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Provider Adherence to Malaria Test, Treat and Track Policy in the Binduri District of the Upper East Region of Ghana

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Abstract

Background: Malaria is a disease of public health concern, which causes significant mortality and morbidity in the tropics, particularly in Africa. Ghana as a country has been implementing a combination of preventive and curative interventions as outlined in the Strategic Plan for Malaria Control in Ghana, 2014-2020. Additionally, Ghana subscribes to sub-regional and global initiatives such as the test, treat and track (T3) initiative which seeks to ensure that every suspected malaria case is tested, every case tested positive is treated with the recommended quality-assured antimalarial medicine, and every case treated with antimalarial is followed up to ensure complete parasite clearance. However, the implementation of this policy is a challenge, hence the need to study provider adherence to the testing, treating, and tracking. **Materials and method:** The study is cross-sectional in nature and data for this research was collected from consulting room registers, patients' folders, the District Health Information Management System and a structured questionnaire designed to interview healthcare providers. The data was exported into Stata for cleaning and analysis. The results of the study were presented in the form of statistical charts and tables. **Results**: The study revealed that generally, provider adherence to the T3 policy was encouraging in the Binduri district, and a high level of testing (100%) of suspected malaria cases eliminated the practice of presumptive treatment. However, tracking of patients (68.2%) was not as high as testing and treatment which was revealed by the number asked to return for a review during the folder review. **Conclusion**: Significant progress in clinicians' adherence to policy on malaria case management (T3) in the Binduri District. Continued training and facilitative supervision are essential to sus-

tain gains and close existing gaps in clinicians' adherence to malaria case management policy.

Keywords

Test, Treat, Track, Malaria

1. Introduction

Malaria is one of the deadliest diseases of public health concern, which causes significant mortality and morbidity in Africa. Malaria is a parasitic disease spread by the bite of a female Anopheles mosquito infected with the parasite. Early diagnosis is critical for disease management and efficient malaria treatment [1]. Malaria case incidence (*i.e.* cases per 1000 population at risk) reduced from 80 in 2000 to 58 in 2015 and 57 in 2019. Between 2000 and 2015, malaria case incidence declined by 27% and then by less than 2% in the period 2015-2019, indicating a slowing of the rate of decline since 2015. Malaria deaths have reduced steadily over the period 2000-2019, from 736,000 in 2000 to 409 000 in 2019. The percentage of total malaria deaths among children aged under 5 years was 84% in 2000 and 67% in 2019. The estimate of deaths in 2015, the GTS baseline, was about 453,000. The malaria mortality rate (*i.e.* deaths per 100,000 population at risk) reduced from about 25 in 2000 to 12 in 2015 and 10 in 2019, with the slowing of the rate of decline in the latter years similar to that seen in number of cases [1].

Malaria is most commonly seen in tropical and subtropical settings, where the parasitic parasites can thrive. Between 2019 and 2020, estimated malaria cases increased from 213 million to 228 million, and deaths from 534,000 to 602,000 in the WHO African Region. This region accounted for about 95% of cases and 96% of deaths globally; 80% of all deaths in this region are among children aged under 5 years. Since 2000, malaria case incidence had reduced from 368 to 222 cases per 1000 population at risk in 2019, before increasing to 233 in 2020 owing to disruptions during the COVID-19 pandemic. Between 2000 and 2019, malaria deaths reduced by 36%, from 840,000 in 2000 to 534,000 in 2019, before increasing to 602,000 in 2020. Between 2000 and 2019, the malaria mortality rate reduced by 63%, from 150 to 56 per 100,000 population at risk, before rising to 62 in 2020 [2]. Malaria continued to be one of the top causes of morbidity and mortality in Ghana. The total number of malaria cases documented in the Binduri district of Ghana's Upper East region in 2018 and 2019 is 21,872 and 25,888, respectively [3].

Malaria continues to be a major cause of morbidity and mortality around the world. According to the World Health Organization (WHO), 212 million cases (ranging from 148 million to 304 million) were reported in 2015, with 429,000 deaths (range 235,000 to 639,000). The bulk of infections occurs in Africa (90

percent), with the Southeast Asia region (6 percent) and the eastern Mediterranean region (6 percent). While malaria mortality rates have decreased by 29% since 2010, much more work is needed to fulfill the WHO's worldwide targets of reducing malaria case incidence and mortality rates by 90% by 2030 [4].

