



Affordability, Accessibility, and Utilization of Antimalarial Drugs in Nigeria's Niger Delta: Emphasis on Artemisinin Combination Therapy (ACT)

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

Background: Despite recommendations for artemisinin combination therapies as first-line malaria treatment, chloroquine, and other monotherapies continue to be widely used in Nigeria, primarily due to issues related to availability and affordability.

Objectives: This study aimed to assess the affordability and availability of antimalarial treatments in the Niger Delta, evaluating key factors influencing their use.

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Methods: Structured questionnaires focused on affordability and availability were distributed across six local government areas in Delta and Bayelsa States, targeting individuals and various healthcare facilities, including pharmacies, medicine stores, and hospitals. Data were analyzed using SPSS.

Results: Among the 582 respondents, 62.9% (366) were aware of ACTs; however, only 24.9% considered them affordable. Higher education attainment was positively correlated with affordability and preference for ACTs, with those holding tertiary education more likely to afford and prefer ACTs. The overall availability of ACTs was moderate, at 63.1%, but their presence in government-owned primary health centers was notably limited. As a result, there remains a strong preference for monotherapy, with only 28.9% of respondents choosing ACTs despite WHO recommendations.

Conclusion: While ACTs are moderately available, their cost limits accessibility, favoring monotherapy use over the recommended ACT treatments. Enhanced affordability and availability of ACTs are essential to improving adherence to WHO malaria treatment guidelines in the Niger Delta region.

Keywords: Artemisinin-based-combination therapy; antimalarial availability; affordability; Niger delta; healthcare accessibility.

1. INTRODUCTION

Malaria is a known endemic disease in sub-Saharan Africa, causing about 85%–90% of deaths [1,2]. Malaria is responsible for more than 25-30% of infant deaths in Nigeria [3]. The resistance of *Plasmodium falciparum* to Chloroquine has contributed substantially to malaria morbidity and mortality, hence the introduction of Artemisinin Combination Therapy (ACTs) has received great hope as a breakthrough in the treatment of malaria. Despite the change from Chloroquine and sulfadoxine-pyrimethamine to ACTs as first-line treatment for malaria, literature evidence shows that Chloroquine is still being widely used in Nigeria [4] and evidence exists that healthcare facilities in the country are yet to fully comply since chloroquine, sulfadoxine-pyrimethamine and artesunate monotherapy are still prescribed for the treatment of malaria [5]. Poverty is significantly associated with an increased risk for malaria [3] and a study has shown that poor patients are not prepared to pay the costs of ACTs [6] even though combination therapy dominates the effectiveness of monotherapy [7]. This implies that the poor lack access to appropriate malaria treatment.

Malaria may have been a human pathogen for the entire history of the species [8] and Humans may have originally caught *Plasmodium falciparum* from gorillas [9]. Malaria is caused by *Plasmodia spp*; *Plasmodium vivax* is rare in Africa where much of the black population lacks the erythrocyte cell surface receptor for infection. *P. falciparum* and *P. ovale* are the most predominant species in Africa and *P. malariae* is the least common and mildest form of malaria

[10]. In sub-Saharan Africa, malaria accounted for about 95% of all cases and 96% of deaths with about 80% of these deaths reported in children below 5 years of age [11]. In Africa, malaria is present both in rural and urban settlements though the risk is lower in larger cities [12]. Prevention of malaria can aim at either preventing infection by avoiding bites by parasite-carrying mosquitoes or prevention of the disease by using antimalarial drugs prophylactically [13]. Antimalarials are drugs taken for the treatment of chronic or acute attack or prophylaxis of malaria. They are classified based on their chemical structure and also their mode of action [14], (Ajibola, 2005). There are several classes including gametocides: primaquine, quinine, mepacrine; casual prophylactics: primaquine proguanil, pyrimethamine; sporonticides: primaquine; schizonticides: sulphonamides; blood schizonticide: quinine, mepacrine, chloroquine, artemisinin-based family, etc., [15,16,17]. Resistance has emerged to virtually all classes of antimalarials except the ACTs [18]. The choice of ACT in a country or region is based on the level of resistance of the partner medicine in the combination. In areas of multidrug resistance, artesunate-mefloquine or artemether-lumefantrine is recommended or artesunate-sulfadoxine-pyrimethamine can be used [19,20].

Affordability refers to the price of a commodity or service concerning the client's ability to pay [21]. In developing countries, most people who need medicine have to pay for them out of their own pockets. Unaffordable prices in countries [21]. The potential value of drug combinations particularly ACTs is widely acknowledged and accepted and high costs are still a major barrier

to their effective use. The unaffordable price could lead to the use of sub-optimal doses, ineffective treatment, increased chances of developing resistance, and perhaps ultimately to increase malaria death [22]. Availability refers to the physical presence of the medicine at the service delivery point [23,24]. Even when ACTs are provided free in public, non-governmental, availability in peripheral public health facilities remains a challenge [21,25].

