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Original Research Article

Assessment of Malaria Case Detection and Management with Artemisinin Based Combination Therapy in Amoyo-Ifelodun, Lga, Kwara State, Nigeria

*Sesan Emmanuel Busayo[1], Sandra Salomy Phiri[2], Gloria Oluwaseun Olatunji[3]

[1]Department of Epidemiology and Biostatistics, University of Medical Sciences, Ondo, Nigeria
[2]Department of Health and Agriculture, University College Dublin (UCD)
[3]Department of Public Health Science, Kwara State University Malete, Nigeria

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***Corresponding author: Sesan Emmanuel Busayo**
Department of Epidemiology and Biostatistics, University of Medical Sciences, Ondo, Nigeria

Abstract

BACKGROUND: Malaria is still a major global health problem and one of the leading causes of morbidity and mortality in Sub-Saharan Africa.

OBJECTIVE: To assess malaria case detection and management with Artemisinin Based Combination Therapy in Amoyo-Ifelodun, Local Government Area, Kwara State, Nigeria

METHODS: This study combined both quantitative and qualitative methods. Structured questionnaire was administered to 127 respondents to determine the frequency and pattern of use of artemether-lumefantrine in the management of malaria.

RESULTS: Out of the 127 respondents, 121 (95.3%) perceived malaria as the most frequently detected disease in the area, and 95 (74.8%) only diagnosed malaria using the presenting symptoms. Similarly, 115 (90.6%) affirmed that there is laboratory in the area and 118 (92.9%) pointed that RDT is one of the best options to diagnose malaria. Majority (94.5%) of the respondents agreed that RDT has a good success rate.

CONCLUSION: Based on the findings of this study, a number of conclusions were made such as: there is no relationship between socio-demographic parameters and malaria case detection (malaria test outcome), there is no relationship between malaria case detection and management versus malaria test outcome and also, there is relationship between malaria case detection and management with ACT. Thus, there is the need for a strong collaboration among major stakeholders including the Government and Non- Governmental Organizations to sensitize the communities on Malaria as a disease as well as developing the holistic and effective methods for the prevention and control of the disease.

Keywords: Artemisinin-based Combination Therapy, Malaria, Management, Diagnosis, Prevalence.

INTRODUCTION

Malaria is still a major global health problem and one of the leading causes of mortality and morbidity in Sub-Saharan Africa. In 2010, an estimated 216 million cases and 655,000 deaths of malaria occurred worldwide, of which about 81% and 91% respectively were in the African Region. Most of the cases and deaths were reported in under 5 year children (UNICEF, 2015).

Malaria is caused by five species of parasites of the genus Plasmodium that affect humans (P. falciparum, P. vivax, P. ovale, P. malariae and P. knowlesi) and malaria due to P. falciparum is the most deadly form and it predominates in Africa; P. vivax is less dangerous but more widespread, and the other three species are found much less frequently (Warrell, & Gilles, 2016). Malaria parasites are transmitted to humans by the bite of infected female mosquitoes of more than 30 anopheles species (Ukoli, 2018). Globally, an estimated 3.3 billion people were at risk of malaria in 2011, with populations living in sub-Saharan Africa having the highest risk of acquiring malaria: approximately 80% of cases and

90% of deaths are estimated occur in the WHO African Region, with children under five years of age and pregnant women most severely affected (Adefioye,et al., 2017). About 90% of all malaria deaths in the world today occur in Africa south of the Sahara. It is also because the most effective malaria vector – the mosquito Anopheles gambiae – is the most widespread in Africa and the most difficult to control (Ukoli, 2018).

It has been discovered that malaria accounts for 60% of outpatient visits and 30% of hospitalizations among children under five years of age in Nigeria, it has the greatest prevalence, close to 50% in children age 6-59 months in the South West, North Central, and North West regions and malaria has the least prevalence, 27.6 percent, in children age 6 to 59 months in the South East region (Nigeria Malaria Fact Sheet, 2016).