Continued investment in research and development, as well as the quick implementation of new tools, are, nonetheless, required. The flexibility of the mosquito and the plasmodium parasite has resulted in an increase in drug and pesticide resistance. In five Southeast Asian nations, resistance to artemisinin-based combination treatments (ACTs) has been discovered. It's possible that these strains would spread to Africa or the Indian subcontinent, which would be disastrous. In two-thirds of malaria-endemic African countries, resistance to two new pesticides has been discovered. Plasmodium vivax parasites can dominant for months or even years after initial infection, and up to 80% of cases are asymptomatic. The current field test is insufficiently sensitive to detect low parasite density in low-transmission zones [5].

When promptly diagnosed and treated, artemisinins combination therapy (ACT) for uncomplicated malaria and parenteral quinine artemisinins for severe malaria are highly effective in avoiding malaria mortality [6]. The World Health Organization (WHO) has suggested diagnostic testing of all suspected malaria patients before starting treatment since 2010, in order to better focus antimalarial treatment and control non-malarial fevers. Almost all malaria-endemic nations have changed their case-management strategies to reflect these recommendations, and the vast majority have made malaria rapid diagnostic tests (RDTs) widely available at health institutions (HFs). However, in a variety of settings, gaps in health worker (HW) practices based on current recommendations have been identified [7].

Despite increased support from the government and other stakeholders for malaria control over the past decade, malaria remains a major global public health problem, with an estimated 214 million new cases and 438,000 deaths in 2015. Sub-Saharan Africa (SSA) dominates global figures, accounting for 80% of cases and 78% of deaths, with the greatest toll on children under five years of age [8]. Malaria continues to be a major cause of childhood mortality and was responsible for an estimated 303,000 (165,000 - 450,000) deaths in children aged under 5 years in 2015. However, this represents a 60% reduction in mortality since 2000, one of the biggest successes in terms of the Millennium Development Goals. Central to this achievement was the widespread deployment of effective tools for prevention and treatment, including insecticide-treated nets and Artemisinin-based Combination Therapies (ACTs). The recent emergence and spread of Plasmodium falciparum (Pf) parasites resistant to ACTs, and mosquitoes' resistance to the pyrethroids, the most commonly used insecticide, threaten to reverse these gains, and the hopes of eliminating malaria [9]. According to the 2018 World Malaria Report, there were 219 million cases of malaria in 2017 [10].

In 2017, the ten African countries with the highest malaria burden had an estimated 3.5 million more cases than the previous year. Malaria continues to kill more than 435,000 people each year, primarily in Africa. Children under the age of five are particularly vulnerable; it is intolerable that a kid dies from this avoidable and treatable disease every two minutes. The research also finds that access to and uptake of life-saving malaria instruments and therapies are limited. To truly eradicate malaria, we need a multifaceted strategy that combines vector control, early diagnosis, and treatment, particularly at the village level. In Africa, a large number of people who are at risk of infection, especially pregnant women and children, are not being protected [10].

Malaria remains a serious global public health problem, despite a 66% drop in mortality between 2000 and 2015, with an estimated 214 million new infections and 438,000 fatalities in 2015. Sub-Saharan Africa (SSA) dominates worldwide data, accounting for 80% of cases and 78 percent of deaths, with children under the age of five bearing the brunt of the toll (11). Prompt treatment with artemisinin-based combination therapy (ACT) for patients who have been diagnosed with malaria is an important malaria control approach used around the world. In 2016, there were an estimated 216 million malaria cases worldwide (95 percent confidence interval [CI]: 196 - 263 million), down from 237 million cases in 2010 (95 percent CI: 218 - 278 million) and 211 million cases in 2015 (95 percent CI: 192 - 257 million) [11].

A higher percentage (90%) of all malaria cases reported in 2016 occurred in WHO African Countries. Out of the 91 countries that reported malaria cases in 2016, all the 15 countries from Sub-Saharan Africa and India carried 80% of the worldwide malaria burden. The WHO African Region accounted for 91% of all malaria deaths in 2016, followed by the WHO Southeast Asia Region (6%). All the WHO regions recorded drops in mortality rates in 2016 as compared to 2010, with the exception of the WHO Eastern Mediterranean Region, where mortality rates remained virtually unchanged in the period. Similarly, between 2015 and 2016, the mortality rates stalled in the WHO Sub-Saharan Regions calling for prompt measures to reduce the mortalities [12].