The role of pharmacists has increased over the last decade in many countries, thus resulting in their increasing involvement in patient care and active participation in public health care programs [8]. Pharmacists should have a thorough understanding of the medical and socio-economic problems associated with the disease, including the vulnerable groups, know the various diagnostic methods, and their advantages and disadvantages, and familiarize themselves with the various national and international anti-malarial treatment guidelines and protocols [15, 26], (Midia et al., 2023). In addition, they should have in stock the recommended, good quality anti-malarial medications such as ACTs, and long-lasting ITNs, have sufficient public health care focus in their practice to fully appreciate the problem, and also be ready to provide wide-scale community-based malaria-related services [27,28,29]. The Pharmacist being a member of the healthcare team has a unique role to play in ensuring good quality antimalarial drugs are available and that they are rationally administered to patients at every level of health care [30]. The study aimed to assess the availability and affordability status of antimalarial especially the first-line treatment drugs in the Niger Delta region.

2. METHODOLOGY

2.1 Study Area

The study was conducted in selected local government areas (LGAs) of Bayelsa and Delta states. For Bayelsa State, Southern Ijaw LGA, Sagbama, and Yenagoa LGAs were selected, while Delta State, Udu, Uvwie, and Ughelli North local government areas were selected, respectively.

2.2 Study Design and Data Collection Instrument

A descriptive-cross-sectional study design was used in this research. A well-structured study questionnaire was prepared for the affordability and availability of antimalarial drugs. The

affordability component was a descriptive cross-sectional survey to determine levels of affordability in selected local government areas in Delta and Bayelsa States. The study includes administering a structured questionnaire to respondents to collect data on the affordability of antimalarial medications. The questionnaire utilized for this investigation included demographic questions. A total of 600 questionnaires were administered in the two states, but only 582 were retrieved, having a percentage response rate of 97%. The questionnaires were intended for patent medicine stores, community pharmacies, and primary, secondary, and tertiary health centers and were disseminated throughout the states in the specified LGA. The surveys included a list of antimalarial medications, as well as information about their availability and pricing. The respondents were asked to rate availability (YES/NO) and include the price for each medicine. The cost of malaria prevention (the cost of insecticide-treated bed nets, or ITNs) and malaria parasite tests were also considered.

2.3 Sample Size

A sample size of 300 respondents was drawn from the 3 LGAs in Delta State, while 283 respondents were obtained from Bayelsa State, making a total of 582 respondents. Inclusion criteria were those respondents who have had malaria and had bought antimalarial drugs, age brackets of 16 years and above, and those who gave their informed consents. Each respondent was given enough time to fill the questionnaires and non-educated respondents were helped to fill the questionnaires based on their answers to the questions they were asked.

3. RESULTS

3.1 Demographics

All the respondents interviewed were 582 and were between the ages of 16 to >60 years of age. About 47.9% of the respondents were students, 22.9% (133) were civil servants 18.9% (110) were traders, and 10.3% (60) engaged in other activities. Also, 62.2% (362) had tertiary education, 28% (163) secondary, 6.7% (39) had primary education, and 3.1% (18) had no formal education. 59.6% (347) were single 33.7% (196) married 1.2% (7) divorced and 5.5% (32) separated. 11.2% (65) of the respondents were pregnant. This is depicted in Table 1. Appropriate treatment-seeking behavior about malaria was high; 84% (489) of the respondents claimed they treated malaria using the orthodox method.

3.2 Antimalarial Affordability

About 62.9% (366) of the respondents knew about ACTs, 24.9% knew about ACTs as very affordable and 23% indicated unaffordability. 36.6% (213) of the respondents earn between NGN 5000 – NGN 10,000 and only 2.4% earn >NGN100,000 monthly. 19.4% (113) were willing to spend NGN 2000 for the treatment of malaria for a child under 5 years of age and adults, 21.8% (127). Then, 38% (221) were willing to spend NGN1000 for the treatment of malaria for a child under 5, and 33.2% (193) could pay NGN1000 for the treatment of an adult. About 32.3% (188) were willing to spend NGN1000 for the prevention of malaria for a child under 5 years of age and adult, 30.1% (175). Three factors that majorly dictated the choice of antimalarials by patients are cost (29.2%), availability (21.5%), and drug efficacy (37.5%). It was observed that 314 respondents with tertiary education preferred to use the orthodox method in treating malaria and only 31 persons

with primary education preferred to use the orthodox. The affordability of ACTs was highest in people with tertiary education and then people with tertiary education were seen to earn the most. The results also showed that 50 and 63 persons can willingly spend NGN2000 for treatment of malaria in under-fives in Delta State and Bayelsa respectively. Then 101 and 92 persons can spend NGN1000 for the treatment of malaria in adults in Delta and Bayelsa respectively. 74 respondents in Delta and 66 persons in Bayelsa prefer artesunate malaria while 68 persons in Delta and 100 persons in Bayelsa prefer ACTs in treating malaria. Also, it was seen from the result that 213 respondents earn within NGN5000-NGN10,000 and only 36.3%T (77) of this individual prefer chloroquine as drug choice for treatment of malaria. Furthermore, 22 respondents were seen to earn between NGN51,000–NGN100,000 and 59.1% (13) of this group of individuals tend to prefer ACT drug choice malaria.

