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## **Ethnomedical Survey of Medicinal Plants Sold in Local Markets in Akure South, Ondo State, Nigeria**

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**ABSTRACT:** Globally, millions of people in the developing world rely on medicinal plants to improve their primary health care, income generation and livelihood. An ethnomedicinal survey was conducted in four markets in Akure South Local Government Area of Ondo State, Nigeria. The aim was to document the diversity of medicinal herbs sold in the markets, their modes of preparation, the plant part(s) used, dosage, and the method of utilization. The respondents were primarily women, consisting of buyers and sellers of the herbals. Sixty-three (63) plant species belonging to 33 families were collected and identified. Asteraceae, Euphorbiaceae, and Malvaceae had the highest number of species (6 each). Most plant materials were preserved and sold in dried forms, either singly or in combinations. The preparations were prescribed to treat various ailments such as malaria, hypertension, typhoid, jaundice, hyperthermia, skin problems, dysentery, anaemia, gonorrhoea, cough, and measles.

**Keywords:** Ethnomedicine, Local markets, Medicinal plants, Folk medicine, Nigeria.

### **Introduction**

The use of plants as medicine to cure or prevent illness is common in every society, irrespective of its level of development and sophistication (Odugbemi and Akinsulire, 2006). Globally, millions of people in the developing world, including African people, rely on medicinal plants as their primary source of income and health care (WHO, 2002; Antwi-Baffour *et al.*, 2014). Between 50,000 and 70,000 plant species are known to be used in traditional and modern therapeutic systems worldwide (Schippmann *et al.*, 2006). Interestingly, like in other African and sub-Saharan African countries, in Nigeria, most citizens use medicinal plants and visit traditional medicine practitioners for their health care needs (Odugbemi, 2006).

Trade in herbal medicine provides an income for many African people, particularly those of West African descent. Still, little is known about the effects of commercial-scale harvesting on wild plant populations (van Andel *et al.*, 2015). The herbal medicine trade is of considerable economic value, providing income for large numbers of people involved in collecting, processing, transporting, and selling plants (Laird *et al.*, 2010). Global and national markets for medicinal plants and herbs have been growing rapidly, and significant economic gains are being realized. The herbal industry shares about US \$100 billion with good growth potential (Gunjan *et al.*, 2015), with WHO estimating that it will hit US \$5 trillion by 2050 (Anonymous, 2013).

In Nigeria, like in other African countries, many of these medicinal plants are harvested from the wild, and there are indications that numerous species in high demand suffer from overharvesting and habitat degradation (IUCN, 2017; Street and Prinsloo, 2013). Following the dependence of so many people on these herbal medicines for their health and income, documenting the folk knowledge or ethnomedical uses of these medicinal plants and ensuring their sustainable extraction from the wild, becomes very important. No doubt, exploring commercialized medicinal plants and documenting the immense treasure of traditional knowledge associated with the plants is an efficient means of acquiring data on local values and conservation status of indigenous

species (Idu *et al.*, 2005). Preserving the folk knowledge, which is eroded following oral tradition and the information forming a basis for further scientific validation of the plants, are also gains of an efficient market survey. However, following a literature search, there is the lack of information on documented folk knowledge of medicinal plants used and sold in the local markets in Akure, Nigeria. Therefore, it is imperative that the present study was designed to document the variety of medicinal plants sold in some local markets in the Akure metropolis, Ondo State, Nigeria.

## **Materials and methods**

*Study area:* The study was carried out in four local markets: Oba, Agbo-Omode, Isinkan and Ijoka markets in Akure South Local Government Area of Ondo State, Nigeria. The markets were selected based on an undocumented preliminary oral investigation, which revealed that the markets were the major markets within the area where medicinal plants are mainly traded. Akure is located within longitude 5° 11' East and Latitude 7° 15' North of the equator. Akure is the capital of Ondo State and the largest city in the state. The city has a population of approximately 491,033 people which is the total population of the two local government areas, Akure South and Akure North (Anonymous, 2010). Most of the indigenes, as well as inhabitants, are of the Yoruba ethnic group.

*Collection of ethnomedical information:* The survey was conducted within six months to obtain relevant information about medicinal plants traded in the area. Ethnomedicinal data collected was based on oral interviews using a semi-structured questionnaire. Data from willing respondents only were recorded. Special attention was paid to the informants' description of the symptoms of the diseases treated and the local name of the plants, the plant parts used, methods of preparation/application and dosage regimen.