Malaria is an entirely preventable and treatable disease, provided the currently recommended interventions are properly implemented. These include (i) vector control through the use of insecticide-treated nets (ITNs), indoor residual spraying (IRS) and, in some specific settings, larval control, (ii) chemoprevention for the most vulnerable populations, particularly pregnant women and infants, (iii) confirmation of malaria diagnosis through microscopy or rapid diagnostic tests (RDTs) for every suspected case, and (iv) timely treatment with appropriate antimalarial medicines like ACT (Artemisinin-based Combination Therapy) (WHO, 2020). Consequences of severe malaria include coma and death if untreated, young children are especially vulnerable. In endemic areas, treatment is often less satisfactory and the overall fatality rate for all cases of malaria can be as high as one in ten (Aribodor, 2023). For reasons that are poorly understood, children with malaria frequently exhibit abnormal posturing, a sign indicating severe brain damage and Malaria has been found to cause cognitive impairments, especially in children. Malaria causes widespread anaemia during a period of rapid brain development and also direct brain damage and this neurologic damage results from cerebral malaria to which children are more vulnerable (Sotimehin, 2018).

Malaria case detection in Nigeria

Malaria is associated with high morbidity and mortality with over 90% of Nigerians at risk. In 2010, 42% of children under the age of 5 years had malaria diagnosed by microscopy tests. Geopolitical zonal variation exists in prevalence of malaria with 48% in the North-West (Roll Back Malaria, 2016). The Nigerian malarial control policy on malaria recommends universal diagnostic testing by microscopy or rapid diagnostic test (RDT) in all suspected cases and the use of Artemisinin-based Combination Therapy (ACT) for treatment of malaria (Roll Back Malaria Progress and Impact Series, 2015). Microscopy requires a laboratory set up and a trained microscopist, which limits its applicability as both requirements are lacking in most primary health care settings. In these settings, therefore, RDT provides a parasite based rapid, early and accurate diagnosis of malaria. The 2009-2013 national malaria control strategic plan aims to reduce malaria-related mortality in Nigeria by 50% and targets 80% parasitological diagnosis for patients 5 years and above using RDT by the end of 2013 (Akanbi et al., 2015). RDT detects plasmodial antigens in the blood by immunochromatographic assay with monoclonal antibodies directed against target antigens impregnated on a test strip (Olasehinde, et al., 2017). Histidine-rich protein antigen 2 (HRP-2) is the most common malarial antigen and is specific for Plasmodium falciparum. RDT requires only a few drops of blood, little expertise and takes only 5-15 min to perform. Although most commercially available RDTs have sensitivity >95% at parasite density count of 200 parasite/µl of blood this, however, declines with low-level parasite density.10 When in good condition some RDT products achieve sensitivity, which approximates to that of microscopy (100 parasite/µl). RDT sensitivity remains varied (WHO 2010). In Lagos Aribodor (2023) has documented low RDT sensitivity while other researchers in contrast have also documented high RDT sensitivity (Ojurongbe, et al., 2017).

A study conducted by Ogungbamigbe, et al., (2015) evaluated the diagnostic performance of one of the popular malaria rapid diagnostic test (RDT) kit in Nigerian market which has not been investigated before in field-condition compared with microscopy as the gold standard. A total number of 250 children of 10 years and below were examined for malaria parasites using both microscopy and RDT in Uhogua community in Edo state and data were analysed using SPSS version 22. The prevalence of malaria by microscopy was 99.2% while only 55.2% were positive by RDT. Majority of the study populations were asymptomatic for malaria infection. RDT sensitivity and specificity compared to light microscopy was 69.08% and 66.67% respectively while the positive predictive value and negative predictive value were 99.6% and 1.77% respectively. The study concluded that RDT accuracy was less than 70%. Thus, RDT cannot be relied upon alone for malaria diagnosis. Microscopy remains the gold standard for malaria diagnosis (Olasehinde, et al., 2017).

However, within the period of rapid uptake, three RDT-associated challenges emerged: (a) varying performance of RDT products in field use, (b) a confusing range of products on the market, and (c) limited acceptance of results by health workers and patients (e.g. so that they prescribe or take medicines in spite of a negative result due to a lack of trust in the new technology, or simply continuing with clinical habits). Since 2002, WHO has used different strategies to address these challenges (Akanbi et al., 2015). In Nigeria, the use of RDTs has continued to increase. However, the usage

of RDT is higher in health facilities compared to privately owned facilities as confirmed by a study done by Aribodor (2023).

A study (Akanbi et al., 2015) carried out on private health facilities reported that about 50% of diagnosis of malaria was confirmed by use of RDTs. It has been recommended by the WHO that standard RDT must have a sensitivity of 95% for the detection of 100/µl of P. falciparum and 95% specificity. However, this benchmark values have been discovered to vary in different areas necessitating the need to determine the performance of different RDTs in different regions. There is therefore a need to continue to determine the performance of the different RDTs found in Nigerian markets (WHO. 2020).