In Ghana, malaria accounted for about 38% of outpatient visits and 27.3% of admissions in health facilities, and 48.5% of under-five deaths in 2015, remaining one of the leading causes of morbidity and mortality. Ghana and nine other countries in Sub-Sahara Africa (SSA) accounted for more than 60% of malaria deaths in Sub-Sahara Africa (SSA) in 2012 [5]. In the Binduri district of the Upper East region of Ghana, the total number of malaria cases recorded in the year 2018 and 2019 are 21,872 and 25,888 respectively [13]. Despite the fact that a huge number of malaria cases were determined in Binduri district in the 2019 district health report, this study sought to determine clinicians' adherence to the malaria testing, treatment, and tracking policy in Binduri district health facilities so as to check for gaps and suggest possible solutions to help in the global fight against malaria in the district.

2. Method

2.1. Study Area Description

Binduri District is located in the eastern part of the Upper East Region. The district is located approximately between latitudes 11˚11' and 10˚40'N and longitude 0˚18'W and 0˚6'E in the north-eastern corner of the region. It shares boundaries with the Republic of Burkina Faso to the North, Garu-Tempane to the South, Bawku Municipal to the East, and to the West with Bawku West. The total population in the district was 65,360. Out of the population, 52 percents are females, and 48 percent, males. The age cohort with the highest proportion of the population is the 5 - 9 age group (14.1%), followed by the age cohort 0 - 4 (13.5%). Predominantly the ethnic groups in the district are kusasi and Mampurisi. The population is made up of 20% urban and 80% rural.

For the purpose of health delivery, the district has been divided into nine (9) sub-districts namely: Aniisi/Kukparigu, Atuba/Nafkolga, Bazua, Binduri Central, Goore/Manga, Zawse/Bansi. Respectively, the following are the sub-district capital health facilities; Aniisi CHPS, Nafkolga CHPS, Bazua Clinic, Binduri Health Center, Goore Clinic, Zawse CHPS with Bawku Presbyterian Hospital in the Bawku municipality serving as the main referral Hospital. There is a total of 12 health facilities/health care providers. There is no hospital in the district hence no medical officers also. These health facilities are manned by various categories of health professionals such as physician assistants, midwives, staff nurses, community health nurses, enrolled nurses, etc. who deliver a different range of services from clinical care to public health interventions including malaria services.

2.2. Study Design

This research is a retrospective cohort study. Medical records from folders of patients who received malaria treatment in the Binduri district of the Upper East Region were reviewed to determine the variables of interest. A cross-section of patient records from selected major health facilities in the district was used in this study. A structured questionnaire was also used to collect qualitative data on the knowledge of providers on malaria testing, treating, and tracking.

2.3. Study Population

The study population was patients who received malaria treatment in Ghana Health Service-approved health facilities in the Binduri district from 1st January 2019 to 31st December 2019. A convenient random sampling technique was adopted to review records of at least one-third (1/3) of the total 2019 reported malaria-treated cases in the district. And prescribers on duty in all health facilities on the day for data collection were also interviewed.

2.4. Data Collection and Analysis

The data for this research was collected from consulting room registers, patients'

folders, and the District Health Information Management System (DHIMS2). A structured questionnaire was designed for the data collection from the service providers.

The data was analyzed using Stata version 14, and Microsoft Excel version 2016 statistical software packages. The results of the study were presented in the form of statistical charts, and tables.

2.5. Inclusion and Exclusion Criteria

2.5.1. Inclusion Criteria

Tested malaria cases are suspected cases tested and confirmed using mRDT or microscopy, whiles treated cases are confirmed malaria cases put on any ACT regimen and a tracked malaria case is a patient given a date for review with an indication in the patient's folder. Patients who were diagnosed and treated by prescribers in 2019 for uncomplicated malaria, severe malaria, and malaria in pregnancy will be included in the study. Because malaria is a recurrent disease, patients who were treated for malaria more than once within the study period were captured once. Only the first treatment within the study period was reviewed.

