



ORIGINAL ARTICLE

# Prevalence, Pattern and Perception of the Use of Traditional Herbs for Malaria Treatment among Pregnant Women in Oshodi-Isolo Local Government Area, Lagos, Nigeria

Kanma-Okafor OJ<sup>1</sup>, Onah NG<sup>1</sup>, Roberts AA<sup>1</sup>, Akinleye HW<sup>2</sup>

<sup>1</sup>Department of Community Health & Primary Care, College of Medicine, University of Lagos

<sup>2</sup>Department of Obstetrics and Gynaecology, Lagos Island Maternity Hospital, Lagos

## Keywords

Traditional herbs;

Malaria;

Pregnant women;

Oshodi-Isolo;

Lagos, Nigeria

## ABSTRACT

**Background:** Traditional herbs have been used for thousands of years to treat malaria and many pregnant women currently rely on them even with their questionable safety. This study aimed to assess the prevalence, pattern and perceptions of the use of traditional herbs for malaria treatment among pregnant women in Oshodi-Isolo Local Government Area, Lagos, Nigeria.

**Methods:** This descriptive cross-sectional study included 410 pregnant women, selected by multistage sampling. Data were collected using an interviewer-administered questionnaire and analyzed using SPSS statistical software. The results of descriptive analysis and associations using the Chi-square test were presented in tables and charts.

**Results:** The mean age of the respondents was 28±6.7years. About half, 193 (47.1%) of the respondents, used traditional herbs to treat malaria in pregnancy. The pattern of use was periodical as malaria prophylaxis 84 (43.5%) or based on the experiencing of symptoms considered to be due to malaria 80 (41.5%). Traditional herbs were used because they were considered natural and hence safer 113 (58.5%), cheaper 101 (52.3%), more effective 97 (50.3%), and more acceptable based on respondents' traditional beliefs 79 (40.0%).

**Conclusion:** The majority of pregnant women who utilized traditional herbs did so only occasionally for the prevention and treatment of malaria. The perceptions of using herbal remedies to treat malaria during pregnancy were largely supportive of this practice. As vital as it is to inform pregnant women about the risks of utilizing herbs to treat malaria during pregnancy, consideration must also be given to regulating usage to ensure safety.

## Correspondence to:

Dr. Oluchi J. Kanma-Okafor  
Department of Community Health & Primary Care,  
College of Medicine,  
University of Lagos, Lagos State.  
Email: [okanma-okafor@unilag.edu.ng](mailto:okanma-okafor@unilag.edu.ng)

## INTRODUCTION

Malaria is an infectious disease caused by *Plasmodium Falciparum*, transmitted by the female anopheles mosquito.<sup>1</sup> This disease which has been a major health concern globally is a leading cause of morbidity and mortality in many tropical countries and is prevalent mostly among pregnant women and children.<sup>2</sup>

According to the 2020 World Malaria Report, of the 87 malaria-endemic countries in 2019, 29 countries accounted for 95% of malaria cases globally, of which five constitute more than half (51%) of all the cases.<sup>3</sup> These countries with the highest burden of malaria were Nigeria (27%), the Democratic Republic of Congo (12%),

Mozambique (4%), Niger (3%), and Uganda (5%).<sup>3</sup> According to WHO's latest World Malaria Report, there were an estimated 241 million malaria cases and 627 000 malaria deaths worldwide in 2020. This represents about 14 million more cases in 2020 compared to 2019, and 69 000 more deaths.<sup>4</sup> There is an extensive economic burden associated with malaria with an impact in Africa estimated at 12 billion dollars per year.<sup>4</sup> Its perpetuating factors have been clearly described in literature ranging from the hot, humid, tropical climates that encourage parasite transmission and subsequent infections to socio-demographic and environmental factors of overcrowding, excessive rural-urban migration, environmental degradation, poverty, and poor housing, among others.<sup>5</sup>

While the above-mentioned factors increase the overall risk of malaria infection, the gravid state is usually associated with a physiological reduction in immunity hence, the more severe presentations of malaria in pregnancy. In pregnant women, the usually acquired semi-immunity observed in inhabitants of malaria-endemic regions is reduced with parasite sequestration in the placenta resulting in maternal anemia and severe cases of maternal death as well as fetal growth restriction, low birth weight infants, fetal and neonatal mortality.<sup>6</sup>

Herbal drugs have been used for thousands of years to treat malaria and some classes of orthodox anti-malarial including artemisinin and quinine derivatives are sourced from them. Traditional herbal medicines are plant-derived preparations with minimal or no industrial processing claimed to have therapeutic benefits, found in a particular geographic location, or used by people of a particular culture.<sup>7</sup> They can be in the form of liquids, powders, capsules, tablets, or ointments. Some are pre-packaged while others are prepared when needed and are used not only to cure illness but as health maintenance or boosters.<sup>8</sup> There is a general belief that these medicines are 'natural', 'safe' and easily accessible compared to the more orthodox forms of medicines, a belief often propagated to those who are unwell by close relatives, neighbours, friends, traditional medicine dealers and sometimes even the media.<sup>9</sup>

Globally, there is a re-emergence of public interest in herbal medicine, as about 70% to 80% of the African population uses herbal medicine for primary care.<sup>10</sup> Traditional herbs such as *Morinda lucida* (Oruwo), *Enantia chlorantha* (Awopa), *Alstonia boonei* (Ahun), *Azadirachta indica* (Dongoyaro) and *Khaya grandifoliola* (Oganwo) were found to be in use for malaria therapy at Okeigbo, Southwest, Nigeria.<sup>11</sup>