Management of malaria cases with Artemisinin-based Combination Therapy (ACT)

In Nigeria, Artemisinin-based Combination Therapy (ACT) is the recommended first line antimalarial medicine for uncomplicated malaria (Olasehinde, et al., 2017).

However, health care providers still continue the use of less efficacious medicines such as Sulphadoxine-pyrimethamine and chloroquine (Ojurongbe, et al., 2017). In Africa, Artemisinin-based Combination Therapy remains the medicine of first choice for malaria treatment in most endemic countries like Nigeria (Adefioye,et al., 2017). Artemisinin-based Combination Therapy (ACT) is the most effective medicine against Plasmodium falciparum as resistance to other antimalarial malaria medicines has been reported (Adefioye,et al., 2017). In 2005, Nigeria adopted ACT for malaria treatment. Despite this adoption ineffective medicines such as Sulphadoxine-pyrimethamine and chloroquine are still used to treat malaria. Children in South-South (27.0%) and North-Central (23.0%) zones are more likely to receive ACT than children in other zones (Nigeria Malaria Fact Sheet, 2016).

In Nigeria, it is common knowledge that all cadres of healthcare providers treat malaria. A preliminary survey conducted by the principal investigator of a study showed that records of medicines used in health facilities were poorly kept, trade names of medicines, rather than generic names were written in most cases, thereby making it difficult to ascertain pharmacologic constituents of such medicines (Aribodor, 2023). Though ACT is effective in adults and children, awareness about the medicine could still be low among healthcare providers. Preference for ACT among healthcare providers is influenced by price and availability of the medicine, health facility type and knowledge of recommended antimalarial medicines and Nigerian policy recommends prompt parasitological confirmation by microscopy or rapid diagnostic test (RDT) in all cases of suspected malaria before treatment (Sotimehin, 2018).

In Lokoja, there are no subsidy schemes for ACTs and patients buy ACTs which are readily available in health facilities and patent medicine vendors' shops. Cost of services are similar in private and public health facilities and are paid for out-of-pocket (Ogungbamigbe, et al., 2015).

Materials and Methods

Study Area

Amoyo is a community in Ifelodun local government, Kwara state. Ifelodun Local Government Area was created in 1976 with the headquarter in Share. It shares common boundaries with Asa, Edu Isin, Irepodun, Ilorin South, Moro and Oyun Local Government Areas. As well as Yagba West Local Government Area of Kogi State. Majority of the people of this Local Government Area practice subsistence farming and petty trading to earn their living. The popular local industries in the area include: Gari processing industries and Shea butter processing industries. Ifelodun Local Government Area has total number of 74 government owned health facilities, these include: BHC Oro-Ago, BHC Oyatedo, BHC Ahun, BHC Ajegunle, BHC Oke-Owa, BHC Oke-Oyan, BHC Owa-kajola, H/P Irabon, H/P Omupo and H/P Oke-Daba etc while the number of health record management professionals in the whole 74 health facilities are 18 in total.

Advocacy/Community Entry

A visit to Basic Primary Health Center (BPHC) in Amoyo community, Ifelodun Local Government Area, Kwara State was made to discuss the researchers' intentions and seek approval to carry out this study.

Study Population

According to Burns and Grove (2018), a population is all the elements that meet the criteria for inclusion in a study. Polit (2015) described a population as an aggregate or totality of all the objects, subjects or members that conform to a set of specifications. In this study, the target population is all qualified health workers in Basic Health Center (BHC) in Amoyo community, Ifelodun Local Government Area, Kwara State

Study Design
This study combined both quantitative and qualitative methods. Secondary data on malaria cases from 2020 to 2022 was gotten from the study area. Also, paper-based interview administered questionnaires were used to determine the frequency and prescription pattern of ACT used in management of malaria in study zone.

Inclusion criteria
All individual that comes to the primary health care routinely for malaria case detection and management with artemether-lumefantrine.

Exclusion Criteria
1. Individuals that are living out of the study area
2. Individual with severe or concomitant infection
3. Individual with chronic illnesses

Sample techniques
There was not need for sampling in this study because the entire population in the study area was used for the study.

