The Bioscientist Vol. 11 (2): 114-127, April 2023
Available online at *http://www.bioscientistjournal.com*



Full Length Research Paper

KNOWLEDGE, ATTITUDES AND PRACTICES REGARDING HERBAL REMEDIES FOR MALARIA IN RURAL COMMUNITIES IN AWKA, ANAMBRA STATE.

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ABSTRACT

Use of herbal malaria remedies has increased globally. Knowledge of malaria and available treatment options at community level is paramount for successful sustainable malaria interventions but this has,most times, been overlooked. Across-sectional study onknowledge, attitudes and practices (KAP) regarding herbal remedies for malaria was done in six rural communities at Awka, Nigeria between October and December 2022. Structured open-ended questionnaires elicited information on demographics andKAPof 200 respondents regardingherbal malaria remedies. Data were analysed with descriptive statisticswhile Friedman test ranked variables at $P<0.05$ confidence interval. About 99% of respondents were aware of malaria andsuffered it; 60% experienced headache, fever (40%), cold (38%), body pain (28%), vomiting (23%), and nausea (18%). About32%hadtwo episodesin a year.Almost 91% preferred orthodox drugs while 18% went forherbal remedies prepared mostly with leaves of *Azadirachta indica*, *Cymbopogon citratus*, and *Carica papaya*plants. Gender, age, and educational level of respondents did not significantly ($P>0.05$) influence KApregarding malaria and its herbal remedies.Public enlightenment on safe preparation, handling, storage, intake and regulation of herbal malaria drugs willenhance their efficacy and reduce associated potential risks.

Keywords: KAP, malaria herbs, rural community, Awka Nigeria

INTRODUCTION

The world populations mostly residents in the tropical and sub-tropical regions are at risk of malaria, a disease which is endemic in most countries and a major cause of mortality and morbidity, with a global estimated burden of 247 million cases in 2021(WHO, 2022).Report have shown that Sub-Saharan Africa bears the majormalaria burden, with about 234 million cases (95%) and 593,000 deaths (96%) in 2021. The risk for malaria has increased tremendously in Nigeria due to proliferation of mosquitoes in the country and Nigeria alone accounts for 26.6% and 31.3% of all cases and deaths due to malaria, withchildren and

pregnant women being the most vulnerable(WHO,2022).

There are numerous orthodox drugs such as chloroquine, mefloquine, quinine, Artemisinin-based combination therapy (ACT), intravenous artesunate and ACT that have been effectively used in the treatment of malaria for decades in the developing countries(Ezihe*et al*., 2019;Chude*et al*., 2022). However, high cost of malaria treatment using these orthodox drugs, lack of access to health facilities coupled with the issues of drug resistance have compelled a sizable number of poor masses in these endemic countries such as Nigeria, Ghana, Kenya and other African countries to depend on traditional practitioners and medicinal plants for the treatment of malaria (Uzochukwu*et al*., 2018; Konlan*et al*., 2019).

World Health Organization estimates that 80% of the world population especially in the developing countries uses herbal medicine as the initial source of healthcare (WHO, 2008, Lu and Lu, 2014).

In most of these poorendemic countries, the healthcare system is usually maintained and sustained by alternative indigenous practices and often gained popularity for historical and cultural reasons (Adera, 2003; WHO, 2004). This is known to emanate from the belief that conventional orthodox medicine for the treatment of malaria is failing and not widespread (Ekor, 2013). Further reports have shown that one-fifth of patients from most endemic countries use indigenous herbal remedies to treat malaria and often, these have been found to be effective as the herbs are taken whole without distortion on their active components (Chude*et al*., 2022). Among these herbal remedies used for treatment of malaria, the following have been noted based on their efficacy and frequency of use. They are *Moringaoleifera, Sarcocephaluslalifoli us* and *Cassia sieberiana,Bambusa vulgaris* Schrad. ExJ.C. Wendl. (Poaceae), *Deinboll iapinnata*Schum&Thonn. (Sapindaceae), *E laeisguineensis* Jacq. (Arecaceae), *Greenwayodendron p*. (Annonaceae) *and Solanum torvum*Sw (Solanaceae), *Morinda lucida* Benth, *Indigofera sp. and Nauclealatifolia*SMA (Asase*et al*., 2009). There is also belief that these herbs work better when used in combination (Che *et al*., 2013). A good example of such "herbal combo"is one made from garlic (*Allium sativum*), ginger (*Zingiber officinale*), onions (*Allium cepa*), scent leaf (*Ocimum gratissimum*), lemon grass (*Cymbopogon citratus*), unripe pawpaw (*Carica papaya*), lime/lemon (*Citrus aurantiifolia*), African pepper (*Piper guineense*), clove (*Syzygium aromaticum*), and West African Black (*Piper nigrum*) reported to beused by the inhabitants of most Nigerian communities (Muanya, 2019). The combo has been effectively used to treat malaria and typhoid (Muanya, 2019). Adebayo and Krettli (2011) reviewed antimalarial drug efficacy of 102 Nigerian plants, their geographical location, phytochemical composition, extraction method, active components, route and mode of administration.