Traditional medicine use is also significant in certain developed countries; for example, between 70% and 90% of the populations in Canada, France, Germany, and Italy report using traditional medicines,<sup>12</sup> under the titles "complementary", "alternative", or "nonconventional" medicines.<sup>13</sup> In developing countries, particularly sub-Saharan African countries, the prevalence of the use of herbs among pregnant women varied between 30 to 70%.<sup>14</sup> As global acceptance of herbal medicine continues to grow, challenges with indigenous health systems such as lack of professional control of pharmaceutical products as well as high illiteracy level, cost of synthetic malaria medicine over orthodox ones, and the perception that herbal remedies are natural and safer continue to encourage the utilization of traditional herbs among pregnant women.<sup>15</sup>

Traditional medicine use among pregnant women raises particular concerns about its safety. Exposure of pregnant women to chemicals such as herbs and supplements during pregnancy period could affect their fetuses<sup>16</sup> and this could contribute to maternal morbidity and mortality. Despite these known concerns by health professionals, many pregnant women use traditional medicine in treating malaria.<sup>17</sup> This study, therefore, assessed the prevalence and pattern of herbal medicine use in the treatment of malaria in pregnancy, perceived effectiveness of use, side effect profile and reasons for traditional herbal medicine use over orthodox medicines. Besides adding to the existing body of knowledge, findings from this study would help inform community awareness programmes and outreach efforts and equip appropriate bodies with information to promote collaboration among traditional practitioners, local communities and conventional health workers

on the safe use of medicinal plants for safer pregnancies.

## METHODOLOGY

This was a community-based cross-sectional descriptive survey conducted between November 2020 and June 2021 among pregnant women, resident for at least six months in Oshodi-Isolo LGA. All pregnant women who were visitors to Oshodi-Isolo and those who were unwell were excluded from the study. Oshodi-Isolo LGA is located in the North East of Lagos State, with a land mass of 41.98 square kilometers. It is constituted of three Local Council Development Areas (LCDA) and 20 administrative wards; Oshodi (7 wards), Isolo (7 wards), and Ejigbo (6 wards). It has 17 government-owned health facilities (15 primary healthcare centres, 2 secondary healthcare facilities) and about 150 private hospitals.<sup>18</sup> Oshodi-Isolo LGA has a population of 1,134,548 and a population

projection of 1,655,691.<sup>19</sup> The residents of Oshodi-Isolo are predominantly traders. Using the Cochran formula,<sup>20</sup>  $n = z^2 pq/d^2$ , where  $n$  is the calculated sample size,  $z$  is the critical value at a 95% confidence interval (1.96),  $p$  is the proportion of pregnant women estimated to use traditional herbs to treat malaria in an urban area for which a prevalence of 50% (0.5) was used since no previous studies on the use of traditional herbs in the treatment of malaria in an urban area such as Oshodi-Isolo was found,  $q$  is estimated as  $1 - p = 0.5$ ,  $d$  is the acceptable margin of sampling error predetermined as 5% (0.05). A minimum sample size of 384 was calculated. To compensate for improperly completed questionnaires or opt-out by any of the selected respondents, the calculated sample size was increased by 10% to 422.

A multi-stage sampling technique was used to select the respondents for this study. All three LCDAs were included in the study. In the first stage, three wards were selected from each of the three LCDAs, 9 in all, by simple random sampling using the ballot method. In the second stage, ten streets were selected from each of the selected wards, 90 in all, by simple random sampling, also by balloting.

In the third stage, five out of about 40 houses on each street were selected by systematic sampling, thus fifty houses were selected per ward, 450 houses in all. In the fourth stage, one household was selected from each of the selected houses by balloting. Finally, in the fifth stage, in households that had more than one pregnant woman, the ballot method was used to select one pregnant woman. Households, where there was no pregnant woman at the time of the survey, were skipped and the next household that had a pregnant woman was sampled in replacement. In all, 422 households were sampled.

Data were collected from each subject by nurses and medical doctors trained as research assistants using a pretested, structured, interviewer-administered questionnaire. The majority of the questions were developed from related literature<sup>16,21</sup> with slight modifications made in line with the objectives of this study and to fit the local context. The questionnaire was designed to collect data on the socio-demographic characteristics of the respondents, their use of traditional herbs for malaria treatment, the experiences of the users of traditional herbs in malaria treatment, the perception of the pregnant women towards the use of traditional herbs in malaria treatment, their concerns for their unborn fetuses and their reasons for using traditional herbs. To determine the reliability of the questionnaire, a Cronbach's alpha reliability coefficient of 0.956 was obtained, indicating an excellent internal consistency of responses, showing that the questionnaire was reliable (>0.70 benchmark).<sup>22</sup>

In scoring the respondents' perception toward the use of traditional herbs for malaria treatment, five statements were scored according to a 5-point Likert scale. Each statement was graded with the lowest score (1) for the least positive response unsupportive to the use of traditional herbs, ranging up to 5 for the most positive response supportive to the use of traditional herbs. The possible total minimum and maximum scores for perception were 5 and 25, respectively. The median score was then computed. "Supportive" perceptions were determined if the respondents scored above the median score while scores below the median

score were considered “unsupportive”. Participants with scores equal to the median were considered to have perceptions that were “neutral”.

Data were entered into a Microsoft Excel worksheet and analysed using SPSS version 25 statistical software. The quantitative data were presented as descriptive frequencies and percentages. The Chi-square test was carried out between independent variables and the outcomes of interest (prevalence of use of traditional herbs). The level of significance was set at  $p < 0.05$ .

Ethical approval was obtained from the Health Research Ethics Committee (HREC) of the Lagos University Teaching Hospital (HREC Assigned number: ADM/DSCST/HREC/APP/4307) before the commencement of the study. Permission was obtained from the authorities at Oshodi-Isole Local Government secretariat before the commencement of the study. Written informed consent was taken from each participant before their enrolment into the study. Confidentiality was ensured by keeping the data anonymous, using numbers rather than names to identify the respondents and the questionnaires. Participation in the study was purely voluntary, with no consequences for non-participation.