Sampling size determination
According to 2006 census, the total population of Amoyo community was 10,264. The sample size was determined by using the statistical formula of Fisher (Korlik & Higgins, 2015) since the target population is more than 10,000.
$N = z^2pq/d^2$
Z = 1.96, 95% confidence limit
d= 0.05 as the acceptable margin of error
p= the probability of the event occurring = 0.09
q= 1-p = which is the probability of the event not occurring in this 1-p =0.92
The sample size will then be determined as follows;
$n= 1.96^2 (pq)/d^2$
$n= 1.96^2(0.09) (0.92)/ 0.0025$
n= 0.31808448/0.0025
n= 127

Research Instruments
The tool that was used for data collection is a self-structured questionnaire. Relevant data for the analysis will be collected through the distribution of the questionnaire among the population under study. The self-structured questionnaires were distributed to the respondents to elicit information from respondents on background characteristics and other variables relevant to the study objectives and questions.

Methods of data collection
The structured questions provided data that is objective and reliable for testing. The researchers ensured that the data collection process was properly carried out. The data collection instrument was also carefully administered, discussed and explained to the respondents for ease of understanding. This was done in Basic Health Center, Amoyo community, Ifelodun LGA, Kwara State for ease of distribution and collection.

Measurement of variables and data processing
The methods of measurement and analysis were objective based using Statistical Package for Social Science (SPSS) in a clear and understandable way.

Method of data Analysis
Only completed questionnaires that are correctly filled and returned were treated. In treating these copies, the research questions were analysed using descriptive statistics.

Ethical Considerations
Ethical consideration is important in ensuring professional research and is non-intrusive in accomplishing research objectives. For this study, the researchers sought for permission to carry out the study from relevant administrative authorities and confirmed that the study was to accomplish academic goals only. The researchers also acknowledged additional sources of information from other scholars.

The researchers used a self-developed questionnaire on the respondents to elicit the available data used for this study. The respondents' consent was sought, and the research procedures were explained and confidentially assured. The questionnaires were collected from the respondents after they were filled.

Limitations of the study

The major constraints that were suffered in the course of the study included:

1. The reluctance of some health workers at Basic Health Center, Amoyo community, Ifelodun LGA, Kwara State.
2. Belief of not wanting to disclose medical activities in the study area. However, these limitations will not affect the validity and reliability of this study.

RESULTS

This chapter presents result from investigation on the assessment of malaria case detection and management with A.C.T in basic health center, Amoyo Community, Ifelodun Local Government, Kwara State, Nigeria. A total of 127 questionnaires were administered and 127 were returned making 100% response rate.

Table 1: Socio-demographic Characteristics (n = 127)

Variables	Categories	Frequency	Percentage
Age	15-25 years	66	52.0
	26-36 years	30	23.6
	37-47 years	19	15.0
	47-above years	12	9.4
Gender	Male	68	53.5
	Female	59	46.5
Marital Status	married	47	37.0
	widow	75	59.1
	divorce	5	3.9
Education State	below ND	31	24.4
	ND	31	24.4
	B.Sc	61	48.0
	M.Sc	4	3.1
Profession	Nurse	52	40.9
	C.H.P	24	18.9
	H.I.M	28	22.0
	Lab. Tech.	23	18.1
Religion	Christianity	51	40.2
	Islam	73	57.5
	traditional	3	2.4

Table 1 and Figure 1 shown the socio-demographic information of the respondents. Out of 127 respondents, 52.0% are between age group 15-25 years old while 23.6%, 15%, 9.4% are of age groups 26-36, 37-47 and ">47" years old. There are 68 (53.5%) male and 46.5% female. There are 37% married respondents while 75 (59.1%) and 5 (3.9%) are widow and divorced respectively. There are 52 (40.9%) nurses, 24 (18.9%) are Community Health Practitioner (CHP) while 28 (22%) are Health Information Manager (HIM) and 23 (18.1%) are Laboratory Technicians.

