

Herbal medicine use and predictors among breastfeeding mothers attending primary healthcare centres in Lagos State, Nigeria.

Ogochukwu U. Amaeze^{1*}, Olubusola O. Olugbake¹, Uchechi A. Okpara¹, Ayobami A. Aiyeolemi²

¹Department of Clinical Pharmacy and Biopharmacy, Faculty of Pharmacy, University of Lagos, Idi-Araba, Surulere Lagos, Nigeria.

²Health Outcomes Division, The University of Texas at Austin, Texas, USA.

ARTICLE INFO

Article history:

Received 3 June 2023
Revised 13 July 2023
Accepted 1 August 2023
Online 30 September 2023
Published

Keywords:

Herbal medicine,
Breastfeeding,
Mothers,
Lagos State,
Prevalence.

* Corresponding Author:

oamaeze@unilag.edu.ng
+234 803 722 6190
<https://orcid.org/0000-0003-3348-7700>

ABSTRACT

Background: Herbal medicines are increasingly used globally and are a more affordable and accessible therapeutic option than conventional medicines. Little is known about their use in breastfeeding mothers and their potential effects on both mother and child.

This study aimed to determine the prevalence, socio-demographic determinants, and commonly used herbal medicines among breastfeeding mothers in Lagos state, Nigeria.

Methods: A cross-sectional survey of breastfeeding mothers attending primary healthcare centres across Lagos state was conducted. Data were collected using a structured and validated interviewer-administered questionnaire and analysed using descriptive and inferential statistics. The association between socio-demographic characteristics and herbal medicine use was assessed using bivariate analysis. Factors related to herbal medicine use were assessed using logistic regression and the effects were measured with odds ratio along with 95% confidence intervals. p -value <0.05 was considered significant.

Results: Of the 400 respondents, 68.3% used herbal medicines for various reasons; however, only 7% reported using them for breastfeeding-related reasons. Herbal medicines were mainly used to treat malaria and typhoid fever (27%). 'Agbo,' a multi-herbal concoction (49%), was the most frequently used herbal medicine. Identified predictors of herbal medicine use included location, tribe, religion, parity, and occupation. Almost 60% of the mothers believed that herbal medicines are more effective than conventional medicines in treating certain illnesses.

Conclusion: Herbal medicine use is relatively common among breastfeeding mothers in Lagos, Nigeria. Factors related to herbal medicine use included religion, tribe, location, parity, and occupation. Herbal medicines commonly used by this population deserve further research for safety and efficacy for acclaimed use.

1. INTRODUCTION

Herbal medicines represent an increasingly and commonly used complementary and alternative medicine modality for treating a wide range of disease conditions¹. Several studies have reported the widespread popularity and use of herbal medicine in Africa^{2,3}. This increasing herbal medicines use has been attributed to their low costs, cultural acceptance, easy accessibility, and perceived supremacy over conventional drugs in certain disease conditions⁴. However,

their use is not without risks, such as a lack of scientific evidence of their safety and effectiveness and possible side effects or toxicities⁵. Previous studies have revealed a higher use of herbal medicine among women than men, primarily due to usage for reproductive and child healthcare purposes such as contraception, treatment of amenorrhea and infertility, pregnancy, and breastfeeding^{2,6-8}. Breastfeeding has been practiced for centuries and has several short and long-term benefits for mothers and their

breastfed infants^{9,10}. Breastfeeding women may require medication for insufficient breast milk supply, mastitis, or other maternal health issues. According to a recent study, over half of postpartum mothers (both nursing and non-breastfeeding) use at least one medication¹¹. However, there are concerns about the risks and effects of conventional medications on the quality and quantity of breast milk, and the possibility of drug transfer to the breastfed infant via breast milk¹². Hence, many breastfeeding mothers are increasingly using herbal medicines, which are perceived as 'natural and safe' to meet their healthcare needs^{12,13}.

Despite the increasing prevalence of herbal medicine use during breastfeeding, evidence of their safety and efficacy remains scarce. Contrary to the popular notion that herbal medicines are 'natural and safe,' they may cause harm to mothers and breastfed infants if not used appropriately. Adverse reactions of varying severities have been reported among breastfeeding mothers who used herbal medicines. For example, fenugreek (*Trigonella foenum-graecum*), a widely used herbal galactagogue, may cause hypoglycemia in diabetic mothers and potentially interact with warfarin to cause bleeding. In addition, like conventional medicines, herbal medicines may be transferred into breast milk and can produce harmful effects on infants. Certain herbs are strongly discouraged during breastfeeding due to their potential to cause serious harm to the mother and child. For instance, the use of comfrey (*Symphytum officinale*) and other plants containing pyrrolizidine alkaloid is strongly discouraged in breastfeeding mothers due to their carcinogenic property and their potential to cause veno-occlusive diseases in mothers and their breastfed infants¹⁴. It is, therefore, essential to evaluate herbal medicine use among breastfeeding mothers to ensure safe and appropriate use.