## RESULTS

A total of 422 respondents were interviewed, however, 410 questionnaires were completely and correctly filled and were recorded for data analysis. This put the response rate at 97%. As seen in Table 1, the participant's ages ranged from 17-45 years, with a mean age of  $28 \pm 6.7$  years. The majority of the respondents 343 (83.7%) were married. The respondents mostly had secondary education, 137 (33.4%) followed by tertiary education, 125 (30.5%) while 103 (25.1%) and 45 (11.0%) respondents had primary education and no formal education, respectively. A greater number, 182 (44.4%), of the respondents while only 36 (8.8%) of the respondents earned above 100,000 Naira monthly. As shown in table 2, the prevalence of the use of traditional herbs for malaria treatment was 47.1%. The most frequently used traditional herbs were garlic, 57 (29.5%), followed by unripe pawpaw and

pawpaw leaves, 51 (26.4%), scent leaves 50 (25.9%), ginger 50 (25.9%), lemongrass 42 (21.8%), other herbs such as mango bark, orange leaf, and bark, *dongoyaro*, bitter kola and *awopa*, singly or as a mixture of herbs 42 (21.8%). The most frequently given reasons for using traditional herbs to treat malaria while pregnant was that herbal remedies were natural and safer 113 (58.5%) and cost 101 (52.3%).

Regarding the pattern of use of traditional herbs, 84 (43.5%) of the women used them periodically for malaria prophylaxis, 80 (41.5%) used them whenever they thought the symptoms they experienced were due to malaria, 16 (8.3%) used the herbs when they had a positive malaria test, while 13 (6.7%) used traditional herbs whenever they felt like it. In their experience of using traditional herbs for malaria treatment, the majority, 151 (78.2%) reported that herbal remedies were effective, and 141 (73.1%) felt relieved of the symptoms of malaria soon after use. However, 77 (39.9%) experienced some side effects after use. The side effects experienced by the respondents after using traditional herbs were nausea 34 (44.2%), vomiting 34 (44.2%), and watery stool 30 (38.9%) (Table 3). As seen in table 4, concern was expressed by 128 (31.2%) of the respondents who believed in the possibility of herbs affecting an unborn child, whereas the majority, 282 (68.8%) of the participants who had no such belief were unconcerned. The effects on the unborn child mentioned by the women included miscarriage 87 (67.9%), intrauterine death 26 (20.3%), premature birth 23 (17.9%) and jaundice 21 (16.4%).

The majority of the pregnant women strongly agreed 139 (33.9%) and agreed 232 (56.6%) that traditional herbs relieve all symptoms of malaria and 201 (49.0%) agreed that herbs have more important beneficial effects on the body than orthodox medicines. Equal proportions of the participants agreed 137 (33.4%) and disagreed 137 (33.4%) with traditional herbs being useful for enhancing the effects of orthodox medicines. One hundred and twenty-one (29.5%) of the participants agreed with traditional herbs being taken freely in pregnancy while 152 (37.1%) disagreed. The majority 253 (61.7%) agreed that traditional herbs are safer than orthodox



medicines, while 137 (33.4%) remained neutral and 120 (29.3%) disagreed that traditional herbs have little or no side effects. One hundred and fifty-two (37.1%) of the women agreed that harmful herbal drugs do not exist while the majority 242 (59.0%) disagreed that herbal drugs are safe when taken alongside orthodox medicines (Table 5).

According to figure 1, 191 (47%) of the participants had overall perceptions that were supportive of using traditional herbs to treat malaria in pregnant women. According to table 6, utilization of traditional herbs showed a statistically significant association with the age of the respondents ( $p < 0.001$ ), a higher proportion of respondents in the older age groups 31 to 40 years, 79 (61.2%), and over 40 years, 26 (70.2%), used traditional herbs to treat malaria in pregnancy. Marital status ( $p = 0.002$ ), religion ( $p < 0.001$ ), level of education ( $p = 0.027$ ), and average monthly income ( $p < 0.001$ ) were significantly associated with the use of herbs.

Regarding marital status, the highest proportion of traditional herb users was amongst those that were single, 22 (75.9%), and the least amongst the married 147 (48.9%). Concerning religion, the highest proportion of users was amongst the traditional worshippers and atheists, the least was among the Muslims, 66 (35.7%). The respondents with no formal education had the highest proportion of users, 30 (66.7%), while those with primary education had the least proportion 41 (39.8%). About the respondents' socioeconomic status, mostly the respondents that earned the lowest used traditional herbs in pregnancy, 58 (66.7%), while those who earned between N51,000 and N100,000 used traditional herbs in pregnancy the least 25 (23.8%). The occupation of the respondents and their concern about the possibility of traditional herbs affecting the unborn child ( $p = 0.180$ ) did not significantly influence their use of herbs, however, a higher proportion of those who were unconcerned, 139 (49.3%), compared to those who were concerned, 54 (42.2%), used traditional herbs in pregnancy.

**Table 1: Socio-demographic characteristics of the respondents**

Variables	Frequency (n=410)	Percent
<b>Age group (years)</b>		
< 21	29	7.1
21-30	215	52.4
31-40	129	31.5
> 40	37	9.0
<b>Marital status</b>		
Single	29	7.1
Married	343	83.7
Separated	22	5.4
Divorced	14	3.4
Cohabiting	2	0.5
<b>Religion</b>		
Christianity	182	44.4
Islam	185	45.1
Traditional	23	5.6
Others	20	4.9
<b>Level of education</b>		
No formal education	45	11.0
Primary	103	25.1
Secondary	137	33.4
Tertiary	125	30.5
<b>Occupation</b>		
Housewife	52	12.7
Trader	118	28.8
Self-employed	99	24.1
Civil servant/Employed	135	32.9
Others	6	1.5
<b>Average monthly income (Naira)</b>		
≤20,000	87	21.2
21,000-50,000	182	44.4
51,000-100,000	105	25.6
>100,000	36	8.8