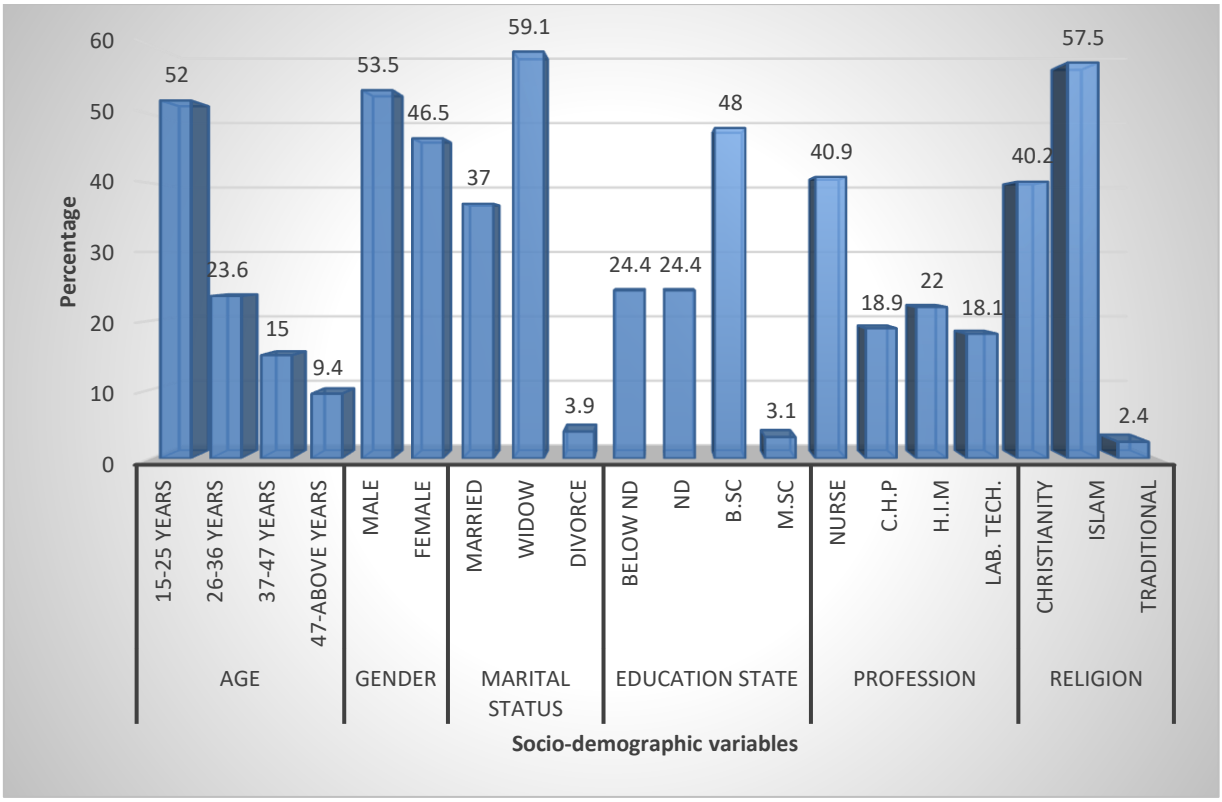

Figure 1: Bar chart of Socio-demographic Characteristics

Table 2: Frequency distribution of responses on malaria case detection diagnosing and prevalence of malaria

Statements	Responses' categories	Frequency	Percent
Is malaria the most frequent detected disease?	Yes	121	95.3
	No	6	4.7
Do you only diagnose malaria using the presenting symptoms?	Yes	95	74.8
	No	32	25.2
There is laboratory test	Yes	115	90.6
	No	12	9.4
RDT is one of the best options	Yes	118	92.9
	No	9	7.1
RDT has a good success rate	Yes	120	94.5
	No	7	5.5
microscopy means outperformed RDT	Yes	96	75.6
	No	31	24.4
diagnosing equipments are readily available	Yes	113	89.0
	No	14	11.0
tested for malaria within the last one week	Yes	89	70.1
	No	38	29.9
if yes what method of test did you use	Microscopy	60	47.2
	RDT	54	42.5
	PCR	13	10.2
TEST outcome	positive	76	59.8
	negative	39	30.7
	undecided	12	9.4

symptoms experienced	Yes	107	84.3
	No	20	15.7
did you repeat the test	Yes	98	77.2
	No	29	22.8
if yes, what is the new outcome	positive	83	65.4
	negative	41	32.3
	undecided	3	2.4

Table 2 shown the frequency and percentage of responses on malaria case detection diagnosing and prevalence. Out of 127 respondents, 121 (95.3%) perceived that malaria the most frequent detected disease in the area and 95 (74.8%) only diagnose malaria using the presenting symptoms. Similarly, 115 (90.6%) affirmed that There is laboratory test in the area and 118 (92.9%) RDT is one of the best options. Majority (94.5%) of the respondents agreed that RDT has a good success rate. More than half of the respondents (59.8%) had tested positive to malaria.