Previous studies from around the world have shown a varying prevalence of herbal medicine use among breastfeeding mothers. A prevalence of 37%, 53.8%, 59.9%, 52.6%, 74.2%, and 87.7% was reported among breastfeeding mothers in Sierra Leone, Tanzania, Australia, Italy, U.S., and Taiwan, respectively^{8,12,15,17}. Health and well-being maintenance and increased breast milk production rank high among indications for herbal medicine use by breastfeeding mothers^{8,18,19}. While previous studies in Nigeria have assessed herbal medicine use in healthy persons and various populations with disease conditions²⁰⁻²⁴, studies evaluating herbal medicine use specifically among breastfeeding mothers are lacking. This study aims

to address this knowledge gap by providing evidence of the prevalence and characteristics of herbal medicine use among breastfeeding mothers in Lagos state, Nigeria. The findings from this study can provide an understanding of herbal medicine use in this population, potentially informing future regional or nationwide studies on herbal medicine use among breastfeeding mothers.

2. METHODS

2.1 Study design and population

This study was a descriptive, cross-sectional survey of breastfeeding mothers (receiving care for themselves or their child) at primary health centres (PHCs) involved in immunisation, child welfare, or mother and child services. The study was undertaken at ten (10) PHCs across Lagos state, Nigeria.

2.2 Inclusion criteria

The inclusion criteria for this study were consenting mothers, eighteen years and older, currently breastfeeding or having breastfed within the past twelve months, duly registered at the respective PHCs, and attending clinics during the study period. Breastfeeding mothers from all cultural and ethnic backgrounds were eligible for the study.

2.3 Sampling method and sample size

A multistage sampling technique was used in this study. Lagos state (6.5227° N, 3.6218° E) was first stratified into five based on the administrative zones (IBILE – Ikorodu, Badagry, Ikeja, Lagos island, and Epe). Of these five zones, Ikeja and Lagos are considered as city centres. Two Local Council Development Areas (LCDAs) were selected from each stratum by simple balloting. The third stage involved the selection of one PHC in each LCDA. A list of PHCs in each selected LCDA was obtained from the Lagos State Primary Health Care Board, and 10 PHCs (one from each LCDA) were randomly selected as the study sites. In the fourth and final stage, eligible participants were determined using a systematic sampling method.

The sample size was calculated using the sample size determination formula for a cross-sectional study as shown below:

$$n = z^2 pq/d^2 \dots\dots\dots \text{Equation 1}$$

Where n is the required sample size, z is the value of test statistic corresponding to a 95% level of confidence (1.96), and p is the estimated probability of herbal medicine use

during breastfeeding (37.0%); taken from a similar study carried out in Sierra Leone⁸, $q=(1-p)$ is the estimated probability of not using herbal medicines during breastfeeding, and d =degree of accuracy or standard error (0.05). This gave 358 participants as the minimum sample size for the study.

2.4 Study instrument

This study utilized a structured and standardized interviewer-administered questionnaire previously developed to assess the use of herbal medicine among breastfeeding mothers⁸. A pilot study was conducted in a PHC exclusive of the already selected study sites. The feedback obtained from the pilot study was implemented to improve the clarity and presentation of the questionnaire, and the reliability of the study instrument was evaluated using Cronbach's alpha. The final version of the questionnaire comprised four sections that explored the participants' demographics, pattern of herbal medicine use, types of herbal medicines used and reasons for use, and participants' perceptions regarding herbal medicine use during breastfeeding. In this study, herbal medicine use refers to the utilisation of plant-derived products (leaves, roots, flowers, seeds, etc.) such as herbal dietary supplements, homeopathic remedies, and medicinal herbal products occurring in different forms such as powdered herbal substances, extracts, tinctures, essential oils, etc. for their preventive or curative properties. Participants were classified as 'users' if they had used herbal medicine during the last 12 months of breastfeeding.

2.5 Ethical approval

Ethical approval for this study was obtained from the Lagos University Teaching Hospital Health Research/ Ethics Committee with approval number ADM/DCST/HREC/APP/4020. Research approval was also obtained from the Lagos State Primary Health Care Board with approval number LS/PHCB/MS/1128/VOL.VIII/094. Participation in this study was voluntary.

2.6 Data collection

Breastfeeding mothers at the various study sites were invited to participate, and the study objectives were explained to potential participants. Verbal consent was obtained from mothers who agreed to participate in the study. Study participants were assured that their responses would be treated anonymously and with the utmost confidentiality.

2.7 Data analysis

Data from filled questionnaires were checked for completeness and coded. Statistical analyses were done using the Statistical Package for Social Sciences (SPSS) Version 25 (IBM SPSS). Categorical data were presented as frequencies and percentages, while continuous variables were presented as mean and standard deviation. The association between respondents' socio-demographics and herbal medicine use was evaluated using bivariate analysis (Chi-square). Predictors of herbal medicine use were determined using logistic regression. p -value <0.05 was considered significant.