Mean age (years)=28±6.7sd, age range=17-45years

**Table 2: Prevalence of use, types and sources of herbs for malaria treatment in pregnancy**

<b>Variables</b>	<b>Frequency</b>	<b>Percent</b>
<b>Ever used traditional herbs to treat malaria while pregnant (n=410)</b>		
Yes	193	47.1
No	217	52.9
<b>Types of herbs used (n=193)*</b>		
Garlic	57	29.5
Pawpaw (leaves and unripe fruit)	51	26.4
Scent leaf	51	26.4
Ginger	50	25.9
Lemon grass	42	21.8
Others/ a mixture of herbs	42	21.8
Turmeric	36	18.7
Bitter leaf	30	15.5
Pineapple	27	13.9
Agbo Iba	24	12.4
<b>Source of herbs used (n=193)*</b>		
Self-made	114	59.1
Herbal vendors	89	46.1
Parents	47	24.4
Traditional birth attendants (TBAs)	35	18.1
Herbalist	30	15.5
Local healer	23	11.9
Family and friends	11	5.7
<b>Reason for using traditional herbs to treat malaria (n=193)*</b>		
Herbal remedies are natural and safer	113	58.5
Herbal remedies cost less than orthodox treatment	101	52.3
Herbal remedies are more effective	97	50.3
Herbal treatments are promoted by traditional beliefs	79	40
Herbal treatments are holistic	77	39.9
Herbal treatments are easily available and accessible	57	29.5
Outcomes of orthodox drugs are dissatisfactory	49	25.4
Herbal treatments give a sense of active participation	20	10.4
Orthodox treatments have worse side effects	19	9.8
No particular reason	18	9.3

\* Multiple responses allowed

**Table 3: Patterns of use, experience and side effects of herbs for the treatment of malaria**

<b>Variable</b>	<b>Frequency</b>	<b>Percent</b>
<b>Patterns of use of traditional herbs(n=193) *</b>		
Periodically as malaria prophylaxis	84	43.5
Whenever I feel I have the malaria symptoms	80	41.5
When I have a positive malaria test	16	8.3
Whenever I feel like it	13	6.7
<b>Experience of the use of traditional herbs (n=193)*</b>		
The herbal remedies were effective	151	78.2
Relieved of the symptom soon after use	141	73.1
Experienced some side effects after use	77	39.9
<b>Nature of side effects experienced (n=77)*</b>		
Nausea	34	44.2
Vomiting	34	44.2
Watery stool	30	38.9
Feeling unwell	19	24.7
Dizziness	16	20.8
Skin rashes	12	15.6
Insomnia	6	7.8
Restlessness	3	3.9
Heartburn	1	1.3
Bleeding	1	1.3

\* Multiple responses allowed

**Table 4: Participants' view on the effects of herbs on the unborn child**

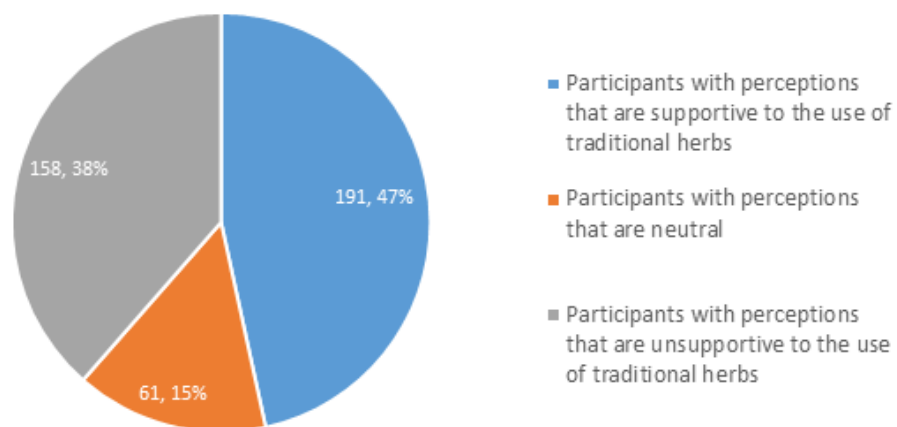
Variable	Frequency	Percent
<b>Possibility of herbs affecting the unborn child (n=410)*</b>		
Concerned, the possibility exists	128	31.2
Unconcerned, no possibility	282	68.8
<b>Suggested effects on unborn child (n=128)*</b>		
Miscarriage	87	67.9
Intrauterine death	26	20.3
Premature birth	23	17.9
Jaundice	21	16.4
Unknown effects	36	28.1

\* *Multiple responses allowed*

**Table 5: Perception of the use of traditional herbs for the treatment of malaria in pregnancy**

Variables	SA n (%)	A n (%)	N n (%)	D n (%)	SD n (%)
Traditional herbs relieve all symptoms of malaria completely	139 (33.9)	232 (56.6)	30 (7.3)	9 (2.2)	0 (0)
Traditional herbs have more important beneficial effects on the body than orthodox medicines	119 (29.0)	201 (49.0)	86 (21.0)	4 (1.0)	0 (0)
Traditional herbs are useful for enhancing the effects of orthodox medicines	11 (2.7)	137 (33.4)	87 (21.2)	137 (33.4)	38 (9.3)
Traditional herbs should be taken freely in pregnancy	7 (1.7)	121 (29.5)	93 (22.7)	152 (37.1)	37 (9.0)
Traditional herbs are safer than orthodox medicines	86 (21.0)	253 (61.7)	49 (12.0)	22 (5.4)	0 (0)
Traditional herbs have little or no side effects	18 (4.4)	75 (18.3)	137 (33.4)	120 (29.3)	60 (14.6)
There are no harmful herbal drugs in existence	20 (4.9)	152 (37.1)	109 (26.6)	115 (28.0)	14 (3.4)
Herbal drugs are safe when taken alongside orthodox drugs	1 (0.2)	17 (4.1)	118 (28.8)	242 (59.0)	32 (7.8)