Table 3: Frequency distribution of responses on the use of Artemisinin-based Combination Therapy (ACT) for management of malaria

Variables	Responses' categories	Frequency	Percent
Aware of ACT drugs	Yes	113	89.0
	No	14	11.0
Is ACT efficient	Yes	106	83.5
	No	21	16.5
Do you prefer using other drugs	Yes	62	48.8
	No	65	51.2
Is herbs better	Yes	53	41.7
	No	74	58.3
ACT drugs outperform other drugs	Yes	90	70.9
	No	37	29.1
Is there government intervention	Yes	111	87.4
	No	16	12.6
Are ACT drugs readily available	Yes	102	80.3
	No	25	19.7
Do patients a time prefer other drugs	Yes	64	50.4
	No	63	49.6
What type of ACT available	Artmether-lumenfaintrine	53	41.7
	Artesunate-amodiaquine	48	37.8
	Dihydroartesmisinin	22	17.3
	Fansidar	4	3.1

Table 3 shown the frequency and percentage of responses on the use of Artemisinin-based Combination Therapy (ACT) for management of malaria. Majority (89%) of the respondents are aware of ACT drugs and 106 (83.5%) perceived that ACT is effective. Similarly, 70.9% perceived that ACT drugs outperform other drugs. Majority of the respondents opined that there is government intervention in the area while 80.3% affirmed that ACT drugs are readily available.

Table 4: Frequency distribution of responses on the effect of Artemisinin-based Combination Therapy (ACT) for management of malaria

Variables		Frequency	Percent
How many days do you use the drug?	1 day	19	15.0
	2 days	19	15.0
	3 days	71	55.9
	5 days	18	14.2
When did the symptoms disappear	2 day	37	29.1

	3 days	59	46.5
	4 days	22	17.3
	5 days	9	7.1
Any adverse effect?	Yes	35	27.6
	No	92	72.4

Table 4 shown the frequency and percentage of responses on the effect of Artemicine Combination Therapy (ACT) for management of malaria. Out of 127 respondents, 85% (i.e 15% + 15% +55.9%) use the drugs for maximum of three days and 75.6% have the symptoms disappear in 3 days. Majority (72.4%) of the respondents' experience "No adverse side effect".

Table 5: cross tabulation of socio-demographic variable versus malaria test outcome

Variables	**Categories**		**TEST outcome**			**Sign.**
			positive	**negative**	**undecided**	
Sex	male	Freq.	47	15	6	0.056
		Percent	37.0%	11.8%	4.7%	
	female	Freq.	29	24	6	
		Percent	22.8%	18.9%	4.7%	
Age	15-25 years	Freq.	47	17	2	0.0001
		Percent	37.0%	13.4%	1.6%	
	26-36 years	Freq.	17	11	2	
		Percent	13.4%	8.7%	1.6%	
	37-47 years	Freq.	6	10	3	
		Percent	4.7%	7.9%	2.4%	
	47-above years	Freq.	6	1	5	
		Percent	4.7%	.8%	3.9%	
Marital status	married	Freq.	20	17	10	0.0001
		Percent	15.7%	13.4%	7.9%	
	widow	Freq.	53	21	1	
		Percent	41.7%	16.5%	.8%	
	divorce	Freq.	3	1	1	
		Percent	2.4%	.8%	.8%	
Educational qualification	below ND	Freq.	21	9	1	0.203
		Percent	16.5%	7.1%	.8%	
	ND	Freq.	15	14	2	
		Percent	11.8%	11.0%	1.6%	
	B.Sc	Freq.	36	16	9	
		Percent	28.3%	12.6%	7.1%	
	M.Sc	Freq.	4	0	0	
		Percent	3.1%	0.0%	0.0%	
Profession	Nurse	Freq.	28	18	6	0.003
		Percent	22.0%	14.2%	4.7%	
	C.H.P	Freq.	13	9	2	
		Percent	10.2%	7.1%	1.6%	
	H.I.M	Freq.	23	1	4	
		Percent	18.1%	.8%	3.1%	
	Lab. Tech.	Freq.	12	11	0	
		Percent	9.4%	8.7%	0.0%	

Religion	Christianity	Freq.	29	20	2	0.165
		Percent	22.8%	15.7%	1.6%	
	Islam	Freq.	44	19	10	
		Percent	34.6%	15.0%	7.9%	
	traditional	Freq.	3	0	0	
		Percent	2.4%	0.0%	0.0%	

Table 6: cross tabulation of association between malaria case detection and management versus malaria test outcome