Table 1. Participants demographic data

Variables		Frequency (N)	Percentage (%)
Sex	Male	256	44
	Female	326	56
Age (years)	16-25years	240	41.2
	26-40years	251	43.1
	41-60	76	13.1
	>60 years	15	2.6
Occupation	Student	279	47.9
	Civil servant	133	22.9
	Trader	110	18.9
	Other	60	10.3
Level of Education	Primary	39	6.7
	Secondary	163	28
	Tertiary	362	62.2
	None	18	3.1
State origin & LGA	Delta state	300	51.5
	Udu	100	17.2
	Ughelli North	100	17.2
	Uvwie	100	17.2
	Bayelsa state	282	48.5
	Southern Ijaw	100	17.2
	Sagbama	82	14.1
	Yenagoa	100	17.2
Marital Status	Single	347	59.6
	Married	196	33.7
	Separated	32	5.5
	Divorced	7	1.2
Pregnancy Status	Positive	65	11.2
	Negative	243	41.8
	Not applicable	247	47

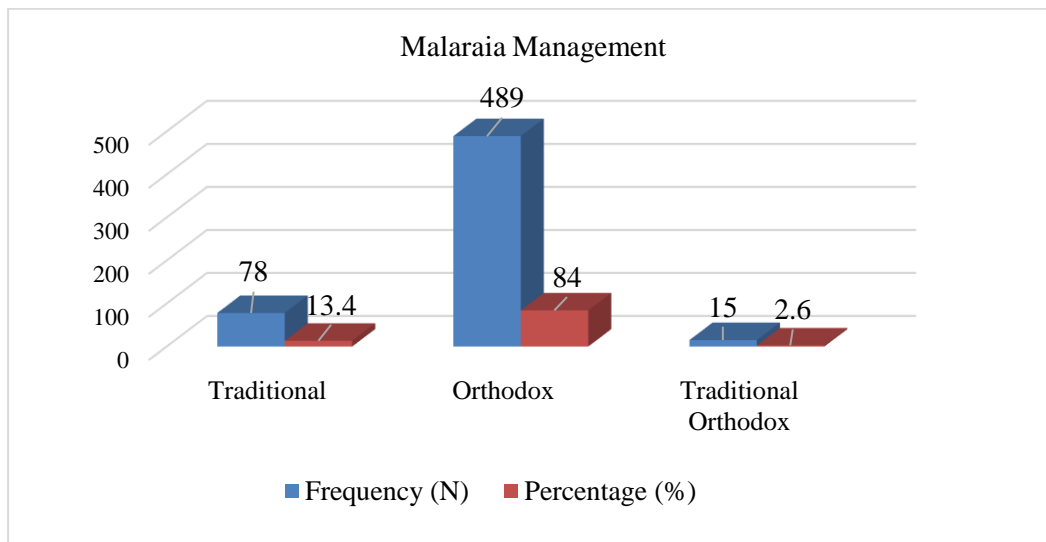


Fig. 1. Malaria treatment pattern

Table 2. The reason behind the use of traditional treatment patterns, perception of availability & affordability of ACTs

Variables		Frequency (N)	Percentage (%)
Why traditional treatment?	More cost-effective	60	10.3
	Less side effect	26	4.5
	Not applicable	468	80.4
	More efficacious	21	3.6
	Because of faking of orthodox medicine	4	0.7
	Unavailability of orthodox drugs	2	0.5
Perception of availability	Always available	144	24.7
	Frequently available	156	26.8
	Rarely available	68	11.7
	Don't know	212	36.4
	Never available	2	0.3
Perception of affordability	Very affordable	91	15.6
	Somewhat available	193	33.2
	Not affordable	84	14.4
	Don't know	214	36.8

Table 3. The amount respondents can spend willingly for treatment and prevention of a child <5 years and an adult