SA=Strongly agree, A=Agree, N=Neutral, D=Disagree, SD=Strongly Disagree n=410



**Figure 1: Respondents' perceptions of the use of traditional herbs for the treatment of malaria in pregnancy**

**Table 6: Factors associated with the utilization of traditional herbs**

Variable	Usage of herbs		X <sup>2</sup>	p-value
	Yes	No		
	(n=193) Freq (%)	(n=217) Freq (%)		
<b>Age group (years)</b>			35.073	<0.001
<21	16 (55.2)	13 (44.8)		
21-30	72 (33.5)	143 (66.5)		
31-40	79 (61.2)	50 (38.8)		
>40	26 (70.2)	11 (29.8)		
<b>Marital status</b>				<b>0.002*</b>
Single	22 (75.9)	7 (24.1)		
Married	147 (48.9)	196 (57.1)		
Separated	13 (59.1)	9 (40.9)		
Divorced	9 (64.2)	5 (35.7)		
Cohabiting	2 (100.0)	0 (0.0)		
<b>Religion</b>				<0.001*
Christianity	91 (50.0)	91 (50.0)		
Islam	66 (35.7)	119 (64.3)		
Traditional	17 (73.9)	6 (26.1)		
Others e.g. atheism	19 (95.0)	1 (5.0)		
<b>Level of education</b>			9.183	<b>0.027</b>
No formal education	30 (66.7)	15 (33.3)		
Primary	41 (39.8)	62 (60.2)		
Secondary	63 (46)	74 (54)		
Tertiary	59 (47.2)	66 (52.8)		
<b>Occupation</b>				0.475*
Housewife	27 (51.9)	25 (48.1)		
Trader	59 (50)	59 (50)		
Self-employed	47 (47.5)	52 (52.5)		
Civil servant	56 (41.5)	79 (58.5)		
Artisans	4 (66.7)	2 (33.3)		
<b>Average monthly income</b>			37.398	<0.001
Less than N21,000	58 (66.7)	29 (33.3)		
N21,000 - N50,000	93 (51.1)	89 (48.9)		
N51,000 - N100,000	25 (23.8)	80 (76.2)		
More than N100,000	17 (47.2)	19 (52.8)		
<b>Possibility of effect on the unborn child</b>				
Concerned	54 (42.2)	74 (57.8)	1.783	0.180
Unconcerned	139 (49.3)	143 (50.7)		

\*Fishers exact p-value

## DISCUSSION

This study revealed a prevalence of traditional herb use for the treatment of malaria in pregnancy of nearly 50%, with the participants mostly using locally available herbs. The patterns of use were majorly periodical as malaria prophylaxis. Traditional herbs were mostly regarded as fast and effective for relieving the symptoms of malaria, with minimal side effects.

Perceptions about traditional herbal medicines were more frequently enabling their use.

The analysis of the demographic data showed a mean age of 28 years with a standard deviation of 6.7 years, which is similar to a study carried out in Enugu, Nigeria with a mean age of 28±8 years.<sup>16</sup> A higher percentage of the respondents were married, also similar to the findings of the Enugu study.<sup>16</sup> In the current study, it was found that



almost half of the participants used herbal medicines for treating malaria while pregnant. This finding can be attributed to two reasons. Firstly, the lack of advocacy by governmental and non-governmental organizations about maternal and child health with emphasis on the safe consumption and use of drugs during pregnancy. Secondly, the inaccessibility of affordable health care in the Local Government Area. Often traditional birth attendants are the most accessible to pregnant women. Furthermore, the lack of funds to make good healthcare available and affordable in public health facilities either through health insurance or subsidized medical treatment leaves pregnant women with traditional methods of care as their best option. In the current study, considering the average monthly income of the respondents, the majority were poor and might have found it difficult to afford orthodox medicine in the treatment of malaria. Compared to our results, a study conducted in South-East Nigeria reported a lower prevalence of traditional herb use in pregnant women of 36.8%.<sup>17</sup> Another study in Ogbomosho, South-western Nigeria reported a prevalence of use of the herbal remedies of 30% and the top two justifications stated were perceived efficacy and cheap cost.<sup>23</sup> A study in Nairobi, Kenya found a prevalence of the use of herbal medicine during pregnancy much lower than that of other sub-Saharan African countries of about 12%, and like our study, also showing that cost, lack of drug availability, travel distance, inaccessibility of medical facilities during illness, and other factors linked to health services influence the use of herbal medicines.<sup>24</sup>

In contrast to our study, the Kenyan study also reported that the price of herbal medicines may not be a key factor in their use and that whether people sought Western or herbal treatments tended to rely on the nature and severity of their illnesses.<sup>24</sup> In our study, older women used herbal medications significantly more frequently. This could be because younger Nigerians are more likely to be influenced by the west and neglect traditional herbs. A systematic review of studies conducted in sub-Saharan Africa corroborates the finding that pregnant women's use of herbal medications tended to rise with age.<sup>25</sup>

The most commonly used herbs in our study were namely garlic, pawpaw leaves, scent leaves and ginger, in contrast to the study carried out in South-East Nigeria where the most commonly used herb was bitter leaf/ironweed plant and palm kernel oil.<sup>17</sup> This is probably based on the vegetation found in each geographical area. As with our study, in a study carried out in Enugu, over half of the respondents stated that they prepared the herbal medicine by themselves.<sup>16</sup>

