria in Masaka, Rakai, and Kalungu are intravenous and oral Masaka greatly minimizing rectal suppository and intra-muscular methods and injections. This could imply that the medical policy framework and practice may highly rule over the trio since they are neighboring districts to Kampala (mean = 2.31) on the thinking that local practices vary. On the other hand, **r**ural health units carry out blood tests for every single visit of the malaria patient only, although peri-urban and urban do the same as the most common method, also carry out weekly schedules (means = 1.31 and 1.33 respectively), but urban health units lead in this practice than peri-and rural. These clinical practices are very unsatisfactory, their level of significance is low Further, rural health units deploy the use of intravenous approach more than other methods. Although the oral method is also significantly used in treating children with malaria, they engage the intra-muscular method as well. Intravenous in children is more frequent in rural (mean =2.15), urban (mean = 2.04), and rural-urban (1.98) health units, oral methods are also engaged more in rural followed by urban and lastly urban-rural.

HC III led to administering malaria drugs to children using intravenous as a popular method. In terms of oral method, hospitals are leading units as HC III, II, and clinics in that order follow. A similar trend is observable for the adults for the same methods. Public health units dominate in rolling out for every single visit of the patient while every week private health units dominate. Private health units seem to have an expounded program of varying testing schedules than their counterparts (mean = 1.25), thus depicting a significant variation between these types of health facilities. The private health units, therefore, dominated in this clinical practice with an overall coefficient of variation of 56.4% against the 49.1% as represented by the public health units. Public health units use intravenous and intra-muscular methods during malaria drug administration in children than injections, while their counterpart uses more of an oral approach than injections and rectal suppository, thus private health facilities play a leading role in varying clinical practices during the administration of malaria drugs in children (CoV = 67.1%). In the case of adults, they use more intravenous and oral methods. Health units that have existed for more than 15 years in operation ranked higher in ad-

ministering blood testing for every single patient's visit. Those with 5-9 and below 5 years do it at the same level, while those in the bracket of 5-9 and 5 years and below adopt more the weekly schedules. These health units 15 years and below 5 years of existence dominate in administering intravenous and oral to children.

3.3 Prevention of malaria

Results suggest that Masaka conducts highly weekly and monthly administration of malaria drugs for prevention (mean = 2.62). Rakai uses daily administration (mean = 1.80) while Kampala uses much for six months (mean = 3.34). This suggests variations in the way the clinical practices are conducted within the districts against time schedules (CoV Rakai =56.9%, Kalungu = 51.5%, Masaka = 48.4%, and lastly Kampala with 35.1%). The implied planning of these activities may depend on the local analysis of the problem based on levels of malaria prevalence and endemicity in the community or region. Masaka, Rakai, and Kalungu districts give malaria control drugs to all categories of patients, while Kampala concentrates on giving it to outpatients and short-time visitors. Masaka and Rakai implement all methods. Because, the two are trans-border districts, they are very sensitive about the trans-border prevalence and transmission. Masaka district takes the lead in employing all methods that provide drugs for vector control, however, Rakai leads significantly but fairly (mean = 2.34) engaged using ITNs. [3], [14] comprehend that non-chemotherapeutic methods like the use of artificial barriers to shield people from vectors of malaria such as Insect Treated Nets (ITNs) or long-lasting treated nets (LLITNs), coils, and vector repellants are key methods in the fight and control of mosquito bites, they are widely used in homes to protect people from malaria. This opinion agrees with the results that vector control in form of the use of these barriers takes the lead in the districts other than other methods. Further, they highlight that there existed a dramatic increase in the number of ITNs delivered by manufacturers from 5.6 million in (2004) to 145 million (2010) in sub-Saharan Africa. World Malaria Report and the Global Malaria Action Plan [17] in conformity with these contributions, also attest that the numbers of ITNs procured between 2008 and 2010 (294 million) were sufficient to cover 73 percent of the 800 million persons at risk in that region. However, this study did not address the potential risks caused by the delays in delivering ITNs and their loss after delivery. Malaria control drugs are highly administered to all categories of patients including short-time visitors in all health units, however, urban ones prioritize significantly outpatients (mean = 2.11). Drugs for vector control (58.8%) are the most used in rural (43%), urban (36%), and peri-urban (21%). The use of ITNs coated with malaria drugs (18%) precedes others (14.1%) such as the use of aerosols (5.8%) and repellants (4%). The average mean (2.23) and sig value (0.04) suggest a fair and significant operationalization of the methods. Rural health units, urban and peri-urban in that order administer malaria control drugs to patients daily. This corresponds with situations where the rural health units engage intravenous methods in children and adults thus depicting a noticeable variance in performance in the status of health units. Urban and rural in that order administer malaria drugs on a weekly and monthly basis to patients while after six months is more operationalized in peri-urban than in any others. This suggests that the status of the health unit has a significant influence on administering drugs for the control of malaria in a region.