*Species identification:* The collected plant samples were immediately labelled with their local names with which they were purchased and later transferred in polythene bags to the point of identification. Most plant species were identified with the professional assistance of Professor MacDonald Idu of the Phytomedicine Unit, Department of Plant Biology and Biotechnology, University of Benin, Nigeria. Standard published texts like Medicinal Plants of West Africa by Ayensu (1978); Vernacular Names of Nigerian Plants (Yoruba) by Gbile (1984); Trees of Nigeria by Keay (1989); Ethnomedical uses of Plants in Nigeria by Gill (1992); Outlines and Pictures of Medicinal Plants from Nigeria edited by Odugbemi (2006). Photo voucher specimens were obtained and kept in the herbarium of the Department of Plant Biology and Biotechnology, University of Benin, Nigeria

## Results

The ethnomedical results are presented in Table 1 below.

**Table 1:** Ethnomedicinal details of medicinal plants sold in selected local markets in Akure South L.G.A. of Ondo State, Nigeria.

Family/Botanical Name	Voucher Number	Local name (Yoruba)	Medicinal Uses	Method of Preparation	Part Used	Dosage/Regimen
<b>Amaryllidaceae</b>						
<i>Allium cepa</i> L.	UBHdt/AS/0008	Alubosa ayu	Anti-diabetes, mouth odour, Spice	Decoction and extraction	Root/bulb	One small glass cup for as long as symptoms persist
<i>Allium sativum</i> L.	UBHdt/AS/0007	Alubosa	Red eye, rheumatism, stroke.	Decoction and extraction	Root/bulb	No recommended dosage
<b>Anacardiaceae</b>						
<i>Anacardium occidentale</i> L.	UBHdt/AS/0011	Kasu	Fever, diabetes, worm expellant.	Decoction	Leaves, bark and fruits	1 glass cup twice daily
<i>Lannea welwitschii</i> (Hiern) Engl.	UBHdt/AS/0042	Epora	Purgative, fever, coated tongue.	Decoction	Bark	No recommended dosage
<i>Mangifera indica</i> L.	UBHdt/AS/0044	Mango	Malaria, jaundice, fever and high blood pressure.	Decoction	Leaves, bark	1 small glass cup for 2 weeks
<i>Spondias mombin</i> L.	UBHdt/AS/0055	Iyeye	Diabetes	Decoction	Leaves, stem, bark	1 small cup once a day for 2 weeks
<b>Annonaceae</b>						
<i>Annona muricata</i> L.	UBHdt/AS/0012	Sharp-sharp	Dysentery, laxative, fever.	Decoction	Leaves	No recommended dosage
<i>Enantia chlorantha</i> Oliv.	UBHdt/AS/0032	Ajo/Awopa	Fever, ulcer, digestive disorders.	Decoction	Leaves, bark	No recommended dosage
<i>Xylopiya aethiopica</i> (Dunal) A.Rich.	UBHdt/AS/0062	Iyere	Analgesic, spice, stomach ache, cough	Decoction	Leaves and stem bark	½ teaspoon twice daily
<b>Arecaceae</b>						
<i>Cocos nucifera</i> L.	UBHdt/AS/0026	Agbon	Poison neutralizer	Decoction of the coconut chaff Chaff is boiled in water and extracted from the coconut fruit.	Whole fruit	No recommended dosage