Studies have shown that in making their decisions to use traditional herbs while pregnant, the majority of pregnant women heavily depended on their own initiative, family, friends, and other relatives.<sup>26,27</sup> As with our study, traditional birth attendants, nearby herb vendors, and herbalists were additional sources, notably in Africa.<sup>28,29</sup> In developed countries, one of the factors influencing the decision to use herbal medicine during pregnancy was the media.<sup>30</sup> In our study, the major side effects reported with the use of traditional herbs were nausea, vomiting and watery stools, much milder than the more severe side effects reported in other studies. In a review of several studies the most frequently found side effects of using herbal medications during pregnancy were heartburn, premature labor, miscarriage, blood flow rise, abortion, and allergic responses.<sup>31</sup> Generally, it is dangerous for the fetus when herbal medications are used in the first and third trimesters of pregnancy.<sup>31</sup>

The patterns of use of traditional herbs for treating malaria in our study varied between periodic use as malaria prophylaxis, to alleviate malaria symptoms, less frequently when they had a positive malaria test, or for no specific reason at all. A similar study among postpartum women in southwestern Nigeria reported that the majority of the women in their study subjected themselves to malaria screening tests in the laboratory/clinic before treatment for malaria, and half of them sought professional care for treatment after the screening test, two-fifths self-medicated thereafter, and about a third even administered the herbs to their newborns as well.<sup>32</sup> Less than half of the ladies in the current study were against utilizing herbal and conventional medications concurrently. Herbal

medicine products were utilized alongside allopathic or orthodox medications, according to a comprehensive analysis of women's motivations and related factors for global herbal medicine use during pregnancy and labor. The health of pregnant women and the unborn was discovered to be severely harmed by concurrent use.<sup>33</sup>

In the current study, herbal medicines were popular because they were considered to be natural and safer than western medicines, as found in Abeokuta, Nigeria.<sup>34</sup> Generally, the users are ignorant of the teratogenic and/or abortifacient properties of certain plants.<sup>34</sup> In our study, about half of the pregnant women used herbal medicines because they considered them to be more effective than orthodox medicines. This might fuel the continued use of traditional medicine for the treatment of malaria in pregnancy. In contrast, a study carried out in Mali, West Africa reported that only 8% preferred herbal medicines because they were considered more effective.<sup>35</sup> Even though certain herbs are thought to be beneficial, the use of traditional medicine is restricted in part because there are few clinical studies demonstrating its safety and efficacy, even though it is frequently more accessible and considered less expensive than Western medicine.<sup>36</sup> A study conducted in Kenya and Mali confirmed the belief that herbal medications are less expensive than conventional pharmaceuticals, which are thought to be more potent and have a faster mode of action than natural therapies.<sup>37</sup> In this international study, pregnant women believed that they and their unborn children were particularly in danger from malaria and valued a professional diagnosis and treatment, but the cost of treatment at health facilities led women to utilize herbal medicines or other over-the-counter medications.<sup>37</sup> There is no agreement on the best botanicals, treatments, and dosages, not even among conventional healers, and depending on a number of variables, the concentration of active chemicals in a plant species varies greatly.<sup>37</sup> Many studies have revealed strong opinions and support for traditional herbs, therefore the use of traditional herbs is expected to continue because they are seen as advantageous and essential during pregnancy.<sup>38</sup> At the cost of losing some

traditional practices, the integration of traditional medicine into the western health system has received some advocacy and has therefore suggested the need to open up dialogue in this respect, about the best way to regulate the safe use of traditional herbs to treat malaria in pregnancy,<sup>38</sup> because like in countries such as the US where herbal medicine use was integrated into the mainstream health system, women had few limitations in consulting their physicians and receiving guidance regarding safe herbal medicine use.<sup>39</sup> Given that women frequently do not disclose their use of herbal remedies to their doctors, as some studies<sup>40</sup> have revealed, integrating traditional herbal remedies and orthodox medicine would be a crucial strategy. This strategy could assist in establishing a pharmacovigilance system so that information regarding the formulation, processing, uses, and side effects of herbal medicines can be gathered given the potential toxic effects and safety issues associated with herbal remedies.<sup>41</sup>

**Limitations to this study:** Our study did not stratify traditional herb use according to the trimester of pregnancy, hence limiting the understanding of the purpose and pattern of herbal medicine use.

## CONCLUSION

About half of the participants in this study used traditional herbs in pregnancy but mostly periodically for malaria prophylaxis and in treating suspected malaria. The perceptions of the use of herbal medicines for treating malaria in pregnancy were mostly enabling this practice. It is therefore important to educate pregnant women about the dangers associated with using herbs for treating malaria in pregnancy and to consider opening up a dialogue regarding the best way to regulate the use of traditional herbs in pregnancy to ensure safety.

**Acknowledgment:** The authors acknowledge all the pregnant women who participated in this study.

**Conflict of interest:** The authors declare no conflict of interest.

**Funding:** No funding was received for this work.

**Contributions to joint publication:** All the authors contributed substantially to the concept and design of the intellectual content, interpretation of statistical analysis, manuscript preparation/ editing and manuscript review of this paper. ONG, KOJ and AHW conducted the literature search while data acquisition and data analysis were conducted by ONG under the supervision of KOJ, who serves as a guarantor for the publication. All authors read and approved the final version of the manuscript.