Hospitals and HC IIIs do administer preventive malaria drugs on a daily, weekly, and monthly schedule and are second to the six-month time schedules as HC IIs leads followed by HC III while yearly time schedules HC IVs are followed by HC IIs. This kind of alternation in time schedules is associated with factors for prevalence highlighting the extent of the malaria case (i.e. mild or complicated) to sanction for the category of the health unit for management, the nearness of the health facility to the patient [6]. Hospitals are seen at the frontline to give prevention drugs to short-time visitors while outpatient HC IIs and clinics are prominent. Vector control using of ITNs and IRS are very prominent as frequent practices used reducing of malaria in communities. Private health units give these drugs to patients a lot on a daily, monthly, and yearly schedule while every week public is more prominent (mean Public: Private are 2.53: 2.37 respectively). Private health units dominate their counterpart for short time visitors, inpatients, and outpatients while full-time resident patients are done more by public health units. The sig values of both methods 0.66 (in children) and 0.140 (in adults) stand to suggest that the type of health unit is not a sig-

nificant parameter for determining the method of administration of preventive malaria drugs in both children and adults. For malaria vector control and application of ITNs are highly operationalized by the public than in private health units, but significant in both public and private health units. IRS is applied more by private health units. The mean, public and private being 3.67 and 3.28 respectively suggest that the methods are satisfactory and significant. The trend of the dominance of the health units/hospitals with the age of 15 years and above is significant and is the same for all medical practices for all the categories of health units. This agrees with the idea that most public health units and hospitals have operated for a long time providing medical services to the biggest population [8].

3.3.1 Prevention practices of malaria and characteristics of health workers

The roles of each of the health workers in the administration of drugs are described by various parameters including the medical title. Health workers engage the various time schedules ranging from daily to yearly (mean range 2.25 as a minimum to 3.64 as maximum), however, nurses (18.0%) are still key and on top of using these schedules across the range, although unsatisfactory (mean = 2.45), significantly depict the most popular schedules as daily, weekly, monthly and six months engaged to all categories of patients including short-time visitors and outpatients This is further observed that health workers who are the youth (20-30 years) make the biggest portion of 35.1% in every single patient's visit and weekly. This implies that young medical workers are more vigilant in conducting clinical roles and medical practices than seniors as they (seniors) may be assumed to indulge more in administration and management roles. Whereas the practice is unsatisfactory (mean = 1.21), in both children and adults, however, the health workers' age bracket is a significant parameter in conducting prevention of malaria in health units. General and "Others) departments were outstanding for giving preventive malaria drugs to patients (15.4% and 9.3% respectively) of which daily (52.1%), weekly (82.2%), and monthly (44.4%) schedules were frequent. In terms of vector control, the trend is similar to that for preventive methods for patients. The use of ITNs (36.2%) and IRS (12.1%) are the most common approaches conducted by general, pediatrics, and "Others" departments among aerosols and repellants. Preventive malaria drugs to patients based on workers' experience are alternated through daily to yearly work schedules, but the schedule of daily administration, in this case, was more used by the 1-5 group which still dominates the same in other alternative schedules (54.4%), and 11-15 (51.6%). Schedules for the "short time visitors" (19.1%) and outpatients (7.3%) in that order where health workers of 6-10 years of experience took the lead and 1-5 are more prominent.

4 Technology Controls

Technological controls were taken to mean the limitations or factors that constrain the user of the available technology (ICT) to put into practice the right activity that translate into successful, effective, and efficient services for which the technology was intended such as tracking administration of malaria drugs. Therefore, it is discoverable that 36.0% of health units have sufficient infrastructure of a computer system that helps them meet their internal routines while 13.1% don't at all. In the situations where these systems are available they provide the ability of the health unit to generate a lot of information when handling daily routines to furnish decision making concerning malaria drugs whenever needed than using traditional means of cataloging whose response time is low for example, 50.5% of the health workers take a very long period to generate the information from the system, thus making it hard for them access specific data sets about malaria drugs in the health facility which affects malaria management. 40% of the healthy workers allude that access to specific data sets depends on the role of the health worker, this explains a substantial level of security and whereas 41.9% of the health workers lack freedom of use of ICT systems to access medical information about malaria drugs as a result of lacking full-time network connectivity (46.9%) during retrieval of medical data, computerized systems (ICTs) ratify sharing information quicker than any other means, lack of freedom to use the platform act as a major hindrance in sharing medical data. For the technology to be effective, it is clear that there must be certain facilitating factors to support the technology system for the good utilization of the available technologies to generate the required services depending

on the information needs of the users. In this case, the facilitating perceived factors included attitudes and perception of users, knowledge, and skills of use. As many may appreciate the use of technology in the different knowledge domains many health workers bear it negative to use it. 48.7% don't enjoy using ICTs in departments in health units as would be assumed one of the driving factors that control usage of the technology. Whereas 73.6% of health workers suggest ICTs should be used in other areas than in actual drug administration, 81.3% imply that it should be used in areas of work that require very low levels of precision or accuracy, especially by young health workers with little medical experience. This could be premised on the fact that 50.2% use ICTs with difficulty as lack of skill is hinged on health units' management failure to organize appraisal training in basic computer skills in the light of many other shortfalls. Therefore the overall rating of skills health workers has to use ICTs is fair which affects the successful administration of malaria drugs in health units. To maintain performance, health workers must conform to standards through education and training [7]