1. RESULTS

3.1 Study instrument reliability test

Cronbach's alpha values of 0.708 (pattern of herbal medicine use during breastfeeding), 0.719 (types of herbal medicines used and reasons for use), 0.715 (perception regarding herbal medicine efficacy and safety), and 0.752 (pooled data) were obtained from the pilot study. The questionnaire items showed good internal consistency, as Cronbach's alpha values were higher than the 0.7 threshold.

3.2 Socio-demographic factors associated with herbal medicine use

Participants' demographics are presented in Table 1. A total of 400 breastfeeding mothers in the five study locations participated in the study. Nearly half (48.8%) of the participants were aged 30-39 years. Most (95.5%) were married, and half (53.5%) had attained tertiary education. About two-thirds (62.8%) of the mothers were traders; many (60.3%) earned between ₦ 51,000 and ₦ 199,000. The Chi-square analysis results indicate that location, religion, tribe, occupation, and parity significantly influenced herbal medicine use among breastfeeding mothers.

Table 1: Socio-demographic characteristics of respondents

Variable	Characteristics	Non-users (%)	Users (%)	p-value
Location	Badagry	31.3	68.7	0.000*
	Epe	21.2	78.8	
	Ikeja	47.5	52.5	
	Ikorodu	18.7	81.3	
	Lagos	41.3	58.7	
Age (years)	≤ 19	0.0	100.0	0.397
	20 – 29	33.0	67.0	
	30 – 39	29.7	70.3	
	40 – 49	46.7	53.3	
Religion	Christian	34.0	66.0	0.036*
	Muslim	26.5	73.5	
	Others	100.0	0.0	
Marital Status	Single	35.7	64.3	0.692
	Married	31.4	68.6	
	Widowed	50.0	50.0	
Tribe	Igbo	33.0	67.0	0.042*
	Yoruba	28.6	71.4	
	Hausa	24.2	75.8	
	Others	47.9	52.1	
Educational Status	No Formal Education	40.0	60.0	0.747
	Primary education	35.7	64.3	
	Secondary education	34.1	65.9	
	Tertiary education	29.4	70.6	
Occupation	Student	63.6	36.4	0.040*
	Trader/ Business owner	33.1	66.9	
	Housewife	21.7	78.3	
	Civil servant	20.6	79.4	
	Professional	35.1	64.9	
	Retired	0.0	100.0	
Monthly Income (Naira)	≤50,000	26.2	73.8	0.152
	51,000 – 199,000	33.2	66.8	
	≥ 200,000	42.4	57.6	
Number of children	1	39.2	60.8	0.041*
	2	23.3	76.7	
	3	35.4	64.6	
	4	28.9	71.1	
	5	20.0	80.0	

*Indicates statistical significance ($p < 0.05$)

3.3 Prevalence and characteristics of herbal medicine use

As shown in Table 2, 68.3% of the study participants used herbal medicines while breastfeeding. However, only 7% reported using herbal medicines for breastfeeding-related reasons. Nearly 55% of the mothers reported that their health care providers (HCPs) do not ask about herbal medicines use. Friends and family (55%) were the primary sources of herbal medicine information. The respondents (26%) mainly bought herbal medicines from the open market. Herbal medicines used by the respondents and their indications for use are presented in Table 3. 'Agbo' (herbal concoction) was the most commonly used herbal preparation (46%). Herbal medicines were mainly used to treat malaria and typhoid fever (22%), and stomach cramps and purging (13%). The respondents also reported using special diets to enhance breast milk production (Table 4).

Table 2: Patterns of herbal medicine use by respondents

Statement	Variable	n (%)
Have you used any form of herbal medicine in the past 12 months of breastfeeding?	Yes	273 (68.3)
	No	127 (31.7)
Are the reason(s) for using them breastfeeding-related?	Yes	28 (7.0)
	No	245 (61.2)
	Nonresponse	127 (31.8)
Does your healthcare provider ask if you use herbal medicine?	Yes	56 (14.0)
	No	217 (54.2)
	Nonresponse	127 (31.8)
If No, why did you fail to disclose your herbal medicine use status to your healthcare provider?	I was not asked	169 (42.2)
	I did not think it was relevant	84 (21.0)
	I was worried about his/her reaction	13 (3.3)
	I did not think it was related to his/her field of expertise	7 (1.7)
	Nonresponse	127 (31.8)
Where do you usually seek information concerning the use of herbal medicines?	Friends and family	220 (55.0)
	Healthcare provider	17 (4.3)
	Street sellers/ hawkers	30 (7.4)
	Internet	6 (1.5)
	Nonresponse	127 (31.8)
Where do you buy /obtain these herbal medicines?	Friends and family	72 (18.0)
	Market	104 (26.0)
	Local sellers/hawkers	69 (17.3)
	Herbal stores	6 (1.5)
	Traditional Medicine Practitioner	22 (5.5)
	Nonresponse	127 (31.7)
Total		400 (100)