Community Perception, awareness, and beliefs about malaria and available treatment options have had significant influence on the efforts geared towards providing effective management strategies for malaria(Adera, 2003;Agyepong, 1992).Also, understanding who already knows about malaria, available treatment options and indigenous practices is a necessary indicator to identifying and targeting vulnerable populations and ensuring successful implementation and sustainability of malaria control efforts (Adongo*et al*., 2005)

Studies on knowledge, attitudes and practices (KAP) relating to malaria

have been done in different parts of the world (Kyawtt-swe and Pearson, 2004; Tyagi *et al*., 2005; Ekwunife*et al*., 2012; Singh *et al*., 2014) but most of these studies indicate that misconceptions concerning malaria still exist, and that treatmentsoptions for malaria have been unsatisfactory (Kyawtt-swe and Pearson, 2004).

The present community survey was conducted to determine knowledge, attitudes and practices regarding herbal remedies for malaria in rural communities at Awka, Anambra State, South-East Nigeria.

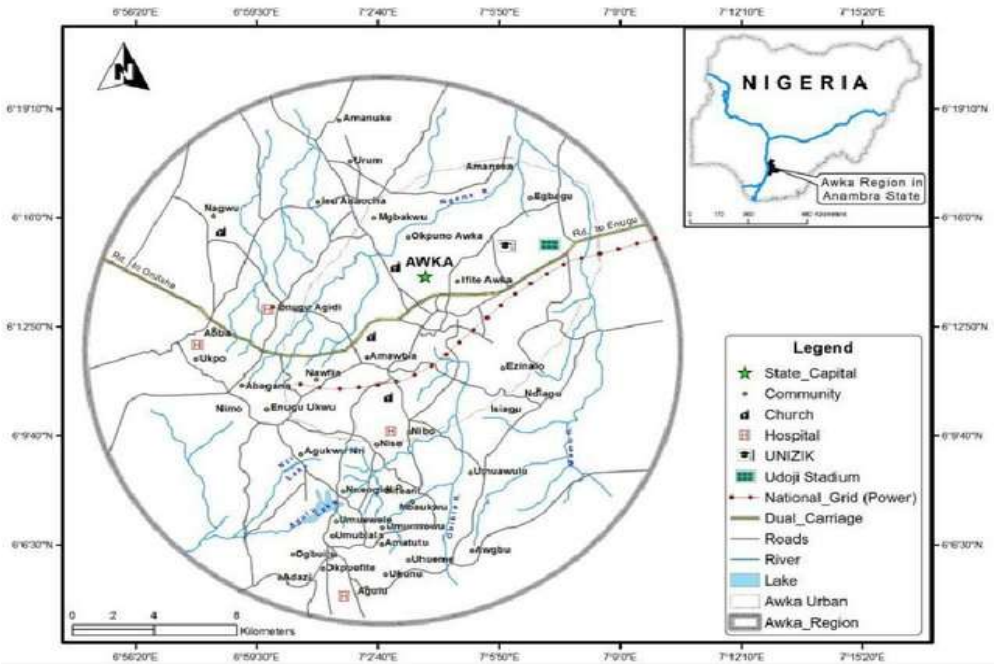


Figure 1: The map of the study area, Awka Anambra State Nigeria (adopted from Ezeabasili *et al*., 2015)