4.1 Regression Analysis of Technology Controls

It is revealed that although not significant, technology impacts positively tracking administration of malaria increase the reduction in the controls of using technology in tracking administration of malaria drugs causing a very small positive influence on the intention and actual use by health workers in the health units. The contribution accounted for by such controls to the actual use is not significant as registers a 0% (R2 =0.00). When the situation was reversed made the intention and actual use of Technology as the independent variable and the presumptive controls dependent, the difference in the results was realized only by a positive correlation (B= 0.113) which was significantly higher than before. This is described as sensitivity analysis. with an exhibited very small correlation (B = 0.058). The influence accounted for by presumptive controls on the intention to use the technology was very low (= 0.081), suggesting that a positive weak.

The regression of the controls on tracking administration of malaria drugs based on technology reveals that there exists a high significant (P-value <0.05) positive correlation on technology integration rated at 53.7% (B = 0.537). This suggested that an increase in the reduction of the controls causes a strong and positive influence (Beta β = 0.391) on tracking administration of malaria drugs by 14.7% (Adjusted R2 = 0.147) if technology is integrated. Results further indicate a low deviation between the variables (SE=0.104) which explains a positive linear regression where the controls are not far away from the line of regression.

5 CONCLUSION

Administration of such drug regimens to malaria patients is not based on the type (public/private) of health facility (value = 0.079) and is not significant to whether its accessibility of the malaria regimens or the type of health unit but for the duration, the health unit has spent in operation as its age has a significant direct and positive correlation with clinical practice (treatment). In terms of diagnosis, urban (status) health units engage more than one way of diagnosing malaria patients than rural ones which use majorly one, and these methods are significantly low, however, the status of the health unit/hospital does not suggest a diagnosis of the malaria patients. Diagnosis in the health units which have existed for more than 15 years in operation employs more testing of blood for every single patient's visit followed by those with 5-9 years where nurses are very key. The medical title of the health worker is not a significant parameter to influence carrying the blood tests and administering malaria drugs for control of malaria among patients, rather the age bracket is a significant parameter in blood testing during the administration of malaria drugs in health units. Juniors with certificates and diplomas with work experience of 1-5 years mostly in general, pediatrics and "others" departments manage malaria issues with minimum guidance and supervision and are more vigilant in conducting clinical roles and medical practices than seniors. The type of health unit is not a significant parameter for determining the method of administration of malaria drugs in both children and adults so is its age as time spent by the health unit in operation does not satisfactorily and significantly influence the clinical practices but influence their variances in managing the administration of malaria drug in Uganda. Parasites' identification, quantification, and concerns decrease in hospitals, clinics, HC III to IV in public health units that ex-

Table 1. Regression Analysis of Technology Controls in tracking administration of malaria drugs

	Unstandardized		Standardized coefficient	t	Pvalue / Sig	Decision on Hypothetical relationship	Direction
Constructs	B	SE	Beta (β)				
Constants	25.717	6.731		3.820	0.000		
Controls	0.058	0.059	0.081	0.990	0.324	Not Significant	Positive
Intension and Actual Use of Technology			R	R Square	Adjusted R^2	F	Sig
			0.081	0.007	0.000	0.980	0.324

Table 2. 2: Regression of the presumptive controls in tracking administration of malaria drugs

Model	Unstandardized		Standardized coefficient	t	Pvalue / Sig	Decision on Hypothetical relationship	Direction
Constructs	B	SE	Beta (β)				
Constants	20.239	11.736		1.724	0.87		
Controls	0.537	0.104	0.391	5.188	0.000	Significant	Positive
Tracking admin. of malaria drugs basing on Technology Integration			R	R Square	Adjusted R^2	F	Sig
			0.391	1.53	0.147	26.919	0.000

isted for 15 and below 5 years. Junior nurse's Engagement in Rapid Diagnostic Test kits is higher in hospitals, clinics, pharmacies, HC III and IV.

5.1 RECOMMENDATION

Recommendations, MoH should improve on planning, surveillance, and supervision of health facilities to enforce diagnosis for malaria cases management and reduction drug resistance. Regulate a holistic policy on diagnosis, treatment (drugs), and control of malaria and emphasized balanced, effective, and sustainable results. , training malaria cases regardless of whether the facility is public or privately be prioritized for good tracking administration of malaria drugs.

6 LIMITATION OF THE STUDY

The study spanned different regions of Uganda, whereas some areas were reachable, others were hard to reach because of reasons including environmental, political, and policy denominations. Data collection therefore would have been affected to help in the generation of particularized results other than a generalization that tend to dominate some regions.

The financial restraint that dominated most research processes acted as a focal point in determining the duration of achieving some objectives and task accomplishments during the research process causing certain levels of unanticipated delays that dictated the time schedules of the study.

Respondents' unwillingness to provide the data in the time frames dependent on the scope and schedules of the study ruled massively. This demanded the use of more resources to get off the hook. Most health workers that were central in providing information were all the time in exchanges, i.e. working in different hospitals and health units

as a matter of policy and mode of operation of rotation in hospitals in Uganda.

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