Table 3: Commonly used herbal medicines during breastfeeding and reasons for use

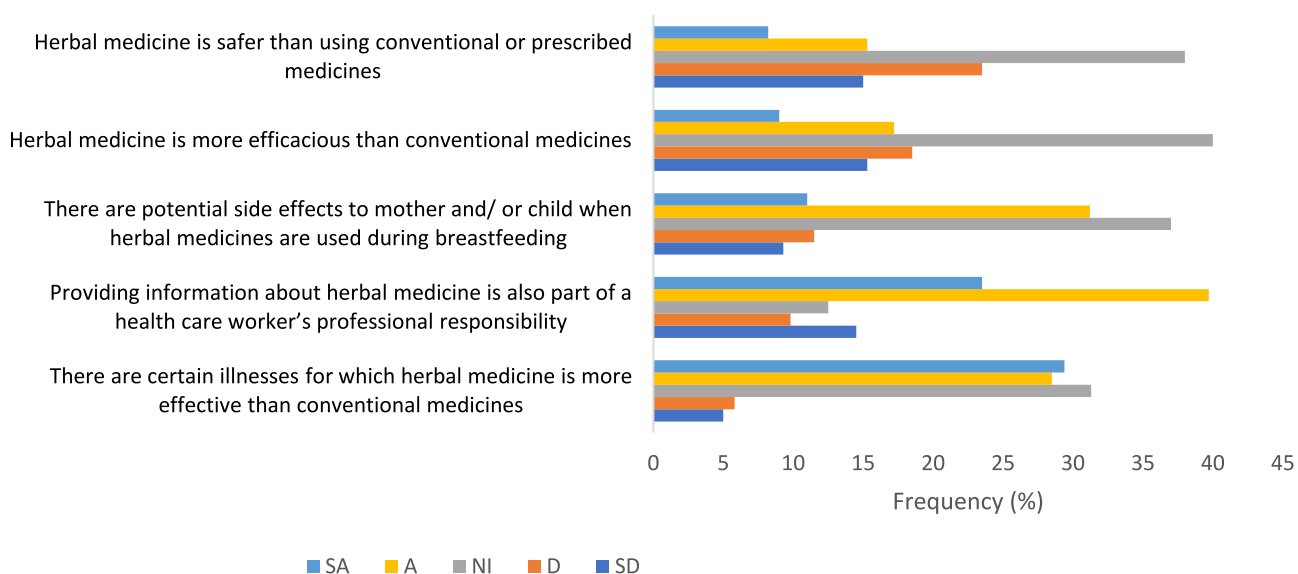
Question	Responses	n (%)
Name of herbal medicine used	<i>Agbo</i>	184 (46.0)
	Bitters	26 (6.5)
	Others	63 (15.7)
	Nonresponse	127 (31.8)
Reason(s) for use	Malaria and typhoid fever	88 (22.0)
	Stomach cramps/purging	53 (13.2)
	Skin condition	56 (14.0)
	Others	76 (19.0)
	Nonresponse	127 (31.8)
Recommended by	Family and friends	184 (46.0)
	Healthcare workers	45 (11.3)
	Street sellers/hawkers	42 (10.4)
	Internet	2 (0.5)
	Nonresponse	127 (31.8)

Table 4: Special diets used by respondents to increase milk supply

Question	Responses	n (%)
Have you ever used any other products, special diets, or methods to help increase milk production or supply during breastfeeding?	Yes	129 (32.3)
	No	271 (67.7)
If yes, name the product/diet /method	Herbal medicine	10 (2.5)
	Special diet (pap, milk, tea etc.)	101 (25.3)
	Other products or methods	18 (4.5)
	Nonresponse	271 (67.7)
Recommended by	Family and friends	112 (28.0)
	Healthcare workers	15 (3.8)
	Internet	2 (0.5)
	Nonresponse	271 (67.7)

3.4 Participants' perception of herbal medicine use

Regarding the participants' perception of herbal medicine use, 57.9% thought herbal medicines are more effective than conventional in certain illnesses. Nearly two-thirds (63.2%) of the mothers believed that providing information about herbal medicine is also part of HCPs responsibilities. Above one-third (38%) did not know if herbal medicines are safer than conventional or prescribed medicines (Figure 1).



SA, Strongly Agree; A, Agree; NI, No Idea; D, Disagree; SD, Strongly disagree

Figure 1 Study participants' perception of herbal medicine use

3.5 Predictors of herbal medicine use among breastfeeding mothers

The result of the multiple logistic regression analysis is shown in Table 5. After the backward elimination model fitting strategy, the socio-demographic variables that remained in the regression model included; location, religion, tribe, occupation, and number of children. Breastfeeding mothers who were Muslim had higher odds of using use herbal medicines compared to those who were Christians (OR: 1.506; CI: 0.815- 2.782, $p = 0.029$). Mothers who belonged to the Yoruba tribe had higher odds of using herbal medicines than those who belonged to the Igbo tribe (OR: 1.143; CI: 0.799- 2.603, $p = 0.024$). Housewives (OR: 7.603; CI: 1.516-38.121, $p = 0.014$) and civil servants (OR: 6.368; CI: 1.196-33.912, $p = 0.030$) had higher odds of using herbal medicines than students. Breastfeeding mothers who lived in Ikeja (OR: 0.437; CI: 0.207-0.925, $p = 0.030$) had higher odds of using herbal medicines than those who lived in Badagry. Multiparous mothers also had higher odds of using herbal medication than primiparous ones (OR: 1.940; CI: 1.077-3.493, $p = 0.027$).