MATERIALS AND METHODS

Study Area

The study was carried out in Awka (Figure 1)from October to December, 2022. Awka comprises seven Igbo groups sharing common blood lineage. This group is divided into the following two sections: the Ifite section and the senior section. They collectively comprises four groups: Ayom-na-Okpala, Nkwelle, Amachalla and Ifite-Oka. The Ezinator section consists of three groups, namely Amikwo, Ezi-Oka and Agulu. Each of these groups has a number of villages, altogether spanning 33 in Awka. Out of each of these group six villages namely,Amaenyi, Umuanaga, Umuogbunu,Obunagu, Amikwo and IfiteAwkain Awka South LGA Anambra State were selected. Anambra is one of the states in the South-east Nigeria,located at latitude 6º16’32.76”N and longitude 7º0’24.62”E. The state capital isAwka located within the coordinates of 6º12’37.9008”N and longitude 7º4’20.1972”E with the estimated population of over 2.5 million as of 2018 estimate, and is the largest city in the state(Amy McKenna, 2021). The city hosts two universities, which are NnamdiAzikiwe University and Paul University.Awka, like most towns in Nigeria, is in the tropical rain forest zone with two seasonal climatic conditions: the rainy season and the dry season, with short spell of Harmattan. The dry season starts from December to February while the rainy season starts from March to November. Harmattan starts from end of November to mid-March. The mean annual rainfall ranges from

1639.40mm to 3863.40mm, temperature of 28.99ºCand relative humidity is over 85%. The warm humid climate and topography of Awka create conducive environment for mosquito breeding and proliferation. The land is considerably fertile and such agricultural products like cassava (*Manihot esculenta*, yam (*Dioscorea* spp), plantain (*Musa* spp), cocoyam (*Colocasia esculenta*), banana fruits (*Musa sapientum*) and vegetables, which have implications on vector population, are readily cultivated for local consumption.

Study Design

The study is a community based descriptive cross-sectional study that targeted all the persons living in six villagesof Amaenyi, Umuanaga, Umuogbunu, Obunagu, Amikwo and IfiteAwkaat the time of study in Awka communityof Anambra Sate. Information was obtained using pre-tested structured close-ended questionnaires administered to the community members. The questionnaireelicited information onidentification; respondents'demographics and their knowledge, attitudes, and practices regarding herbal remedies for malaria. Questionnaire was satisfactorily explained to the respondents in their local dialect by the researchers who also guided those that could neither read nor write

Sample Size and its demographic categories

The sample size was determined using the formula for determining finite population: $n = N/(1+N (e)^2$ where n is the sample size, N is the population under study, e is the margin error (0.05) (Taro Yamane, 1967). Using the projectedpopulation of 2.5 million peoplefor Awka (NPC, 2020);n = 2500, 000/1+2500, 000 $(0.05)^2$ = 399.9 approximately 400. Out of this number, two hundred (200) participants (from six villages out of thirty-three) were randomly selected for interviews using standardized questionnaire.Demographic distributions of respondents were as follows:

Demographics	Categories	Total	
		No.	%
Gender	Male	81	40.5
	Female	119	59.5
Age (y)	< 20	23	11.5
	21 – 30	56	28.0
	31 – 40	68	34.0
	41 – 50	32	16.0
	51 – 60	21	10.5
Marital status	Single	94	47.0
	Married	100	50.0
	Divorced	6	3.0
Educational background	Informal	14	7.0
	Primary	10	5.0
	Secondary	86	43.0
	Tertiary	90	45.0
Religious Faith	Christians	174	87.0
	Muslims	1	0.5
	ATR	2	1.0
	No response	23	11.5
	Total	**200**	**100.0**

Ethical Clearance

Informed consent was obtained from the each of the seven Village Heads and discussions held with them and members of their respective Village Council. At these advocacy meetings, the research objectives and methodology were explained in details. With their cooperation, community members were subsequently sensitized and mobilized for the study.

Data Analysis

Quantitative data from completed structured questionnaires were checked manually by the researchers for consistency, completeness and appropriate responses before coding the data. Data wereanalysed using SPSS Version 22.0 for Windows (SPSS Inc, Chicago, ILL, USA) and means separated using Friedman Test for P-value at 0.05 level of confidence.

RESULTS AND DISCUSSIONS

Knowledge of malaria by respondents

About 99% of the respondentswere aware of malariaas an illness, called 'Odanwu'or'Iba' in local parlance. 'Iba' is significantly more commonly used (99.4%) than 'Odanwu' (0.6%) in referring to malaria (Table 1). 'Iba' has earlier been reported as a local name for malaria in an earlier study elsewhere in Anambra State Obiukwu*et al.* (2011).