Variables	**Categories**		**TEST outcome**			**Sign.**
			positive	**positive**	**positive**	
method of test did you use	Microscopy	Freq.	46	10	4	0.004
		Percent	36.2%	7.9%	3.1%	
	RDT	Freq.	24	23	7	
		Percent	18.9%	18.1%	5.5%	
	PCR	Freq.	6	6	1	
		Percent	4.7%	4.7%	.8%	
symptoms experienced	Yes	Freq.	67	29	11	0.130
		Percent	52.8%	22.8%	8.7%	
	No	Freq.	9	10	1	
		Percent	7.1%	7.9%	.8%	
did you repeat the test	Yes	Freq.	65	28	5	0.003
		Percent	51.2%	22.0%	3.9%	
	No	Freq.	11	11	7	
		Percent	8.7%	8.7%	5.5%	
When did the symptoms disappear	2 day	Freq.	25	11	1	0.002
		Percent	19.7%	8.7%	.8%	
	3 days	Freq.	30	25	4	
		Percent	23.6%	19.7%	3.1%	
	4 days	Freq.	16	3	3	
		Percent	12.6%	2.4%	2.4%	
	5 days	Freq.	5	0	4	
		Percent	3.9%	0.0%	3.1%	

Table 7: cross tabulation of association between malaria case detection and management with ACT

Variables			**Type of ACT**				**Sign.**
			Artmether-lumenfaintrine	**Artesunate-amodiaquine**	**Dihydroartesmisinin**	**Fansidar**	
How many days do you use the drug?	1 day	Freq.	4	6	9	0	0.0001
		Percent	3.1%	4.7%	7.1%	0.0%	
	2 days	Freq.	7	4	7	1	
		Percent	5.5%	3.1%	5.5%	.8%	
	3 days	Freq.	36	29	5	1	
		Percent	28.3%	22.8%	3.9%	.8%	
	5 days	Freq.	6	9	1	2	
		Percent	4.7%	7.1%	.8%	1.6%	

When did the symptoms disappear	2 day	Freq.	15	14	6	2	0.206
		Percent	11.8%	11.0%	4.7%	1.6%	
	3 days	Freq.	19	24	14	2	
		Percent	15.0%	18.9%	11.0%	1.6%	
	4 days	Freq.	15	5	2	0	
		Percent	11.8%	3.9%	1.6%	0.0%	
	5 days	Freq.	4	5	0	0	
		Percent	3.1%	3.9%	0.0%	0.0%	
Any adverse effect?	Yes	Freq.	15	14	6	0	0.849
		Percent	11.8%	11.0%	4.7%	0.0%	
	No	Freq.	38	34	16	4	
		Percent	29.9%	26.8%	12.6%	3.1%	

Bivariate analyses

Null Hypothesis 1: There is no significant relationship between socio-demographic parameters and malaria case detection (malaria test outcome).

Alternative Hypothesis 1: There is significant relationship between socio-demographic parameters and malaria case detection (malaria test outcome).

Table 5 represents the relationship between socio-demographic parameters and malaria case detection (malaria test outcome). Being categorical variables, the chi-square statistical test was adopted. The test outcome is independent of gender, religion and education qualification since the P-values (0.056, 0.165 and 0.203 respectively) are greater than significant levels (that is, $\alpha = 0.05$), which implies that the factors are not statistically significant. However, the same cannot be said of age, marital status and profession with their P-values less than 0.05, which mean that there is significant association between malaria test outcome and age, marital status and profession.

Null Hypothesis 2: There is no significant association between malaria case detection and management versus malaria test outcome.

Alternative Hypothesis 2: There is significant association between malaria case detection and management versus malaria test outcome.

Table 6 represents the relationship between malaria case detection and management versus malaria test outcome. The test outcome is independent of symptoms experience since the P-values (significant values = 0.130) is greater than levels of significance (0.05), which implies that the factor is not statistically significant. The same cannot be said of other variables with the P-values less than 0.05.

Null Hypothesis 3: There is no significant association between malaria case detection and management with ACT.

Alternative Hypothesis 3: There is significant association between malaria case detection and management with ACT.

Table 7 represents the relationship between malaria case detection and management with ACT. There is significant association between type of ACT and number of days the drugs are used since the P-values (significant values = 0.0001) is less than levels of significance (0.05), which implies that the factor is statistically significant. However, the type of ACT drugs is not significantly associated with the adverse side effect.