Table 5: Predictors of herbal medicine use among breastfeeding mothers

Predictors	Odds Ratio (95%CI)	<i>p</i> -value
Study site		
Badagry	1	
Epe	1.602 (0.714, 3.598)	0.253
Ikeja	0.437 (0.207, 0.925)	0.030*
Ikorodu	1.969 (0.848, 4.570)	0.115
Lagos	0.538 (0.256, 1.133)	0.103
Religion		
Christian	1	
Islam	1.506 (0.815, 2.782)	0.029*
Others	0.008 (0.000, 0.010)	0.999
Tribe		
Igbo	1	
Yoruba	1.443 (0.799, 2.603)	0.024*
Hausa	0.789 (0.280, 2.222)	0.654
Others	0.571 (0.268, 1.217)	0.147
Occupation		
No formal education	1	
Trader	2.813 (0.672, 11.777)	0.157
Housewife	7.603 (1.516, 38.121)	0.014*
Civil Servants	6.368 (1.196, 33.912)	0.030*
Professional	1.945 (0.421, 8.989)	0.394
Retired	42.975 (11.000, 101.138)	0.774
Number of Children		
One (1)	1	
Two (2)	1.940 (1.077, 3.493)	0.027*
Three (3)	0.702 (0.360, 1.366)	0.297
Four (4)	1.466 (0.561, 3.830)	0.435
Five (5)	3.231 (0.296, 35.258)	0.336

*Indicates statistical significance ($p < 0.05$)

4. DISCUSSION

This study reports the prevalence and characteristics of herbal medicine use among breastfeeding mothers in Lagos state, Nigeria. The herbal medicine use prevalence rate of 68% observed in this study is higher than the reports of similar studies conducted in Australia - 59%¹², Sierra Leone - 39%⁸ and Tanzania - 53.8%¹⁷, but lower than those

conducted in Taiwan - 87.7%¹⁵, Italy - 97.7%¹³ and the USA - 74.2%¹⁶. The difference in the prevalence values between this study and previous studies could be explained by the variations in the definition of herbal medicines, the socioeconomic status of study participants, cultural acceptance, and availability of herbal medicines in the study locations^{8,12}. For instance, the definition of herbal

medicine in the Italian study encompassed a broader range of products, including cosmetic products, which may explain the higher prevalence observed in their study compared to this study³.

The most commonly reported herbal medicine used by the participants is '*Agbo*.' '*Agbo*' is the Yoruba (a tribe in South West Nigeria) name for herbal medicines. It is a herbal concoction comprising several plant parts such as tree bark, roots, leaves, and other materials such as alcohol, palm wine, and water in varying proportions. While similar plants may be used, there is no standardized formula for '*Agbo*', leaving the seller to make their own combination of plants. It is believed to cure fevers, backaches, and many other ailments^{25,26}. The predominant use of '*Agbo*' by the study participants is worrisome as they may be at risk for potential herb-herb or herb-drug interaction. It is well known that many herbal concoctions are usually not appropriately labelled and may contain plant species with similar or opposing pharmacological effects (additive, antagonistic), thereby putting users at an increased risk of adverse effects⁵. Previous studies have reported heavy microbial contamination and high levels of toxic metals in commonly used herbal concoctions in Nigeria²⁷⁻²⁹. Unstandardised herbal concoctions may potentially harm breastfeeding mothers and their infants, so their use by this population calls for careful monitoring and evaluation.

The most common indication for herbal medicine use reported by the study participants was the treatment of "malaria and typhoid fever" which are often self-diagnosed and self-treated. This finding agrees with a previous Nigerian study, where pregnant women mainly reported using herbal medicines to treat malaria²⁴. Malaria and typhoid fever are public health concerns in Nigeria, and several studies have documented the use of herbal medicines to manage them³⁰⁻³². Hence, it was not surprising that it ranked high among the reasons for herbal medicine use in the study population. Interestingly, very few (7%) of the study participants used herbal medicines to increase breast milk production. This observation compares with a previous study in Sierra Leone (2.1%)⁸ but contrasts that of another study in Australia (24.3%)¹². The lower percentage observed in our study may be because fenugreek, a well-known and researched herbal galactagogue that participants in the Australian study mostly used, is not easily accessible in Nigeria and other West African countries³³. Contrary to the finding of James et al.,⁸ where 94% of the mothers used special diets to improve milk production, only 25% of our study participants did so. The study participants reported consuming milk, tea, and pap to

increase breastmilk production. To our knowledge, no scientific evidence exists to show that these meals improve milk production. Future studies are needed to evaluate the effect of these meals on milk production.