Compliance is said to have attained when patients suspected to have malaria are tested first then followed by giving ACT to the positive results and following up on patient by home visit or appointment of a revisit after completion of treatment cause.

2.5.2. Exclusion Criteria

Patients whose medical records were not traceable were excluded from the study.

2.6. Sample Size Determination

A total of 383 symptomatically diagnosed patients' medical records was reviewed for the study. The sample size was calculated using the formula:

In order to obtain an appropriate sample size for the study, Cochran's (1977) formula for calculating a sample size was adopted. The formula is denoted as follows:

$$n = \frac{Z\alpha/2^2\, P(1-P)}{e^2}$$

where: n: required sample size z: confidence level 95%, $P = 0.5226$ (Binduri district malaria incidence), e = allowable precision of 5% (0.05) and $q = 1 - p$.

The calculated sample size for the study is 383.

2.7. Sampling Method

A simple random sampling technique was used to select the patients' records from two health centers which were used for the study. A list of all patients who were symptomatically diagnosed with malaria in 2019 was created by reviewing the OPD register and patient folders. This list was serially numbered. The researcher randomly select patients' folders numbered with even numbers one af-

ter another until 383 folders were selected. These patients' records were reviewed for the study.

2.8. Data Management and Analysis Plan

Data obtained will be cleaned and exported into Stata. Descriptive outputs were generated in the form of frequencies, standard deviations, means, and percentages. Cross tabulations was done using the Chi-squared test to determine the association between the variables. Odds ratios were used to test for the strength of association between the variables that prove significant. The test result with a *p*-value less than 0.05 will be considered significant.

3. Results

3.1. Socio-Demographic Characteristics of Respondents

A total of 21 clinicians were found in the facilities sampled and interviewed. Out of those interviewed 9 (42.9%) were between the age range of 24 - 29 years, 10 (47.6%) were within 30 - 39 years and 2 (9.5%) from the age group 40 plus (Table 1). The table also shows that out of the total respondents 38.1% were females whiles 69.9% were males. Also, with regards to the years of practice, about 4 (19.0%) of the respondents have practiced not more than 1 year, about9 (42.9%) have practiced within 2 - 5 years and 8 (38.1%) have practiced for 6 years, and more. The majority, 16 (76.2%) of the respondent were nurses. Only few 2 (9.5%), 2 (9.5%) and 1 (4.8) were midwives, physician assistants and medical laboratory assistants respectively.

Table 1. Background data on health care providers interviewed.

Variables	Frequency (N = 21).	Percentage (%)
Age		
24 - 29	9	42.9
30 - 39	10	47.6
40+	2	9.5
Sex		
Female	8	38.1
Male	13	61.9
Years of Practice		
0 - 1	4	19.0
2 - 5	9	42.9
6+	8	38.1
Profession		
Nurse	16	76.2
Midwife	2	9.5
Physician Assistant	2	9.5
Medical lab Tech	1	4.8

Moreso, a sum of 376 folders were reviewed and the background characteristics have been detailed in Table 2. The sex distribution of patients whose folders were reviewed 156 (41.5%) being males, and 220 (58.5%) begin females. The age categories were 201 (53.5%) 1 - 5 years, 118 (31.4%) 6 - 20 years and 57 (15.1%) were 21 years and above.

Treated malaria cases confirmed using RDT or Microscopy

The first study objective aims at determining the proportion of treated malaria cases confirmed using RDT or Microscopy as per the policy in Ghana. Table 3 indicates that out of the 376 folders reviewed, 374 (99.5%) documented suspected malaria and all (100%) were tested for malaria using either mRDT or microscopy. 304 representing about 85% of suspected malaria cases had positive results and all (100%) were put on treatment. 70 (15%) of the patients had negative test results and only one was put on antimalarial treatment. The antimalarial was Artemether Lumanfantrine.

Table 2. Background information patients' folders reviewed.

Variables	Frequency (N = 376).	Percentage (%)
Age of Patients		
1 - 5	201	53.5
6 - 20	118	31.4
21+	57	15.1
Sex		
Female	220	58.5
Male	156	41.5

Table 3. Treated malaria cases confirmed using mRDT or microscopy.