Amount (NGN)	Prevention of a child <5 years (n) (%)	Prevention in an adult (n) (%)	Treatment of a child <5 years (n) (%)	Treatment of an adult (n) (%)
2000	83 (14.3)	91 (15.6)	113 (19.4)	127 (21.8)
1000	188 (32.3)	175 (30.1)	221 (38)	193 (33.2)
800	83 (14.3)	103 (17.7)	52 (8.9)	80 (13.7)
500	147 (25.3)	129 (22.2)	138 (23.7)	115 (19.8)
400	34 (5.8)	31 (5.3)	22 (3.8)	31 (5.8)
300	20 (3.4)	20 (3.4)	13 (2.2)	11 (1.9)
200	17 (2.9)	20 (3.4)	12 (2.1)	14 (2.4)
100	10 (1.7)	13 (2.2)	11 (1.9)	11 (1.9)

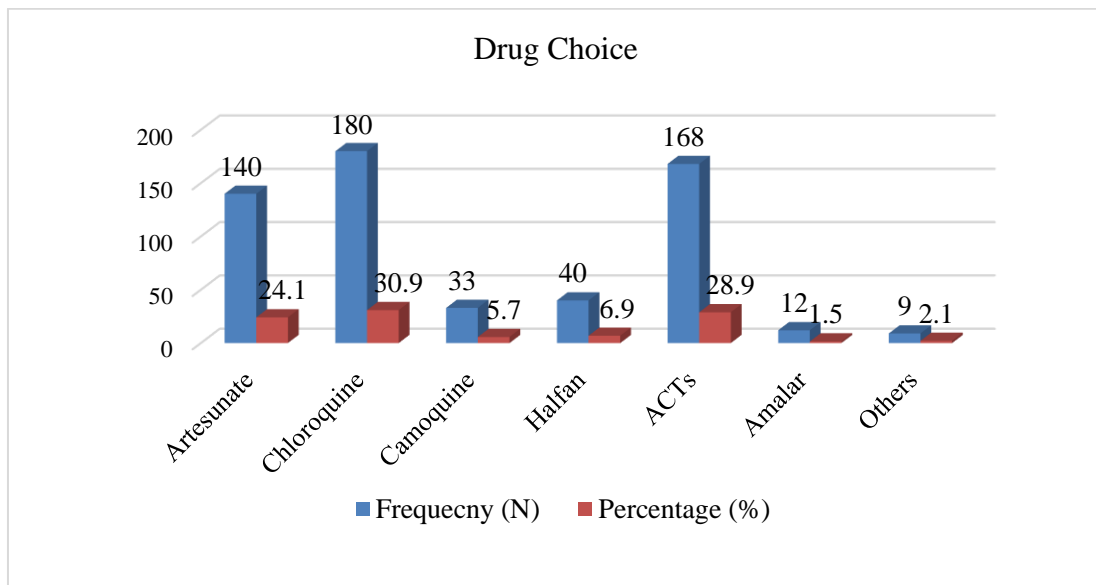


Fig. 2. Respondent's Drug of Choice

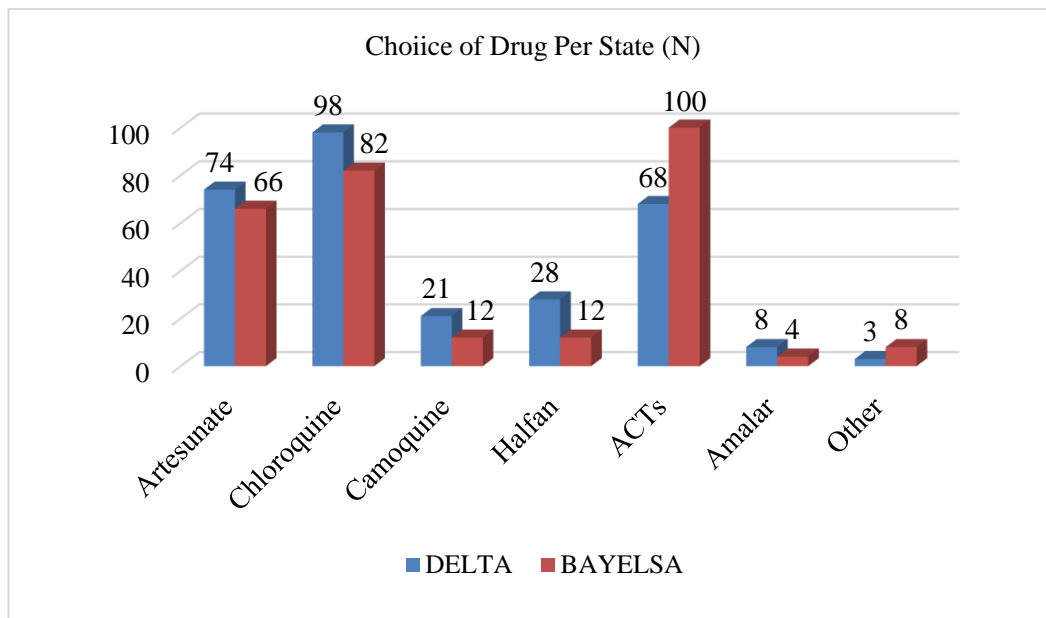


Fig. 3. Respondent's drug preference vs state of origin

3.3 Availability of Antimalarial

Patient medicine stores were more common than hospitals and even pharmacies as indicated in the study. It was seen that only 24.6% (16) use fans, refrigerators, and air conditioners to improve the convenience status of the premise as well as storage Condition. Also, pharmacists had the highest frequency as dispensers (35.4%) followed by nurses (30.8%), which is fairly good. 50.8% (23) of the facilities surveyed had insecticide-impregnated bed nets available and 35.4% (23) did not have them. Only 9.2% (6)