Half of our study participants reported that their HCPs do not ask about herbal medicine use. This finding is similar to that of James et al.,⁸ where 57.4% of study participants reported that their HCPs do not ask about herbal medicine use. Another study in the U.S. revealed that a higher proportion (87.9%) of breastfeeding mothers reported their HCPs do not inquire about their use of herbal medicines¹⁶. Considering that over 80% of Africans use herbal medicines for their primary healthcare needs, it is intuitive that HCPs in Nigeria may have a higher tendency to ask about herbal medicine use than those in developed countries like the U.S., where orthodox medicines are primarily used to meet healthcare needs³⁴. Similar to previous studies, the primary reasons for breastfeeding mothers' non-disclosure of herbal medicine use to their HCPs were that they were not asked and didn't consider it relevant to disclose such information to their HCPs^{8,17}. Non-disclosure of herbal medicine use to HCPs can potentially put breastfeeding mothers at risk for herb-drug interactions, therapeutic failure, and toxicity³⁵. These findings, therefore, highlight the need for HCPs to enquire about herbal medicine use practices of breastfeeding mothers and the need to educate breastfeeding mothers on the importance of disclosing any herbal medicine use to their HCPs.

Consistent with previous studies, more than half of the study participants who used herbal medicines sought herbal medicine information from friends and family. Millinga et al.¹⁷ reported that 67.5% of the surveyed breastfeeding mothers sought information about herbal medicine from family and friends. Other studies in women and urban residents have shown that family and friends are important determinants of herbal medicine use^{3,23}. However, they (family and friends) may lack the knowledge and expertise to provide accurate information about herbal medicines. Breastfeeding mothers could benefit from educational interventions such as public awareness campaigns and presentations during hospital clinic visits on available resources to obtain appropriate information about herbal medicines, such as certified traditional, complementary and alternative medicine practitioners.

Location, religion, tribe, occupation, and parity were significant predictors of herbal medicine use among breastfeeding mothers, contrary to similar studies conducted in other African countries. James et al.⁸ found that child age was a significant predictor, while Millinga et

al.¹⁷ identified educational level and adequacy of breastmilk supply as significant predictors. These differences may be attributed to differences in the study instrument design, geographic location, and cultural background of study participants. As expected, participants who lived in the urban Ikeja area showed less inclination towards herbal medicine use compared to those who lived in less urban Badagry area. Previous studies have associated rurality with a higher tendency of herbal medicine use^{36,37}. Similar to a recent study among adult women in Ibadan, Nigeria, our study indicates a varying use of herbal medicines among the different tribes²³. Future national studies are recommended to explore further the effect of tribe on herbal medicine use among breastfeeding mothers.

Congruent with other studies^{8,38}, more than half of the study participants in this study thought that herbal medicines are more effective than conventional medicines in treating certain diseases. Despite the perceived efficacy of herbal medicines in treating certain illnesses, many remain untested, and scientific evidence of their efficacy and safety is grossly lacking³⁸. Medicines taken by breastfeeding mothers can be transferred to the breastmilk with possible effects on the breastfed infant. Hence, rational use of herbal medicine among breastfeeding mothers should be emphasized. To promote the rational use of herbal medicines, breastfeeding mothers should be educated about the inherent limitations of herbal medications, such as lack of scientific evidence of efficacy, possible toxic effects, and unsuitability for acute conditions. A good number (63.2%) of the study participants believed that providing information about herbal medicines is a part of HCPs responsibility. Previous studies have revealed poor knowledge of herbal medicines among healthcare workers and students in Nigeria^{22,39}. Integrating herbal medicine into conventional medical training and practice in Nigeria could help HCPs provide evidence-based information on herbal medicines to patients⁴⁰.

This study has some limitations. Firstly, the PHC-based nature of this study limits the generalisation of the findings to the entire breastfeeding mothers population in Lagos, as mothers who did not visit PHCs were not included in the study. Secondly, there is a possibility that respondents were not entirely truthful about the use of herbal remedies, seeing that many of them reported withholding such information from their doctors. Some study participants may have seen the investigators as 'doctors' and acted likewise. Thirdly, we could not ascertain the exact constituents of the herbal concoctions used by most of the study participants. We, therefore, recommend that future research evaluate the

constituents of '*Agbo*' remedies commonly used by breastfeeding mothers in Lagos. Knowing the individual component of these remedies could potentially guide future interventions to ensure their safe use by breastfeeding mothers. However, to our knowledge, this is the first study documenting herbal medicine use among breastfeeding mothers in Lagos, Nigeria. The findings could guide future research and policy-making efforts toward appropriate herbal medicine use among breastfeeding mothers in Nigeria.

5. CONCLUSION

This study showed that herbal medicine use is common among breastfeeding mothers in Lagos state, and mainly without the knowledge of their HCPs. Relevant interventions are required to address the lack of communication between breastfeeding mothers and their HCPs about herbal medicine use. Predictors of herbal medicine use among breastfeeding mothers include religion, tribe, location, parity, and occupation. Family and friends significantly influence breastfeeding mothers' use of herbal medicine. Educational interventions targeted toward the general public and breastfeeding mothers could potentially improve rational herbal medicine use among breastfeeding mothers.