Variables	Frequency (N = 376).	Percentage (%)
Prescriber Suspect patient of having malaria		
Yes	374	99.5
No	2	0.5
Client referred for malaria test		
Yes	374	99.5
No	2	0.5
Results of client's malaria test		
Positive	304	80.9
Negative	72	19.1
Patient put on any malaria treatment		
Yes	304	80.9
No	72	19.1
Treatment given	**N (304)**	**(%)**
Artemether Lumanfantrine	304	100

3.2. Proportion of Treated Malaria Patients Tracked by Physicians

Figure 1 shows that 299 (80.0%) patients were scheduled to return on a specific day for review and 77 (20.0%) patients were not scheduled for any review according to folders reviewed.

3.3. Compliance with the Recommended Malaria Treatment Guidelines

The total compliance of the respondent according to Figure 2 indicated that 230 (61.2%) complied while 146 (38.8%) did not.

3.4. Knowledge on Malaria Testing, Treatment, and Tracking

Figure 3 estimated that a little above half 13 (59.1%) were health professionals who had good knowledge on malaria testing, treatment, and tracking. Only 9 (40.9%) had poor knowledge.

Table 4 below also indicates that the age range 24 - 29 has the highest record of good knowledge of 75.3% and the age range with the highest record of poor knowledge is within 30 - 39 years (69.2%).

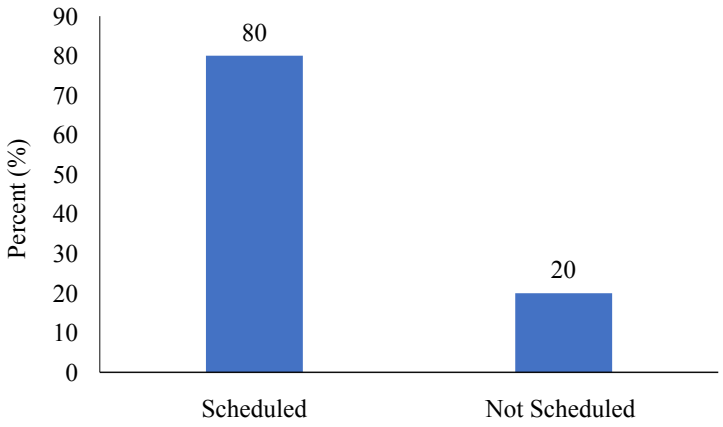

Figure 1. Patient scheduled for review in the folder.

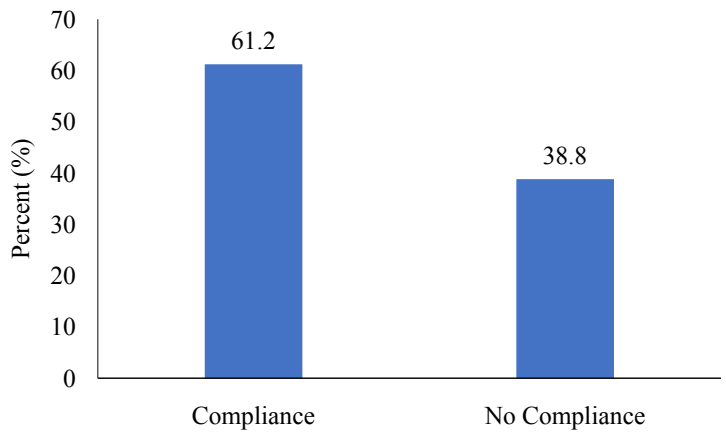

Figure 2. Compliance to the recommended treatment guidelines.

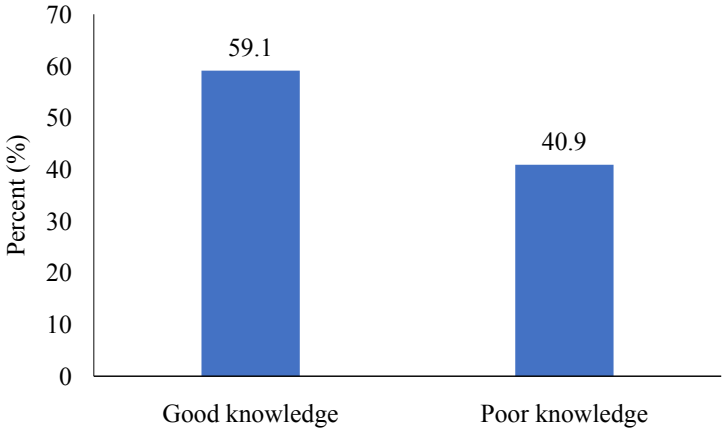

Figure 3. Overall Knowledge of the respondents

Table 4. Level of knowledge across socio-demographics of the respondents.