Table 8: Output of the logistic regression model

	Estimate	S. E	Z value	Sign.
Intercept	0.972975	0.076945	12.64	<2e-16 ***
age	0.00285	0.002591	1.10	0.271
Null deviance: 2439.5 on 2122 degrees of freedom Residual deviance: 2438.3 on 2121 degrees of freedom				

Logistic regression was adopted, as presented in Table 8, to assess the relationship between the age and malaria status as obtained in the secondary data. The logistic model is:

$$\log(\text{odds}) = 0.9729 + 0.00285\text{age}$$

The result from the secondary data shown that the odds of having positive malaria test outcome, at a unit (year) increase in age, is exp (0.00285) = 1.002854, that is 0.285% higher. Hence, age has no significant effect in determining the outcome of malaria test.

DISCUSSION

Table 2 shows the frequency and percentage of responses on malaria case detection diagnosing and prevalence. Out of 127 respondents, 121 (95.3%) perceived that malaria the most frequent detected disease in the area and 95 (74.8%) only diagnose malaria using the presenting symptoms. Similarly, 115 (90.6%) affirmed that There is laboratory test in the area and 118 (92.9%) RDT is one of the best options. Majority (94.5%) of the respondents agreed that RDT has a good success rate. More than half of the respondents (59.8%) had tested positive to malaria. Also, Table 3 shown the frequency and percentage of responses on the use of Artemisinin-based Combination Therapy (ACT) for management of malaria. Majority (89%) of the respondents are aware of ACT drugs and 106 (83.5%) perceived that ACT is effective. Similarly, 70.9% perceived that ACT drugs outperform other drugs. Majority of the respondents opined that there is government intervention in the area while 80.3% affirmed that ACT drugs are readily available. In comparism, this is in agreement with WHO (2016) findings which affirmed the rate of using Artemisinin-based Combination Therapy (ACT) for the management of malaria and the perceived benefits among health workers in Africa.

Table 5 represents the relationship between socio-demographic parameters and malaria case detection (malaria test outcome). Being categorical variables, the chi-square statistical test was adopted. The test outcome is independent of gender, religion and education qualification since the P-values (0.056, 0.165 and 0.203 respectively) are greater than significant levels (that is, $\alpha = 0.05$), which implies that the factors are not statistically significant. However, the same cannot be said of age, marital status and profession with their P-values less than 0.05, which mean that there is significant association between malaria test outcome and age, marital status and profession. This is in cntst to the findings of Aribodor, (2023)

Table 6 represents the relationship between malaria case detection and management versus malaria test outcome. The test outcome is independent of symptoms experience since the P-values (significant values = 0.130) is greater than levels of significance (0.05), which implies that the factor is not statistically significant. The same cannot be said of other variables with the P-values less than 0.05. this is in disagreement with the findings of Akanbi et al., (2015)

Table 7 represents the relationship between malaria case detection and management with ACT. There is significant association between type of ACT and number of days the drugs are used since the P-values (significant values = 0.0001) is less than levels of significance (0.05), which implies that the factor is statistically significant. However, the type of ACT drugs is not significantly associated with the adverse side effect. This is in agreement with the findings of (Sotimehin, 2018).

Summary

The result from the secondary data shown that the odds of having positive malaria test outcome, at a unit (year) increase in age, is exp (0.00285) = 1.002854, that is 0.285% higher. Hence, age has no significant effect in determining the outcome of malaria test. Also, the findings shows majority (72.4%) of the respondents experience "No adverse side effect" after the use of Artemisinin-based Combination Therapy (ACT) for management of malaria.

CONCLUSION

Based on the findings of this study, a number of conclusions are made. There is no relationship between socio-demographic parameters and malaria case detection (malaria test outcome), there is no relationship between malaria case detection and management versus malaria test outcome and also, there is relationship between malaria case detection and management with ACT.

Recommendations

Based on the findings of this study, the following are hereby recommended:

1. There is the need for a strong collaboration among major stakeholders including the Government and Non-Governmental Organizations to sensitize the communities on Malaria as a disease as well as developing the holistic and effective methods for prevention and control of the disease.
2. Health education forum at community level should be organised on regular basis, this would afford women, especially those who hardly visit health facility the opportunity to learn about sanitation and childcare practices
3. Efforts must be seriously made by the major players in the health sector to make insecticide treated net readily available in the communities at low prices to enable the ordinary Nigerians to purchase it.
4. In order to improve timeliness of treatment, health care service facilities consequently need to be closer to the communities especially those found in the remote areas and appropriately use ACT in a well conformed manner for proper treatment of malaria cases.

5. There is need for government to organize seminar for health workers to improve their knowledge on the appropriate us of ACT for the management of malaria cases and also to positively engineer the mindset of health workers on the perceived effects of ACT.

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