facilities had ITNs free of charge to all patients. For 13.8% (9) of the facilities surveyed that had nets, the cost was between NGN501- NGN1000, and only 3.2% (2) facilities sold for less than NGN500. The result for availability of ACTs shows that ACTs are overtly available as Artemether -Lumefantrine had 90.8% Artesunate Amodiaquine had 63.1% Artesunate Mefloquine had 43.1%. However, the cost ranges from NGN500.00 to NGN1500.00. Also, antimalarial monotherapy drugs were seen to have a higher availability profile as well only that are much more affordable than ACTs between <NGN50 as

in chloroquine to NGN300 for artesunate and also sulfadoxine-pyrimethamine (SP). Lastly, it was observed that malaria parasite test was conducted in 12 pharmacies and 3 secondary health centers. The cost ranges from NGN300-NGN500. Only in the primary health center of the facility was the malaria parasite test conducted for free. The four primary health facilities visited in Delta State had no drug

in stock for sale to patients. Health workers only diagnose and send patients to buy drugs from outside. The cost of drugs was seen to be slightly higher in pharmacy shops than in other facilities, and drugs cost little or nothing in primary health centers only that they are rarely available. From the results obtained, there is no significant difference in the prices of ACTs in both states.

Table 4. Reasons behind the drug choice and preferred place of drug purchase

Variables		Frequency (N)	Percentage (%)
Reasons behind the drug choice	Costs	170	29.2
	Always Available	125	21.5
	Less Side Effect	65	11.2
	Efficacy	218	37.5
	Others	1	0.2
	Not Applicable	3	0.5
Preferred place of drug purchase	Pharmacy	311	53.4
	Chemist	224	38.5
	Market	8	1.4
	Hawkers	7	1.2
	Hospital	26	4.5
	Not applicable	6	1.0

Table 5. Comparative analysis: how much respondents are willing to pay for treatment and prevention for a child and an adult in both states

Amount	T <5 DE	T <5 BY	P <5 DE	P <5 BY	T Adult DE	T Adult BY	P Adult DE	P Adult BY
2000	50	65	27	56	52	75	40	51
1000	104	117	84	104	101	92	94	81
800	24	28	43	40	44	36	55	48
500	86	52	94	53	66	49	67	62
400	15	7	24	10	16	15	15	16
300	8	5	14	6	6	5	13	7
200	6	6	8	9	8	6	9	11
100	7	4	6	4	7	4	7	6

T-Treatment, P-Prevention, BY – Bayelsa, DE – Delta, <5 – less than 5 years

Table 6. Comparative analysis: treatment pattern, monthly salary, etc., to their educational status

Variables: Educational level→	Primary	Secondary	Tertiary	None
How Respondents Treat Malaria	Orthodox	133	314	11
	Traditional	27	38	7
	Orthodox Traditional	3	10	0
Affordability	Very Affordability	5	25	59
	Somewhat Affordable	6	35	149
	Not Affordable	2	34	48
	Don't Know	26	69	106
Monthly Income (NGN)	5000-10000	10	68	30
	11000-20000	19	40	100
	21000-40000	2	20	60
	41000-50000	4	19	31
	51000-100000	1	4	15
	>100000	1	1	12