On the number of malaria episodes experienced in a year, responses ranged from one to four, with majority (32.0%) having it twice a year (Table 2). This is similar to the official estimates of WHO and UNICEF (2003), which suggested a likelihood of up to four bouts of malaria episodes of per person per year on the average. This finding points to the fact that malaria could be of great public health importance in Awka where a person experiences at least one episode per year. Moreover, Nigeria has been reported to account for one-quarter of the burden of malaria in Sub-Saharan Africa (WHO, 2019).

Table 1: Knowledge of malaria among respondents (n=200)

Questions	Response (%)	Mean ±se	P-value
Aware of malaria	Yes	99.1 ± 0.6^{a}	0.0000
	No	0.3 ± 0.3^{b}	
Local name for malaria	Iba	99.4 ± 0.6^{a}	0.0000
	Odanwu	0.6 ± 0.6^{b}	
Ever experienced malaria?	Yes	99.4 ± 0.6^{a}	0.0000
	No	0.6 ± 0.6^{b}	

***Similar lettersin superscripts are significantly different**

Table 2: Malaria episodes among respondents (n=200)

Questions	Responses (%)	Mean ±se	P-value
Malaria episodes per year?	Once	18.4 ± 4.4^{a}	0.045
	Twice	32.0 ± 3.0^{d}	
	Thrice	$27.3\pm2.8^{b,c}$	
	Four times	$22.2\pm2.4^{b,\,c}$	

*** Similar letters in superscripts are significantly different**

Malaria episodes in respondents

Malaria episodes in the year according tothe demographic characteristics of respondents are shown in Table 3.

Females accounted for the majority of respondents (59.5%) while the age group of 31-40 years was in the majority (28%). This is in line with the report of Konlan *et al*. (2019, In Ho Municipality Ghana, Akande-Sholabi *et al*. (2020) in a similar study, observed that 52% of the participants were female while those in the age limit of 26 to 40 were in the majority. Most of the respondents had tertiary education (45%) with almost half being married (50%). No significant association was found between the number of malaria episodes per year and the categories within the various variables: gender, age, marital status and educational background. This simply means that inhabitants of the study area can suffer from malaria once, twice, thrice or four times irrespective of the person's demographic characteristics. Factors such as continual presence of malaria vector breeding sites in an area (Egbuche *et al.* 2019), compliance to drug regimen and use of malaria control tools, treatment failure, drug resistance (Chude *et al*., 2022), host genetic make-up and immune system (Natama *et al*., 2021) may determine the number of episodes of malaria in a year.

Table 3: Malaria episodes among respondents (n=200)

Demographics	Category	Malaria episodes in a year										p-value
		Total respondents		Once		Twice		Thrice		4 times		
		No.	%	No.	%	No.	%	No.	%	No.	%	
Gender	Male	81	40.5	17	21.3	32	40.0	20	25.0	12	13.8	0.108
	Female	119	59.5	24	20.2	32	26.9	32	26.9	31	26.1	
Age (y)	< 20	23	11.5	7	30.4	6	26.1	5	21.7	5	21.7	
	21 – 30	56	28.0	11	19.6	20	35.7	14	25.0	11	19.6	
	31 – 40	68	34.0	15	22.1	22	32.4	21	30.9	10	14.7	0.700
	41 – 50	32	16.0	7	21.9	10	31.3	8	25.0	7	21.9	
	51 – 60	21	10.5	1	4.8	6	28.6	4	19.1	10	47.6	
Marital status	Single	94	47.0	24	25.5	29	30.9	24	25.5	17	18.1	
	Married	100	50.0	16	16.0	32	32.0	28	28.0	24	24.0	0.594
	Divorced	6	3.0	1	16.7	2	33.3	1	16.7	2	33.3	
Educational background	Informal	14	7.0	4	28.6	4	28.6	3	28.6	3	21.4	
	Primary	10	5.0	2	20.0	3	30.0	2	20.0	3	30.0	0.578
	Secondary	86	43.0	21	24.4	23	26.7	23	26.7	19	22.1	
	Tertiary	90	45.0	14	15.6	34	37.8	24	26.7	18	20.0	
	Total	**200**	**100.0**	**41**	**20.5**	**64**	**32.0**	**52**	**26.0**	**43**	**21.5**	

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Malaria symptoms perceived by respondents

Typical symptoms experiencedby respondents during malaria episodeare in the order headache (60%), fever (40%), cold (38%), body pain (28%), vomiting (23%), while 18% of them exhibited nausea. These responses corroborate the reports that malaria is associated with a wide range of clinical outcomes (Egbuche*et al.,* (2021); Bittaye*et al.,* (2022) but these symptoms are not specific to malaria. However, fever is acclaimed to be the commonest symptom for clinical diagnosis of Malaria (Iwueze*et al.,* 2013, Bittaye*et al.,* 2022).