Family/Botanical Name	Voucher Number	Local name (Yoruba)	Medicinal Uses	Method of Preparation	Part Used	Dosage/Regimen
<i>Elaeis guineensis</i> Jacq.	UBHdt/A S/0031	Ekuro/Eyin	Menstrual disorders	Decoction	Fruit/nut	1 cup daily until flow normalizes
<b>Aristolochiaceae</b>						
<i>Aristolochia repens</i> Mill.	UBHdt/A S/0013	Akogun	For de-worming	Decoction of leaves and root	Root	1 teaspoon 3 times daily for 3 days
<b>Asparagaceae</b>						
<i>Dracaena mannii</i> Baker	UBHdt/A S/0030	Peregun	Stomach disorders, dysentery	Decoction of leaves	Leaves	No recommended dosage
<b>Asphodelaceae</b>						
<i>Aloe vera</i> (L.) Burm. f.	UBHdt/A S/0009	Ahon-erin	Skin diseases, Purgative, dysentery, diabetes	Cut succulent leaves into bits and soak in water and drink	Leaf	No recommended dosage
<b>Asteraceae</b>						
<i>Ageratum conyzoides</i> (L.) L.	UBHdt/A S/0005	Imi-Esu	General eye ailments, wounds, digestive disturbance, Skin diseases	Decoction of leaves and root	Leaves, roots. Whole plant	No recommended dosage
<i>Aspilia africana</i> (Pers.) C.D.Adams	UBHdt/A S/0014	Yinrinyun-emo	Cleaning wounds, body ache, skin rashes	Decoction of leaves and direct application on wound surface.	Leaves	No recommended dosage
<i>Chromolaena odorata</i> (L.) R.M.King & H.Rob.	UBHdt/A S/0022	Ewe Akintola	Malaria, wounds/bleeding	Decoction of leaves, direct application on wounds	Leaves	No recommended dosage
<i>Lactuca capensis</i> Thunb.	UBHdt/A S/0041	Yanrin	Diuretic, constipation	Decoction of Leaves	Leaves	1 small cup once daily
<i>Tridax procumbens</i> L.	UBHdt/A S/0059	Igbalode	Malaria, body ache, wound dressing	Decoction	Leaves	No recommended dosage
<i>Vernonia amygdalina</i> Delile	UBHdt/A S/0061	Ewuro	Stomach disorders, dysentery, Measles	Extract water from leaves, add little salt and drink	Leaves	1 small cup twice daily for a week
<b>Basellaceae</b>						
<i>Basella alba</i> L.	UBHdt/A S/0017	Amunututu	Blood supplement, vegetable	Mild decoction of leaves; can also be cooked.	Leaves	No recommended dosage
<b>Bromeliaceae</b>						
<i>Ananas comosus</i> (L.) Merr.	UBHdt/A S/0010	Ope oyinbo	Typhoid and Indigestion	Decoction of unripe fruit	Fruit	No recommended dosage

Family/Botanical Name	Voucher Number	Local name (Yoruba)	Medicinal Uses	Method of Preparation	Part Used	Dosage/Regimen
<b>Caricaceae</b>						
<i>Carica papaya</i> L.	UBHdt/A S/0021	Ibepe	Jaundice, Fever.	Decoction of Leaves and Unripe fruit	Leaves, fruits	1 small cup twice daily
<b>Clusiaceae</b>						
<i>Garcinia kola</i> Heckel	UBHdt/A S/0034	Orogbo	Cough, Body pain reliever	Decoction of Bark, Chew seeds to cure cough	Bark, Seeds	1 small cup once daily for adults
<b>Cucurbitaceae</b>						
<i>Telfairia occidentalis</i> Hook. f.	UBHdt/A S/0057	Ugu	Blood supplement	Squeeze leaf into water and drink	Leaves	1 cup morning and night for 2 weeks
<b>Dioscoreaceae</b>						
<i>Dioscorea dumetorum</i> (Kunth) Pax	UBHdt/A S/0029	Esuru	Skin diseases, Malaria	Decoction	Tuber, Leaves	No recommended dosage
<b>Euphorbiaceae</b>						
<i>Acalypha wilkesiana</i> Müll. Arg.	UBHdt/A S/0002	Jinwinni	Anti-microbial, Skin problems	Rub sap from leaves on affected body parts.	Leaves	No recommended dosage
<i>Alchornea cordifolia</i> (Schumach. & Thonn.) Müll. Arg.	UBHdt/A S/0006	Pepe	Fever, teeth problems, rheumatism	Decoction	Leaves, stem	1 teaspoon twice daily for 2 weeks
<i>Jatropha curcas</i> L.	UBHdt/A S/0037	Lapalapa	Eczema, skin diseases	Stem latex	Leaves/stem sap	Rub continuously until condition improves
<i>Jatropha gossypifolia</i> L.	UBHdt/A S/0038	Lapalapa Pupa	Smallpox, Black tongue, Skin diseases.	Stem latex	Leaves/Stem sap	Rub continuously until condition improves
<i>Jatropha multifida</i> L.	UBHdt/A S/0039	Ogege	Coated tongue	Stem sap/latex	Leaves/stem sap	No recommended dosage
<i>Manihot esculenta</i> Crantz.	UBHdt/A S/0045	Gbaguda	Eye problems, ulcer	Decoction of premature leaves	Leaves, Stems	No recommended dosage
<b>Fabaceae</b>						
<i>Caesalpinia bonduc</i> (L.) Roxb.	UBHdt/A S/0018	Ewe Ayo	Anti-fungal infections	Decoction of Leaves	Leaves	No recommended dosage
<i>Calliandra haematocephala</i> Hassk.	UBHdt/A S/0019	Egbo Tude	Stomach ache, Worm expellant	Decoction of Root	Root	½ teaspoon for babies, 1 teaspoon for Adults once a day
<i>Daniella oliveri</i> Hutch. & Dalziel	UBHdt/A S/0028	Iya	Skin rashes and general skin diseases	Decoction	Root	1 teaspoon for Babies.