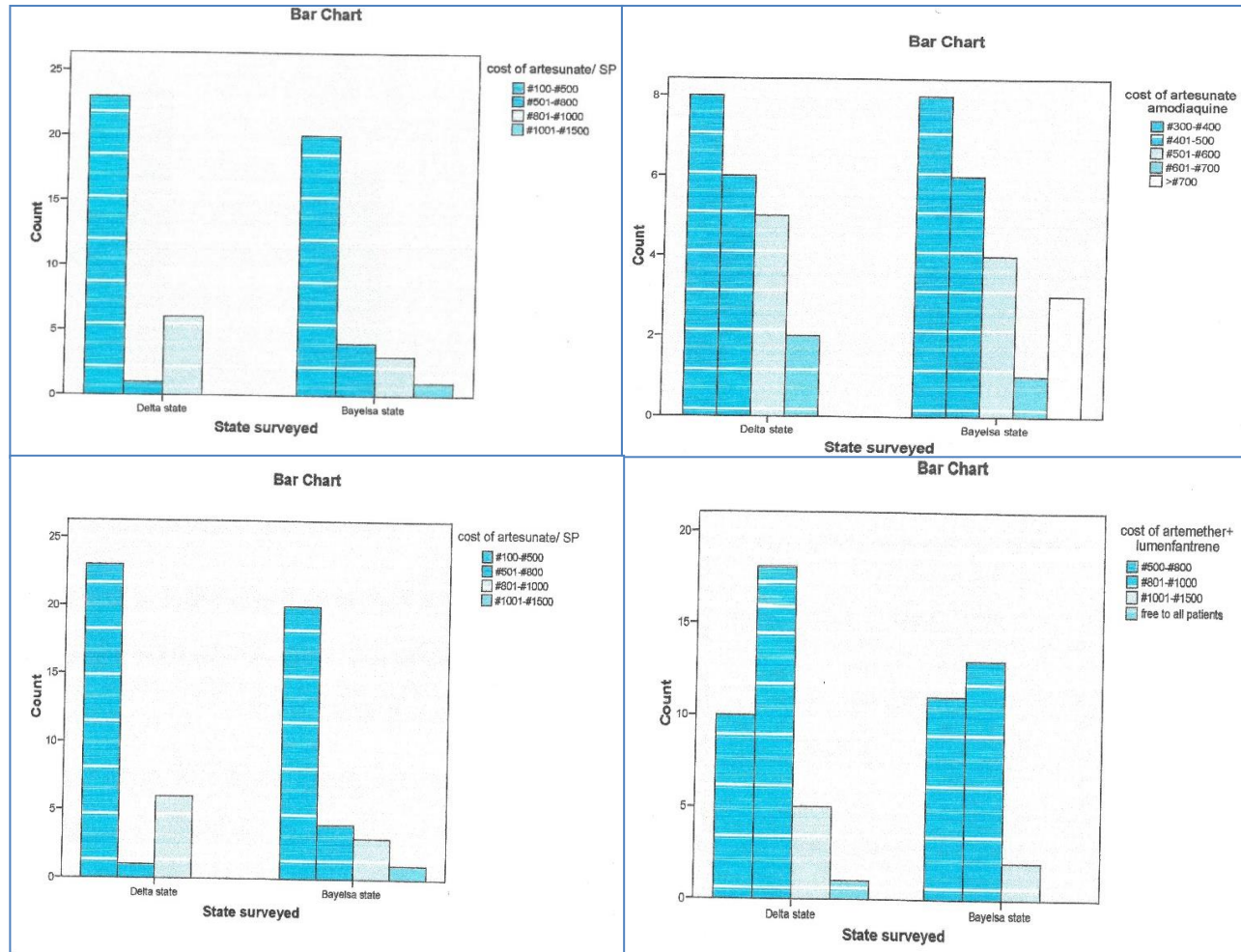


Fig. 4. Comparative analysis of the cost-effectiveness of antimalarial among the two states

Table 7. Facility status

Variables		Frequency (N)	Percentage (%)
Facility	Patent medicine store	34	52.3
	Pharmacy	26	40
	Primary health center	1	1.5
	Secondary health center	4	6.2
Registration status of pharmacy	Yes	29	44.6
	No	1	1.5
	Not applicable	35	53.8
Storage condition/convenience	Fan	26	40
	Air conditioner	7	10.8
	Refrigerator	8	12.3
	Fan air conditioner	1	1.5
	Fan air conditioner refrigerator	16	24.6
	Fan refrigerator	4	6.2
	Air conditioner & refrigerator	1	1.5
	None	2	3.1
Dispenser	Pharmacist	23	35.4
	Sales attendant	15	23.1
	Nurse	20	30.8
	Others	3	4.6
	Pharmacist and Nurse	2	3.1
	Pharmacist, Nurse, and Sales attendant	2	3.1
Availability of ITNs	Yes	33	50.8
	No	23	35.4
	Not applicable	9	13.8
Is ITN free to all patients?	Yes	6	9.2
	No	32	49.2
	Not applicable	27	41.5
Cost of bed net (NGN)	<500	2	3.1
	501-1000	9	13.8
	1001-1500	7	10.8
	1501-2000	5	7.7
	2001-3000	1	1.5
	>3000	1	1.5
	Not applicable	40	61.5
Location of facility	Delta State	37	56.9
	Bayelsa State	28	43.1