Variable	Good knowledge *n* (%)	Poor Knowledge *n* (%)	Total *n* (%)
Age			
24 - 29	6 (75.3)	3 (23.1)	9 (42.9)
30 - 39	1 (12.5)	9 (69.2)	10 (47.6)
40+	1 (12.5)	1 (7.7)	2 (9.5)
Sex			
Female	4 (50.0)	4 (37.8)	8 (38.1)
Male	4 (50.0)	9 (69.2)	13 (61.9)
Years of Practice			
0 - 1	1 (7.7)	3 (37.5)	4 (19.1)
2 - 5	5 (38.5)	4 (50.0)	9 42.9)
6+	7 (53.6)	1 (12.9)	8 (38.1)
Profession			
Nurse	7 (87.5)	9 (69.2)	16 (76.2)
Midwife	2 15.4)	0 (0.0)	2 (9.5)
Physician Assistant	1 (12.5)	1 (7.7)	2 (9.5)
Medical lab. Tech	1 (7.69)	0 (0.0)	1 (4.8)

The table also shows that more male respondents have poor knowledge than females; out of the 13 male respondents only 4 (37.8%) of them have good knowledge and out of the 8 female respondents, 4 (50.0%) have good knowledge and 4 (50.0%) have bad knowledge. Furthermore, respondents with 6+ years of experience had the highest score of good knowledge of 53.6%.

4. Discussion

4.1. Treated Malaria Cases Confirmed Using RDT or Microscopy

This study assessed the treated malaria cases confirmed using mRDT or Micro-

scopy by reviewing folders of patients in the four health Centre's in Binduri District of the Upper East Region. When the folders of patients were reviewed all the patients suspected to have malaria were tested using either mRDT or microscopy. The findings from the study showed that there has been a great improvement in malaria cases tested before treatment over the past years and this is corroborated by a study from Kenya [12], in their composite performance, defined as patient tested for malaria and treated with AL if the test result was positive or not treated for malaria if the result was negative, improved significantly by 34.2%; from 15.7% at the baseline to 49.9% at the last follow-up survey ($p < 0.001$) with an increasing trend across all survey rounds ($p < 0.001$). A similar trend was observed in children below 5 years (11.8% vs 49.0%; $p < 0.001$) and in patients 5 years and above (18.9% vs 50.5%; $p < 0.001$). With respect to testing rates, improvements of 34.0% were observed; from 23.9% at the baseline to 57.9% during the last survey ($p < 0.001$). In the same period, the testing rates in children increased from 20.5% to 55.2% ($p < 0.001$) while testing in older children and adults improved from 26.7% to 59.7% ($p < 0.001$) [7]. GHS National Malaria Control bulletin in 2017 showing that test positivity rate measured using RDTs increased from 20.6% in the first quarter of 2016 to 21.5% in 2017. and that the number of suspected malaria cases put on ACTs reduced from 1,206,237 in the first quarter of 2016 to 1,145,062 in 2017 given us a reduction by 61,175 (5.1%). This was attributed to the improvement in adherence to the T3 policy [14].

The findings clearly show a high level of testing and confirmation of malaria cases of 100% in the district, which indicates the first T of the policy is been achieved and that we have moved from the presumptive treatment of suspected malarial cases.