Family/Botanical Name	Voucher Number	Local name (Yoruba)	Medicinal Uses	Method of Preparation	Part Used	Dosage/Regimen
<i>Daniella oliveri</i> Hutch. & Dalziel	UBHdt/A S/0028	Iya	Skin rashes and general skin diseases	Decoction	Root	1 teaspoon for Babies.
<i>Pterocarpus santalinoides</i> DC.	UBHdt/A S/0052	Gbegbe	Skin diseases	Soak bark in alcohol and drink, as well as rub the body	Bark	Drink and rub the body till results gotten
<b>Irvingiaceae</b>						
<i>Irvingia gabonensis</i> (Aubry-Lecomte ex O'Rorke) Baill.	UBHdt/A S/0036	Oro	Infertility in women	Decoction of leaves with seeds	Leaves and Seeds	1 cup once daily
<b>Lamiaceae</b>						
<i>Ocimum basilicum</i> L.	UBHdt/A S/0048	Efinrin wewe	Stomach problems, fever, pile	Decoction of leaves, Squeeze leaves into water and drink	Leaves, Whole plant	No recommended dosage
<i>Ocimum gratissimum</i> L.	UBHdt/A S/0049	Efinrin nla	Cough, fever, dysentery, pile	Decoction of leaves, Squeeze leaves into water and drink	Leaves, whole plant	No recommended dosage
<b>Lauraceae</b>						
<i>Persea americana</i> Mill.	UBHdt/A S/0050	Pia	High blood pressure	Decoction of the leaves	Leaves	1 small cup once daily preferably at night before bed
<b>Malvaceae</b>						
<i>Abelmoschus esculentus</i> (L.) Moench	UBHdt/A S/0001	Ila	Gonorrhoea, Low sperm count	Grind fruits and seeds together, and add Onion and little honey.	Fruits, Seeds	1 teaspoon for as long as possible
<i>Adansonia digitata</i> L.	UBHdt/A S/0003	Ose/Ese	Arthritis/Rheumatism	Decoction	Leaves, Bark	No recommended dosage
<i>Sida acuta</i> Burm. f.	UBHdt/A S/0053	Iseketu	Malaria, worm expellant, wound dressing	Decoction of leaves, Squeeze leaves and apply extract on the wound	Leaves	No recommended dosage
<i>Sida rhombifolia</i> L.	UBHdt/A S/0054	Iseketu pupa	Malaria, Wound dressing, Worm expellant	Decoction of leaves, Squeeze leaves and apply extract on the wound	Leaves	No recommended dosage