REFERENCES

1. Ekor M (2014). The growing use of herbal medicines: issues relating to adverse reactions and challenges in monitoring safety. *Front Pharmacol* 4 (177). <https://www.frontiersin.org/articles/10.3389/fphar.2013.00177>
2. James PB, Wardle J, Steel A, Adams J (2018). Traditional, complementary and alternative medicine use in Sub-Saharan Africa: a systematic review. *BMJ Glob Health* 3(5):e000895. <https://doi.org/10.1136/bmjgh-2018-000895>
3. Shewamene Z, Dune T, Smith CA (2017). The use of traditional medicine in maternity care among African women in Africa and the diaspora: a systematic review. *BMC Complement Altern Med* 17(1):382. <https://doi.org/10.1186/s12906-017-1886-x>
4. Builders P (2019). Herbal Medicine. <https://doi.org/10.5772/intechopen.69412>. Accessed May 20, 2023
5. Oreagba IA, Oshikoya KA, Amachree M (2011). Herbal medicine use among urban residents in Lagos, Nigeria. *BMC Complement Altern Med* 11(1):117. <https://doi.org/10.1186/1472-6882-11-117>

6. Budzynska K, Gardner ZE, Dugoua JJ, Low Dog T, Gardiner P (2012). Systematic review of breastfeeding and herbs. *Breastfeed Med* 7(6):489-503.
7. Dali GL, Pappoe AN, Akotoye HK (2019). Plants used as abortifacients and contraceptives in some communities on the fringes of Subri River Forest Reserve in Ghana. *Afr J Reprod Health* 23(4):92-98. <https://doi.org/10.29063/ajrh2019/v23i4.11>
8. James PB, Kaikai AI, Bah AJ, Steel A, Wardle J (2019). Herbal medicine use during breastfeeding: a cross-sectional study among mothers visiting public health facilities in the Western area of Sierra Leone. *BMC Complement Altern Med* 19(1):66. <https://doi.org/10.1186/s12906-019-2479-7>
9. Alimoradi F, Javadi M, Barikani A, Kalantari N, Ahmadi M (2014). An Overview of importance of breastfeeding. *J Compr Pediatr* 5(2). <https://doi.org/10.17795/compreped-14028>
10. Binns C, Lee M, Low WY (2016). The long-term public health benefits of breastfeeding. *Asia Pac J Public Health* 28(1):7-14. <https://doi.org/10.1177/1010539515624964>
11. Saha MR, Ryan K, Amir LH (2015). Postpartum women's use of medicines and breastfeeding practices: a systematic review. *Int Breastfeed J* 10(1):28. <https://doi.org/10.1186/s13006-015-0053-6>
12. Sim TF, Sherriff J, Hattingh HL, Parsons R, Tee LBG (2013). The use of herbal medicines during breastfeeding: a population-based survey in Western Australia. *BMC Complement Altern Med* 13:317. <https://doi.org/10.1186/1472-6882-13-317>
13. Aleandri V. The use of herbal products during breastfeeding (2014): A study from a public Italian hospital. *J Food Process Technol* 05(08). <https://doi.org/10.4172/2157-7110.1000354>
14. Lawrence RM, Lawrence RA (2022). Medications, herbal preparations, and natural products in breast milk. In: Lawrence RA, Lawrence RM (eds). *Breastfeeding* (Ninth Edition). Elsevier:326-392. <https://doi.org/10.1016/B978-0-323-68013-4.00011-0>
15. Chuang CH, Chang PJ, Hsieh WS, Tsai YJ, Lin SJ, Chen PC (2009). Chinese herbal medicine use in Taiwan during pregnancy and the postpartum period: a population-based cohort study. *Int J Nurs Stud* 46(6):787-795. <https://doi.org/10.1016/j.ijnurstu.2008.12.015>
16. Kochhar K, Saywell RM, Zollinger TW, et al. (2010) Herbal remedy use among Hispanic women during pregnancy and while breastfeeding: are physicians informed? *Hisp Health Care Int* 8(2):93-106. <https://doi.org/10.1016/j.midw.2013.06.001>
17. Millinga VP, Im HB, Hwang JH, Choi SJ, Han D (2022). Use of herbal medicines among breastfeeding mothers in Tanzania: a cross-sectional study. *Front Pharmacol* 13. <https://doi.org/10.3389/fphar.2022.751129>
18. Jackson P (2010). Complementary and alternative methods of increasing breast milk supply for lactating mothers of infants in the NICU. *Neonatal Netw* 29(4):225-230. <https://doi.org/10.1891/0730-0832.29.4.225>
19. Kimani-Murage EW, Wekesah F, Wanjohi M, et al (2015). Factors affecting actualisation of the WHO breastfeeding recommendations in urban poor settings in Kenya. *Matern Child Nutr* 11(3):314-332. <https://doi.org/10.1111/mcn.12161>
20. Amorha KC, Nwabunike IA, Okwumuo BM, Ayogu EE, Nduka SO, Okonta MJ (2018). Use of herbal medicines in a Nigerian community and their reported adverse effects: a pilot study. *Trop J Pharm Res* 17(10):2067-2072. <https://doi.org/10.4314/tjpr.v17i10>
21. Busari AA, Mufutau MA (2017). High prevalence of complementary and alternative medicine use among patients with sickle cell disease in a tertiary hospital in Lagos, South West, Nigeria. *BMC Complement Altern Med* 17(1):299. <https://doi.org/10.1186/s12906-017-1812-2>
22. Fakeye TO, Adisa R, Musa IE (2009). Attitude and use of herbal medicines among pregnant women in Nigeria. *BMC Complement Altern Med* 9(1):53. <https://doi.org/10.1186/1472-6882-9-53>
23. Li S, Odedina S, Agwai I, Ojengbede O, Huo D, Olopade OI (2020). Traditional medicine usage among adult women in Ibadan, Nigeria: a cross-sectional study. *BMC Complement Med Ther* 20(1):93. <https://doi.org/10.1186/s12906-020-02881-z>
24. Nnaemeka O, Phyllis N, Chinaza O (2021). The use of herbal medicines in pregnancy: a cross-sectional analytic study. *Int J Sci Res Dent Med Sci* 3(2):66-72. <https://doi.org/10.30485/ijrsdms.2021.280771.1144>
25. Mukherjee PK, Efferth T, Das B, et al (2022). Role of medicinal plants in inhibiting SARS-CoV-2 and in the management of post-COVID-19 complications. *Phytomedicine Int J Phytother Phytopharm* 98:153930. <https://doi.org/10.1016/j.phymed.2022.153930>
26. Onyeka TC, Ezike HA, Nwoke OM, et al (2012). Herbal medicine: a survey of use in Nigerian presurgical patients booked for ambulatory anaesthesia. *BMC Complement Altern Med* 12:130. <https://doi.org/10.1186/1472-6882-12-130>
27. Adeleye I, Okogi G, Ojo E (2005). Microbial