4.2. The Proportion of Treated Malaria Patients Tracked by Physicians

As part of the guidelines of the WHO malaria treatment policy, tracking of patients is very essential and this is done by requesting for the patient to return for a review. Tracking ensures patient adherence to medication and promotes patient care. The study conducted in Atebubu Government Hospital revealed that compliance to the treatment guidelines of ACT for malaria and requesting for patients who were treated to return for review was poor [10], hence the tracking component of the T3 strategy still remains a challenge [15]. The findings in this study brought to light that, about 299 (80.0%) of the patient's folder reviewed were asked to return on a later date for a review whiles 77 (20.0%) of the folders review did not indicate a request for patients to return for a review, hence the number of patients are not tracked. This shows an improve from the study conducted in the Bongo district which revealed that out of a total of 353 children, one hundred and eighty-six (52.7%) children were not tracked. Out of 167 (47.3%) who were asked to return for a review, 77 (46.1%) were asked to return on specific days while 90 (53.9%) were asked to return only if the child's condition did

not improve. The majority, 70.6% of the children seen at the CHPS compound, were asked to return for a review, while only 39.5% at the Hospital and 33.3% at the Health Centers were asked to return for a review [16].

4.3. Compliance to the Recommended Malaria Treatment Guidelines

Compliance is said to have attained when patients suspected to have malaria are tested first then followed by giving ACT to the positive results and following up on patient by home visit or appointment of a revisit after completion of treatment cause. The findings from this study showed overall compliance of the recommended guidelines by 68.2%, this is an indication that some providers in the district do not follow the test treat and track policy by WHO in 2013.

This supports the finding which revealed that though there was a high level of awareness of the test-before treatment policy among prescribers, significant numbers did not routinely request a malaria test for all suspected cases of malaria [17].

4.4. Knowledge on Malaria Testing, Treatment, and Tracking

Factors affecting adherence to the protocols can often be associated with a lack of adequate knowledge. The findings show that over 50% have good knowledge and support an earlier study than in Ghana to assess the level of knowledge of prescribers on mRDTs and microscopy [17]. The association between respondents and their background revealed that the age group with the highest record of good knowledge was 24 - 29 years with a score of 75% and the age group with the highest record of poor knowledge was 30 - 39 years respectively, it also showed that out of the 13 male respondents only 4 representing 37.8% had good knowledge. The study also showed that, respondents with 6+ years' work experience had the highest score of good knowledge of 53.6%, which is an indication that the number of years of practice has an impact on the level of knowledge of respondents. This also suggests that the longer clinicians stay in the service the higher the level of knowledge, hence this directly influences adherence to the policy.

5. Conclusion

Generally, providers' adherence to the T3 policy was encouraging in the Binduri District and a high level of testing of suspected cases eliminated the practice of presumptive treatment. However, tracking of patients was not as high as testing, and treatment which was revealed by the number asked to return for a review during the folder review. This may be a result of poor knowledge among health care providers especially those who are fairly new in the service and have less experience. These findings have policy implications for the public health system on malaria control in the country. The discrepancies and gaps found as hindrances to the adherence of the T3 policy may lead to poor information, plan-

ning, and decision-making. The study also buttresses and confirms most of the literature assertions on the knowledge on malaria case management, however, this can be seen as an opportunity to address the existing gaps and improve the overall health system through malaria control in the district.

Declarations

Ethics Approval and Consent to Participate

Ethical clearance for the study was obtained from the University of Health and Allied Science Ethical Review Committee (UHAS-ERC) with the number (UHAS-REC A.9 [34] 21-22). Permission was sought from the district health directorate through an introductory letter.

Authors' Contributions

JBT, WKT and LA both conceived the study. JBT, JP, EA, PAND, GEY and JBT collected and analyzed the data. Both JBT, WKT and LA wrote and approved the final manuscript.

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Conflicts of Interest

The authors declare that they have no competing interests

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List of Abbreviations

ACTs: Artemisinin-Based Combination Therapies; A-L: Artemether Lumanfantrine; AS-AQ: Artesunate Amodiaquine; CDC: Center of Disease Control; DDHS: District Director of Health Service; DHAP: Dihydroartimisinin-Piperaquine; DHIMS2: District Health Information Management System 2; GHS: Ghana Health Service; HFs: Health Facilities; HW: Health Worker; HRP-2: Histidine-Rich Protein 2; MICS: Malaria Indicator Cluster Survey; MOH: Ministry of Health; OPD: Out-Patient Department; PCR: Polymrase Chain Reaction; Pf: Plasmodium falciparum; PfHRP2: Plasmodium falciparum Histidine-Rich Protein 2; RDTs: Rapid Diagnostic Test; 3T: Test, Treat and Track.