Table 8. Availability of antimalarials

Availability and % availability of antimalarials		
Antimalarials/test	Available N (%)	Not available N (%)
Artesunate + Amodiaquine	41(63.1)	24(36.9)
Amodiaquine + Dihydroartemisinin	10(15.4)	55(84.6)
Artemether + Lumefantrine	59(90.8)	6(9.2)
Artesunate + Mefloquine	28(43.1)	37(56.9)
Amodiaquine	49(75.4)	16(24.6)
Artemether	46(70.8)	29(29.2)
Artesunate + Sulfadoxine/Pyrimethamine	58(89.2)	7(10.8)
Artesunate	59(90.8)	6(9.2)
Chlorproguanil + Dapsone	10(15.4)	55(84.6)
Chloroquine	52(80)	13(20)
Dihydroartemisinin	47(36.9)	18(27.7)
Dihydroartemisinin +Piperazine + Trimethoprim	24(15.4)	41(63.1)
Halofantrine	48(73.8)	17(26.2)
Mefloquine	10(15.4)	55(84.6)
Malaria Parasite Test	26(40)	39(60)
Proguanil	38(58.5)	27(41.5)
Primaquine	16(24.6)	49(75.4)
Pyrimethamine	32(49.2)	33(50.8)
Quinine	54(83.1)	11(16.9)
Sulfadoxine/Pyrimethamine	63(96.9)	2(3.1)
Sulfamethopyrazine+Pyrimethamine	24(36.9)	41(63.1)
Sulfamethopyrazine+Pyrimethamine	17(26.2)	48(73.8)

Table 9. Cost of antimalarials

Name of Antimalarial	Cost (NGN)						
	<100-200 N (%)	201-400 N (%)	401-600 N (%)	601-800 N (%)	801-1000 N (%)	1001-1500 N (%)	>1500 N (%)
Amodiaquine	39(60)	6(9.3)	5(7.7)	-	-	-	-
Artesunate+Amodiaquine	-	16(24.6)	21(32.3)	3(4.6)	3(4.6)	-	-
Artemether+ Lumefantrine	-	-	-	21(32.3)	31(47.7)	7(10.8)	-
Artesunate/SP	-	43(66.2)	-	5(7.7)	9(13.8)	1(1.5)	-
Artemether	-	-	9(13.8)	15(23.1)	-	11(16.9)	10(15.4)
Artesunate	-	25(69.2)	3(16.9)	6(4.6)	-	-	-
Artesunate +Mefloquine	-	1(1.5)	-	11(16.9)	-	16(25.0)	-
Chloroquine	34(52.2)	18(27.7)	-	-	-	-	-
Chlorproguanil +Dapsone	-	6(9.2)	-	-	4(6.2)	-	-
Dihydroartemisinin	-	-	-	42(64.6)	-	3(4.6)	-
Dihydroartemisinin + Piperazine +Trimethoprim	-	10(15.4)	-	-	14(21.5)	-	-
Amodiaquine + Dihydroartemisinin	-	-	-	4(6.2)	5(7.7)	-	-
Halofantrine	-	-	-	8(12.3)	9(13.8)	30(46.2)	1(1.5)
Mefloquine	-	-	-	5(7.7)	7(10.8)	-	-
Primaquine	-	-	10(15.4)	-	6(9.2)	-	-
Proguanil	-	-	12(18.5)	-	3(4.6)	23(35.4)	-
Pyrimethamine	32(49.2)	-	-	-	-	-	-
Sulfadoxine + Pyrimethamine	16(24.6)	45(69.2)	-	2(3.1)	-	-	-
SP+Mefloquine	-	20(30.8)	-	6(9.2)	-	-	-
Sulfamethopyrazine+Pyrimethamine	8(12.3)	10(15.4)	-	-	-	-	-
Malaria parasite Test	-	9(13.8)	14(21.5)	1(1.5)	1(1.5)	-	-
Quinine	-	33(50.7)	21(32.3)	-	-	-	-

Table 10. Comparative analysis of availability & cost of antimalarial in different facilities

Variables		Patent Medicine Store	Pharmacy	Primary Health Center	Secondary Health Center
Availability	Yes	13	16	1	3
	No	21	10	0	1
Is it free to patients?	Yes	4	0	1	1
	No	30	16	0	3
What's the Cost? (NGN)	<500	2	0	0	0
	501-1000	3	6	0	0
	1001-1500	1	5	0	1
	1501-2000	0	5	0	0
	2501-3000	1	0	0	0
	>3000	1	0	0	0
Availability Status of Drug (N)		Patent Medicine Store	Pharmacy	Primary Health Center	Secondary Health Center
Artemether + Lumefantrine	Yes	30	24	1	4
	No	4	2	0	0
Artesunate+ Mefloquine	Yes	10	16	0	2
	No	24	10	1	2
Artesunate+ SP	Yes	30	25	0	3
	No	4	1	1	1
Artesunate + Amodiaquine	Yes	20	19	0	2
	No	14	17	1	2