## REFERENCES

- World Health Organization. The "World Malaria Report 2019" at a glance. [Last accessed: 29 March 2022]. Available at: <https://www.who.int/news-room/feature-stories/detail/world-malaria-report-2019>
- Yalewayker T, Daniel A, Sintayehu A, Setegn E, Ayenew A, Ayalew JZ. The prevalence of malaria among pregnant women in Ethiopia: A systematic review and meta-analysis. *Journal of Parasitology Research*. 2019; 9 <https://doi.org/10.1155/2019/8396091>
- World Health Organization. World Malaria Report 2020. [Last accessed: 3 July 2022]. Available at: <https://www.who.int/publications/i/item/9789240015791>
- World Health Organization. World Malaria Report 2021. [Last accessed: 3 July 2022]. Available at: <https://www.who.int/teams/global-malaria-programme/reports/world-malaria-report-2021>
- De Silva PM, Marshall JM. Factors contributing to urban malaria transmission in sub-Saharan Africa: a systematic review. *J Trop Med*. 2012; 819563. <https://doi:10.1155/2012/819563>
- Agomo CO, Oyibo WA. Factors associated with risk of malaria infection among pregnant women in Lagos, Nigeria. *Infect Dis Poverty*. 2013; 2(1):19. <https://doi:10.1186/2049-9957-2-19>
- Bandaranayake WM. Quality control, screening, toxicity, and regulation of herbal drugs. *Modern phytomedicine; Turning medicinal plant into drugs*. 2006; <https://doi:10.1002/9783527609987.ch2>
- World Health Organization. General guidelines for methodologies on research evaluation of traditional medicine. 2000. [Last accessed: 10 August 2022]. Available at: <https://www.who.int/publications/i/item/9789241506090>
- Khadivzadeh T, Ghabel M. Complementary and alternative medicine use in pregnancy in Mashhad, Iran, 2007-8. *Iran J Nurs Midwifery Res*. 2012; 17(4): 263-269 PMID: 23833624; PMCID: PMC3702144.
- World Health Organization. Traditional medicine. 2021. [Last accessed: 25 August 2022]. Available at: <https://www.afro.who.int/health-topics/traditional-medicine>.
- Odugbemi TO, Akinsulire OR, Aibinu IE, Fabeku PO. Medicinal plants useful for malaria therapy in Okeigbo, Ondo State, Southwest Nigeria. *Afr J Tradit Complement Altern Med*. 2006 Nov 13; 4(2): 191-198. <https://doi:10.4314/ajtcam.v4i2.31207>
- Barnes PM, Bloom B, Nahin R. Complementary and alternative medicine use among adults and children: United States 2007. Hyattsville, MD, National Center for Health Statistics, 2008 (National Health Statistics Report, #12. [Last accessed: 25 June 2022]. Available at: <http://nccam.nih.gov/news/2008/nhsr12.pdf>
- World Health Organization. Traditional Medicine Factsheet. 2008. [Last accessed: 25 June 2022]. Available at: <http://www.who.int/mediacentre/factsheets/fs134/en/>
- Malan DF, Neuba DFR. Traditional practices and medicinal plants use during pregnancy by Anyi-Ndenye women (eastern Côte

- d'Ivoire). *Afr J Reprod Health*. 2011; 15: 85-93  
PMID: 21987942
15. Ekpenyong MS, Bond C, Matheson D. Challenges of maternal and prenatal care in Nigeria. *J Intensive & Crit Care*. 2019; 5(1): 6-11. doi: 10.21767/2471-8505.100125
  16. Chidinma EI, Duru AC, Ingwu JA, Arinze JC, Chikeme PC, Kotoye CO. Use of traditional medicines in treatment of malaria among pregnant women in two urban slums in Enugu State, Nigeria. *Journal of Public Health and Diseases*. 2019; 2(2): 24-31. doi: [10.31248/JPHD2019.032](https://doi.org/10.31248/JPHD2019.032)
  17. Duru CB, Nnebue CC, Uwakwe KA, Diwe KL, Agunwa CC, Achigbu KI, et al. Prevalence and pattern of herbal medicine use in pregnancy among women attending clinics in tertiary hospital in Imo state, South East Nigeria. *International Journal of Current Research in Biosciences and Plant Biology*. 2016; 3(2): 5-14. doi: [10.20546/ijcrbp.2016.302.002](https://doi.org/10.20546/ijcrbp.2016.302.002)
  18. Federal Ministry of Health. Nigeria Health Facility Registry (HFR) Hospitals and Clinics. [Last accessed 26 August 2022]. Available at: [https://hfr.health.gov.ng/facilities/hospitals-search?token=GOsIQWBKWFEMZHjE2jtvv627Cjc4VyGSZfl3G1RK&state\\_id=124&lga\\_id=1523&ward\\_id=&facility\\_level\\_id=1&ownership\\_id=2&operational\\_status\\_id=1&registration\\_status\\_id=0&license\\_status\\_id=0&geo\\_codes=0&service\\_type=0&service\\_category\\_id=0&facility\\_name=&entries\\_per\\_page=20](https://hfr.health.gov.ng/facilities/hospitals-search?token=GOsIQWBKWFEMZHjE2jtvv627Cjc4VyGSZfl3G1RK&state_id=124&lga_id=1523&ward_id=&facility_level_id=1&ownership_id=2&operational_status_id=1&registration_status_id=0&license_status_id=0&geo_codes=0&service_type=0&service_category_id=0&facility_name=&entries_per_page=20).
  19. Lagos State Government. Abstract of Local Government Statistics-2019. [Last accessed: 16 May 2022]. Available at: <http://mepb.lagosstate.gov.ng/wp-content/uploads/sites/29/2020/08/Abstract-of-Local-Government-Statistics-Y2019.pdf>
  20. Cochran G. Sampling techniques. New York: John Wiley and Sons. 1977: 428
  21. Okafor IP, Ezekude C, Oluwole EO, Onigbogi OO. Malaria in pregnancy: A community-based study on the knowledge, perception, and prevention among Nigerian women. *J Family Med Prim Care*. 2019; 8(4): 1359-1364. doi: [10.4103/jfmprc.jfmprc\\_295\\_18](https://doi.org/10.4103/jfmprc.jfmprc_295_18)
  22. Gliem JA, Gliem RR. Calculating, interpreting, and reporting Cronbach's Alpha Reliability Coefficient for Likert-Type Scales. *Midwest Research to Practice Conference in Adult, Continuing, and Community Education*. 2003; p. 87. [Last accessed: 27 August, 2022]. Available at <https://scholarworks.iupui.edu/bitstream/handle/1805/344/Gliem%20&%20Gliem.pdf?s>
  23. Babatunde OA, Adeoye IA, Usman AB, Umeokonkwo CD, Fawole OI. Pattern and determinants of self-medication among pregnant women attending antenatal clinics in primary health care facilities in Ogbomoso, Oyo State, Nigeria. *J Interval Epidemiol Public Health*. 2021; 4(3): 7 doi: <https://doi.org/10.37432/jieph.2021.4.3.36>
  24. Mothupi MC. Use of herbal medicine during pregnancy among women with access to public healthcare in Nairobi, Kenya: A cross-sectional survey. *BMC Complement Altern Med*. 2014; 432. <https://doi.org/10.1186/1472-6882-14-432>
  25. El Hajj M, Holst L. Herbal medicine use during pregnancy: A review of the literature with a special focus on Sub-Saharan Africa. *Front. Pharmacol*. 2020; 11: 866. doi: [10.3389/fphar.2020.00866](https://doi.org/10.3389/fphar.2020.00866)
  26. Kennedy DA, Lupattelli A, Koren G, Nordeng H. Herbal medicine use in pregnancy: Results of a multinational study. *BMC Complement. Altern. M*. 2013; 355: 1-10. doi: [10.1186/1472-6882-13-355](https://doi.org/10.1186/1472-6882-13-355)
  27. John LJ, Shantakumari N. Herbal medicines use during pregnancy: A review from the Middle East. *Oman Med. J*. 2015; 30(4): 229-236. doi: [10.5001/omj.2015.48](https://doi.org/10.5001/omj.2015.48)
  28. Teni FS, Birru EM, Surur AS, Belay A, Wondimsiegn D, Gelayee DA, Shewamene