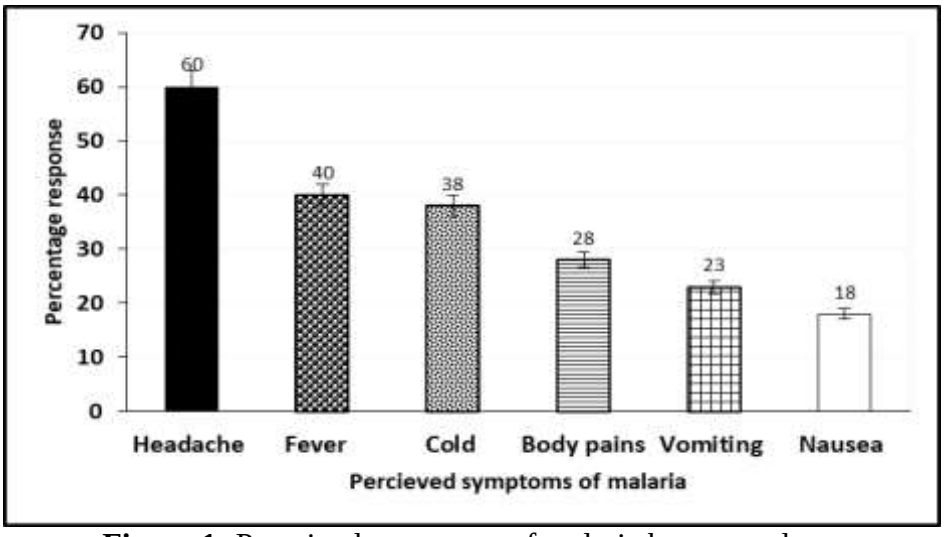


Figure 1: Perceived symptoms of malaria by respondents
(Friedman test; p value = 0.000)

Drug Preferences for malaria treatment by respondents

About 91% of the respondents preferred orthodox drugs while 18% preferred herbal medicaments against malaria (Figure 2).Elsewhere in Anambra State it was shown that39.0%, 27.0% and 6% of the people preferred antimalarial drugs, herbal preparations,and a combination of both, respectively (Obiukwu *et al.* (2011). Orthodox drugs recommended for use by WHO in the treatment of uncomplicated malaria are ACTs (WHO, 2015).

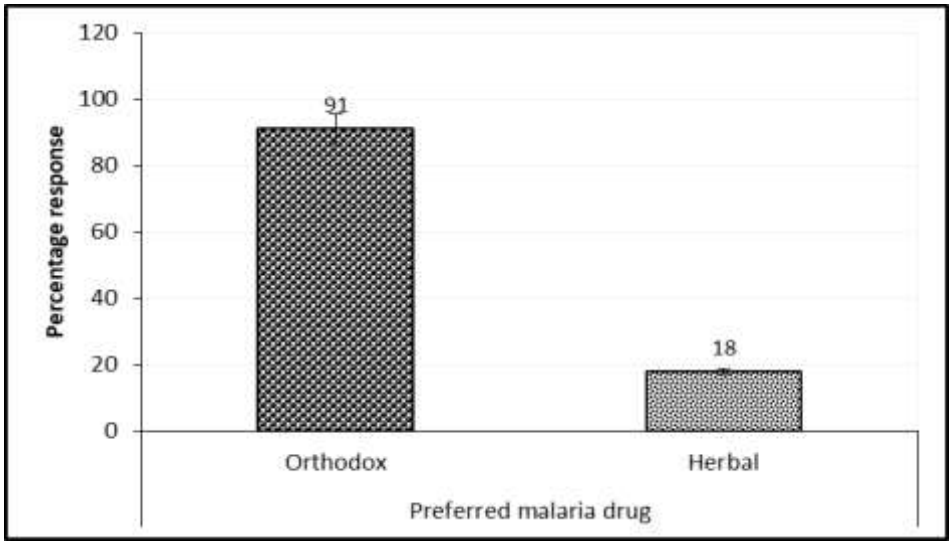


Figure 2: Drug of choice for malaria treatment
(Friedman test; p value = 0.000)

According to the respondents, orthodox medicines were highly and significantly preferred due to their potency (fast recovery / active). Other reasons given for the use of orthodox drugs were: flavor (which was not bitter compared to some herbal medications) and standard dosages.However, a significant 92.5% of respondents who preferred herbal remedystated that it makes them feel better, and about 7.5% of them perceived that herbal preparations are cheaper and easily affordable than orthodox drugs (Table 4).