- contamination of herbal preparations in Lagos, Nigeria. *J Health Popul Nutr* 23:296-297
28. Agbo BE, Mbotto CI (2012). Phytochemical and antibacterial evaluation of selected locally produced herbal medicines sold in Calabar, Nigeria. *Arch. Appl. Sci. Res* 1974-1990. <http://scholarsresearchlibrary.com/archive.html>.
29. Aigberua A (2019). Composition of potential heavy metal contaminants in selected liquid and powdered herbal medicines commonly sold in Port Harcourt Metropolis, Nigeria. *Int J Med Plants Nat Prod* 5:30-39. <https://doi.org/10.20431/2454-7999.0501005>
30. Adebayo JO, Krettli AU (2011). Potential antimalarials from Nigerian plants: a review. *J Ethnopharmacol* 133(2):289-302. <https://doi.org/10.1016/j.jep.2010.11.024>
31. Akinyemi KO, Oyefolu AOB, Mutiu WB, et al (2018). Typhoid fever: tracking the trend in Nigeria. *Am J Trop Med Hyg* 99(3 Suppl):41-47. <https://doi.org/10.4269/ajtmh.18-0045>
32. Dickson I, Edagbo DE, Temitope B, Ahmed A, Michael C (2012). Herbs used by the Urhobo people in Delta state Nigeria for the treatment of typhoid fever. *Int J Recent Sci Res* 3:478-481
33. Zapantis A, Steinberg JG, Schilit L (2012). Use of herbals as galactagogues. *J Pharm Pract.* 25(2):222-231. <https://doi.org/10.1177/0897190011431636>
34. WHO 2002: Traditional medicine strategy 2002-2005. <https://apps.who.int/iris/handle/10665/67163>. Accessed March 8, 2023
35. Anderson PO (2017). Herbal use during breastfeeding. *Breastfeed Med* 12(9):507-509 <https://doi.org/10.1089/bfm.2017.0150>
36. Rahayu Y, Araki T, Rosleine D (2020). Factors affecting the use of herbal medicines in the universal health coverage system in Indonesia. *J Ethnopharmacol* 260:112974. <https://doi.org/10.1016/j.jep.2020.112974>
37. Da Costa Ferreira E, Anselmo MD, Guerra NM, et al (2021). Local knowledge and use of medicinal plants in a rural community in the Agreste of Paraíba, Northeast Brazil. *Evid Based Complement Alternat Med* 2021:e9944357. <https://doi.org/10.1155/2021/9944357>
38. Tengku Mohamad TAS, Islahudin F, Jasamai M, Jamal JA (2019). Preference, perception and predictors of herbal medicine use among Malay women in Malaysia. *Patient Prefer Adherence* 13:1829-1837. <https://doi.org/10.2147/PPA.S227780>
39. Adisa R, Fakeye T (2006). Assessment of the knowledge of community pharmacists regarding common phytopharmaceuticals sold in South Western Nigeria. *Trop J Pharm Res* 5(2):619-625. <https://doi.org/10.4314/tjpr.v5i2.14640>
40. Omoregie H, Aliyu J, Danjuma C, Folashade O (2015). Integrating traditional medicine practice into the formal health care delivery system in the new millennium—the Nigerian approach: a review. *Int J Life Sci.* 4(2): 120-128.