- Z. Pattern and predictors of medicine use among households in Gondar Town, northwestern Ethiopia: A community-based medicine utilization study. *BMC Res. Notes* 2017; 10(1): 357. doi: 10.1186/s13104-017-2669-7
29. Enata EFO, Erihi RE. Knowledge, perception and management of malaria in pregnancy by traditional birth attendants in Benin City. *Journal of Pharmaceutical and Allied Sciences*. 2011; 8(2): 35-41
30. Hall HG, Griffiths DL, McKenna LG. The use of complementary and alternative medicine by pregnant women: A literature review. *Midwifery*. 2011; 27(6): 817-824. doi:10.1016/j.midw.2010.08.007
31. Laelago T. Herbal medicine use during pregnancy: Benefits and untoward effects. In: Builders PF, editor. *Herbal Medicine*. London: IntechOpen; 2018 [Last accessed: 23 June 2022]. Available from: <https://www.intechopen.com/chapters/61138> <https://www.intechopen.com/chapters/61138doi:10.5772/intechopen.76896>
32. Iribhogbe OI, Odoya EM. Self-medication practice with antimalarials and the determinants of malaria treatment-seeking behavior among postpartum mothers in a rural community in Nigeria. *Pharmacoeconomics and Drug Safety* 2020; 30(4): 435-444. doi: 10.1002/pds.5178
33. Sumankuuro J, Soyen C, Crockett J, Ibrahim M, Ngmenkpiewo F, Wulifan J. Women's motivation and associated factors for herbal medicine use during pregnancy and childbirth: A systematic review. *Health*. 2020; 12: 572-597. doi: 10.4236/health.2020.126044
34. Babalola AS, Idowu OA, Ademolu KO, Olukunle J, Rahman SA. Antiplasmodial activities and abortifacient properties of three commonly used African indigenous anti-malarial plants in *Plasmodium berghei* infected pregnant mice: implication for maternal and fetal health. *Bull Natl Res Cent*. 2020; 44: 153. <https://doi.org/10.1186/s42269-020-00399-5>
35. Nergard CS, Ho TP, Diallo D, Ballo N, Paulsen BS, Nordeng H. Attitudes and use of medicinal plants during pregnancy among women at health care centers in three regions of Mali, West-Africa. *Journal of Ethnobiology and Ethnomedicine*. 2015; 11: 73. doi: 10.1186/s13002-015-0057-8
36. Willcox ML, Bodeker G. Traditional herbal medicines for malaria. *BMJ*. 2004; 329(7475): 1156-1159. doi:10.1136/bmj.329.7475.1156
37. Hill J, Kayentao K, Achieng F, Diarra S, Dellicour S, Diawara SI, et al. Access and use of interventions to prevent and treat malaria among pregnant women in Kenya and Mali: A qualitative study. *PLOS ONE*. 2015; 10(3): e0119848. <https://doi.org/10.1371/journal.pone.0119848>
38. Thipanyane MP, Nomatshila SC, Oladimeji O, Musarurwa H. Perceptions of pregnant women on traditional health practices in a rural setting in South Africa. *International Journal of Environmental Research and Public Health*. 2022; 19(7): 4189. <https://doi.org/10.3390/ijerph19074189>
39. Fakeye TO, Adisa R, Musa IE. Attitude and use of herbal medicines among pregnant women in Nigeria. *BMC Complementary and Alternative Medicine*. 2009; 53. <https://doi.org/10.1186/1472-6882-9-53>
40. Holst L, Wright D, Haavik S, Nordeng H. The use and the user of herbal remedies during pregnancy. *J Altern Complement Med*. 2009; 15(7): 787-792. doi: 10.1089/acm.2008.0467
41. Ahmed SM, Nordeng H, Sundby J, Aragaw YA, de Boer HJ. The use of medicinal plants by pregnant women in Africa: A systematic review. *J. Ethnopharmacol*. 2018b; 224: 297-313. doi: 10.1016/j.jep.2018.05.032