Even when orthodox drugs are more preferred to herbal preparations, there was no significant association between the reasons for choice of orthodox drugs and the categories within the demographics (Table 5). The most significant reason given is related to the potency of orthodox drugs but use of herbal drugs is still practiced in the study area.

Table 4: Choice of malaria by respondents (n=200)

Reasons for choice	Responses (%)	Mean ±se	P-value
Orthodox drugs	Fast recovery/ active	97.5 ± 1.8^{a}	
	Not as bitter as herbal drugs	1.3 ± 0.8^{b}	0.0000
	Has dosage	1.2 ± 1.2^{b}	
Herbal drugs	Makes one feel better	92.5 ± 6.5^{c}	0.0000
	Cheaper than orthodox drugs	7.5 ± 6.5^{d}	

*** Similar letters in superscripts are significantly different**

Table 5: Reasons for choice of orthodox drugs by respondents (n=177)

Demographics	Category	Respondents		Reasons for choice						p-value
				Fast recovery and active		Not as bitter as herbs		Has dosage		
		No.	%	No.	%	No.	%	No.	%	
Gender	Male	70	39.5	69	39.0	1	0.56	0	0.00	0.495
	Female	107	60.5	104	58.8	1	0.56	2	0.13	
Age (y)	< 20	23	13.0	23	13.0	0	0.00	0	0.00	0.479
	21 – 30	50	28.2	49	27.7	1	0.56	0	0.00	
	31 – 40	59	33.3	58	32.8	1	0.56	0	0.00	
	41 – 50	28	15.8	27	15.3	0	0.00	1	0.56	
	51 – 60	17	9.6	16	9.0	0	0.00	1	0.56	
Marital status	Single	84	47.4	83	46.9	1	0.56	0	0.00	0.727
	Married	89	50.3	86	48.6	1	0.56	2	1.13	
	Divorced	4	2.3	4	2.3	0	0.00	0	0.00	
Educational background	Informal	6	3.4	6	3.4	0	0.00	0	0.00	0.900
	Primary	12	6.8	12	6.8	0	0.00	0	0.00	
	Secondary	73	41.2	72	40.7	1	0.56	0	0.00	
	Tertiary	86	48.6	83	46.9	1	0.56	2	1.13	
Religious Faith	Christianity	174	98.3	170	96.1	2	1.13	2	0.13	0.999
	Islamism	1	0.56	1	0.56	0	0.00	0	0.00	
	ATR	2	1.1	2	1.13	0	0.00	0	0.00	
	Total	**177**	**100**	**173**	**97.74**	**2**	**1.13**	**2**	**1.13**	

Plants used forherbalpreparations

About 88.6% of the respondents preferred using a combination of herbs while 11.4% preferred a single herb (Table 6). The significant difference observed in the use of herbs singly or in combination is similar with the policy on the use of ACTs(WHO, 2018).

Table 6: Numberof plant-leaves used for malaria herbal drugs

Question	Responses (%)	Mean ±se	p-value
Plant-leaves (no.) incorporated in herbal drug	Single	11.4±6.1[a]	0.000
	Combination	88.6±6.1[b]	

*** Similar letters in superscripts are significantly different**

Among the herbs often used by the community members listed in their order of importance were the leaves *Azadirachtaindica, Cymbopogoncitratus, Carica papaya*), *Psidiumguajava* and *Mangiferaindica*(Table 7).Their use (excepting Paw-Paw leaves) in the preparation of malaria herbal remedies had earlier been reported in a similar study from Anambra State, Nigeria (Iwueze *et al.*, 2013).