Table 11. Comparative cost of ACTs in different facilities

Cost of Drugs (NGN)		Patent Medicine Store	Pharmacy	Primary Health Center	Secondary Health Center
Artemether + Lumefantrine	500-800	13	7	0	1
	801-1000	13	15	0	3
	1001-1500	5	2	0	0
Artesunate + Amodiaquine	300-400	13	2	0	1
	401-500	5	6	0	1
	501-600	3	6	0	0
	601-700	1	2	0	0
	>700	0	3	0	2
Artesunate + SP	100-500	25	17	0	1
	501-800	2	2	0	1
	801-1000	3	5	0	1
	1001-1500	0	1	0	0
Artesunate + Mefloquine	>500	1	0	0	0
	501-1000	4	6	0	1
	1001-1200	4	9	0	1
	1201-1500	1	1	0	0

4. DISCUSSION

The affordability analysis showed that the poor will have difficulty and may not be so willing to pay for their antimalarial medicines (ACTs). This is consistent with a study conducted in Benin City, Nigeria, which revealed that first-line antimalarial drugs are not cost-effective to the majority of the people who live in poverty, as the least paid government employee must work for 5.53 to 10.38 days before they can pay for one full dose of artemether/lumefantrine tablet, which is the recommended first-line anti-malarial drug in the national malaria treatment policy [31]. Another research on the perception of healthcare providers towards chloroquine and ACTs showed that though respondents (pharmacist and doctor) preferred ACTs to chloroquine they did not believe that the ACTs were affordable to their patients [32]. This lack of affordability will hurt drug compliance and reduction in malaria morbidity and mortality will not be achieved. Antimalarial drugs were seen to be less affordable in private pharmacies than in other facilities. This seems to imply that dispensers are making up their drugs excessively to make a larger profit. This is in line with a study carried out in Kenya which showed in some settings patients pay less at medicine stores than in other facilities to obtain a drug [33]. This tendency of increased profits could lead to irrational drug use has been reported in Zimbabwe where a desire to increase income was associated with less clinically and economically appropriate prescribing [34]. The results suggest that individuals are prepared to spend the same amount of money, if not more, on malaria prevention and treatment for both children under the age of five and adults. This describes the popular adage "prevention is better than cure." However, there are numerous and unquantifiable costs connected with malarial disease, such as the cost of pain and suffering, time spent in the hospital, and, most crucially, the cost of absenteeism from work owing to illness.

This study also showed that ACTs are fairly available however less available in primary health centers. This is in line with a study in Kenya that showed that a quarter of public health facilities had none of the nationally recommended ACT treatment in stock and three-quarters lacked the full range of weight-specific packs required [25]. Meanwhile, modern medicine relies heavily on drugs as the main tool of therapeutics. Other therapeutic procedures such as diet surgery exercise etc are also important of course as deliberate non-

intervention but none is so widely applied as drug-based therapeutics [35]. Malaria is a major cause of death and illness in children and adults especially in tropical countries [36], preventive measures like the availability of insecticide-impregnated bed nets ought to be readily available and distributed for free for every household in the country done in Ethiopia (Andualem, 2007).

Also, WHO guidelines emphasize testing malaria with RDTs or microscopy before treating it (evidence-based recommendation) [36]. As a result, pharmaceutical vendors should be taught in RDTs to minimize ACTs expenses in cases where malaria parasites are not involved and to protect ACTs from resistance by assuring their reasonable usage [37,38]. RDTs (RAPID DIAGNOSTIC TEST) detects plasmodium-specific antigens in a finger-prick blood sample using immunochromatographic methods and can be performed by anybody with minimum training [39]. Reducing multiple taxes levied by the state and local governments, as well as price regulation, may help to lower medicine prices in Nigeria [40-42]. Drug prices in private facilities must be controlled and monitored to remain below reasonable limits. Furthermore, the government must raise minimum earnings above what they now are so that the poor can be buoyant enough to afford antimalarial drugs [31].

5. CONCLUSION

When compared to antimalarial monotherapy medications, ACTs are more expensive for the vast majority of poor people. Also, ACTs have not acquired traction as the first line of malaria treatment in the two states surveyed, as a large portion of the population has yet to learn about them. Furthermore, malaria management is suboptimal, as shown by a strong predilection for antimalarial monotherapy. Finally, ACTs are reasonably available, but the cost makes them inaccessible. It is pertinent to note that, the unavailability or restricted access to essential medicines like antimalarial in rural communities will pose a threat to the general public and therefore become a public health concern as it will negatively impact on health of the community. Therefore, the government and policymakers, as well as healthcare providers, should collaborate and enhance ACTs' accessibility and affordability by strengthening the drug revolving funds, increasing the coverage of health insurance schemes, and engaging in community health advocacy programs.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

CONSENT

As per international standards or university standards, respondents' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

The study was approved by the research and ethic committee of the Faculty of Pharmacy, Niger Delta University, Bayelsa State, Nigeria. Data retrieved from the study were analyzed with SPSS software utilizing ANOVA and simple descriptive statistics.

COMPETING INTERESTS

Authors have declared that they have no known competing financial interests or non-financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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