Table 7: Plants used for malaria herbal drugs in the study area

S/n	Plants		
	Local name	Common name	Scientific name
1	Dogoyaro	Neem	*Azadirachtaindica*
2	Achara ehi	Lemon grass	*Cymbopogoncitratus*
3	Okwuru	Pawpaw	*Carica papaya*
4	Gova	Guava	*Psidiumguajava*
5	Mangolo	Mango	*Mangifera indica*
6	Oroma nkirisi	Lime	*Citrus limon*
7	Nchuonwu	Scent leaf	*Ocimum gratissimum*
8	Jinja	Ginger	*Zingiber officinale*
9	Eti erin	Aloe vera	*Aloe barbadensis*
10	Okwe oyibo	Moringa	*Moringa oleifera*
11	Onugbu	Bitter leaf	*Vernonia amygdalina*
12	Kachu	Cashew	*Anarcardium occidentale*
13	Ayo	Garlic	*Allium sativum*
15	Shawashop	Sour sop	*Annona muricata*
15	Aki-inu/ugoro	Bitter kola	*Garcinia kola*
16	Uziza	West African Black pepper	*Piper guineense*
17	Uburu oocha	Wild custard apple	*Annona senegalensis*
18	Abanidiegwu	Siam weed	*Chromolaena odorata*
19		Unripe fruit	
20		Super 7 herbal mixture	

Sources ofmalaria herbaldrugs used by the respondents

About 52.0% of the respondents admit that herbal drugs used are provided by the family members while 34% claimed they purchased the herbal remedies from the market (Table 8). Homeopaths supplied the herbal drugs to about 10% of the respondents while the remaining 4% obtained them from either friends (2%) or other unspecified sources (2%).

Table 8: Source of malaria herbal drugs used by respondents (n=200)

Question	Responses (%)	Mean ±se	P-value
How do you source malarial herbal drugs?	Family member	52 ± 16.6^{b}	
	Friend	2.0 ± 2.0^{a}	
	Market	$34\pm19.9^{a,b}$	0.036
	Others	2.0 ± 2.0^{a}	
	Homeopathic	10.0 ± 10.0^{a}	

*** Similar letters in superscripts are significantly different**

Preparation of the malaria herbal drugs

The different ways community members prepare their herbal drugs is presented in Table 9. The result shows that 55.3% out of 25 females that responded prefer to prepare their herbal drugs as combination therapy whereas 23.7% of these are male. However, using herbs singly or in combination did not show any significant association with gender, age, marital status, educational background and religious faithof respondents but in the

demographics combination of herbs was mostly used(Table 9).

Table 9: Preparation of the malaria herbal drugs by respondents (n=38)

Demographics	Category	Respondents		Herbs in malaria drug				P- value
				Single herb		Combinations		
		No.	%	No.	%	No.	%	
Gender	Male	13	34.2	4	10.5	9	23.7	0.289
	Female	25	65.8	4	10.5	21	55.3	
Age (years)	< 20	3	7.9	0	0.0	3	7.9	0.313
	21 – 30	7	18.4	3	7.9	4	10.5	
	31 – 40	14	36.8	3	7.9	11	29.0	
	41 – 50	8	21.1	1	2.6	7	18.4	
	51 – 60	6	15.8	1	2.6	5	13.2	
Marital status	Single	16	42.1	4	10.5	12	31.6	0.611
	Married	22	57.9	4	10.5	18	47.4	
	Divorced	0	0.0	0	0.0	0	0.0	
Educational background	Informal	2	5.3	1	2.6	1	2.6	0.152
	Primary	5	13.1	1	2.6	4	10.5	
	Secondary	22	57.9	6	15.8	16	42.1	
	Tertiary	9	23.7	0	0.0	9	23.7	
Religious faith	Christianity	35	92.1	8	21.0	27	71.1	0.351
	Islamism	0	0.0	0	0.0	0	0.0	
	ATR	3	7.9	0	0.0	3	7.9	
	Total	**38**	**100**	**8**	**21.0**	**30**	**79.0**	

CONCLUSION

The present study conducted a survey on the knowledge, attitude and practices of some rural communities in Awka regarding herbal remedies for malaria. The findings from the study have shown that majority of people in the rural communities are aware of malaria and have suffered several episodes with various symptoms. The study have also shown that a greater number of the community members preferred orthodox drugs while a few take herbal remedies, majority of which are leaves of common herbs. Greater percentages of respondents who are females, prefer to prepare the herbal drugs in combination and their age, marital status, educational background and religious faith did not play any significant role in determining their decision to prepare the herbs either singly or in combination. Based on the findings from this study, it is recommended that public enlightenment on safe preparation, handling, storage, intake and regulation of herbal malaria drugs will enhance their efficacy and reduce associated potential risks. Thus, there is need for intensive study of these herbs and spices to ascertain their efficacy and safety, as well as the responsible phytochemicals present in them.

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