Family/Botanical Name	Voucher Number	Local name (Yoruba)	Medicinal Uses	Method of Preparation	Part Used	Dosage/Regimen
<i>Urena lobata</i> L.	UBHdt/A S/0060	Esinsin-agborin	Diarrhoea, dysentery, worm expellant	Decoction of leaves, whole plant	Leaves, Whole Plant	½ teaspoon for babies once daily; 1 teaspoon daily for adult
<b>Meliaceae</b>						
<i>Azadirachta indica</i> A.Juss.	UBHdt/A S/0015	Dongoyaro	Malaria, jaundice.	Decoction of Leaves, Stem-bark	Leaves, stem-bark	1 small cup once daily for 1 week
<i>Khaya ivorensis</i> A. Chev.	UBHdt/A S/0040	Oganwo	Blood supplement, tonic, anaemia	Decoction	Bark	1 small cup once daily
<b>Moraceae</b>						
<i>Ficus exasperata</i> Vahl	UBHdt/A S/0033	Epinpin/Erinpin	Hypertension, urinary problems	Decoction of leaves, bark, seeds	Leaves, bark	1 small cup twice daily
<b>Musaceae</b>						
<i>Musa sapientum</i> L.	UBHdt/A S/0046	Ogede Ibile wewe	Malaria	Infusion of fruit	Fruits	1 teaspoon twice daily for 1 week
<b>Myrtaceae</b>						
<i>Psidium guajava</i> L.	UBHdt/A S/0051	Guaba	Fever, Digestive disorders	Decoction of leaves, Bark	Leaves, bark	1 small cup twice daily
<i>Syzygium guineense</i> (Wild.) DC.	UBHdt/A S/0056	Ori	Purgative	Decoction	Bark	1 small cup once for adults / 2 teaspoons once daily for children
<b>Poaceae</b>						
<i>Bambusa vulgaris</i> Schrad.	UBHdt/A S/0016	Ewe Oparun	Gonorrhoea, can induce abortion	Decoction of young leaves and shoots	Leaves, Young shoots	1 cup twice daily
<i>Cymbopogon citratus</i> (DC.) Stapf	UBHdt/A S/0027	Ewe tea	Anti-Malaria	Decoction	Leaves	1 small cup twice daily
<b>Rubiaceae</b>						
<i>Sarcocephalus latifolius</i> (Sm.) E.A.Bruce	UBHdt/A S/0047	Gberesi	Jaundice, Cough, Malaria, Menstrual and stomach disorders	Decoction of root, bark	Root, bark	1 small cup once daily
<b>Rutaceae</b>						
<i>Citrus aurantiifolia</i> (Christm.) Swingle	UBHdt/A S/0023	Osan wewe	Malaria, typhoid	Decoction of leaves, stem bark and root bark	Leaves, Stem and roots	1 small cup once daily
<i>Citrus aurantium</i> L.	UBHdt/A S/0024	Osan ganyinganyin	Malaria, typhoid	Decoction of leaves, stem bark and root bark	Leaves, stem and root bark	1 small cup once daily

Family/Botanical Name	Voucher Number	Local name (Yoruba)	Medicinal Uses	Method of Preparation	Part Used	Dosage/Regimen
<i>Citrus paradisi</i> Macfad.	UBHdt/A S/0025	Osan nla, Gerepu	Malaria, typhoid	Decoction of fairly ripened fruit and leaves with <i>C. citratus</i> .	Fruit, leaves	1 small cup once daily
<b>Sapindaceae</b>						
<i>Lecaniodiscus cupanioides</i> Planch. ex Benth.	UBHdt/A S/0043	Akika	Jaundice, cough, malaria, body pain	Decoction of stem-bark, leaves, young shoot	Stem bark, leaves and young shoot	1 small cup once daily
<b>Solanaceae</b>						
<i>Capsicum frutescens</i> L.	UBHdt/A S/0020	Ata wewe	Fever, dysentery, malaria, stimulant	Fruits and seeds can be used in cooking and eaten or can be eaten raw.	Fruits, seeds	No recommended dosage
<b>Tiliaceae</b>						
<i>Glyphaea brevis</i> (Spreng.) Monach.	UBHdt/A S/0035	Atori	Malaria	Decoction of the leaves	Young leaves and stem bark	Take 1 cup once daily
<b>Zingiberaceae</b>						
<i>Aframomum melegueta</i> K. Schum.	UBHdt/A S/0004	Ataare	Smallpox, chickenpox, cough,	Seeds can be eaten either raw or cooked; leaves can be cooked or boiled.	Seed, leaves, roots	No recommended dosage
<i>Zingiber officinale</i> Roscoe	UBHdt/A S/0063	Ataale, Jinja	Cold, cough, asthma, stimulant, digestive problems	Seeds can be eaten raw or cooked	Seeds, rhizome	No recommended dosage

## Discussion and conclusion

There has been a growing public awareness and usage of herbal medicinal products in treating and preventing diseases (Okunola *et al.*, 2007). The local markets within the study area (Akure) are the major areas where medicinal plants are sold. From the markets, sixty-three species belonging to thirty-one families were recorded. The Asteraceae, Euphorbiaceae, and Malvaceae families had the highest number of species. Information relating to their local names, parts used, preparation methods, medicinal uses and dosage regimens were documented. The plants were grouped into families and listed in alphabetical order. The documented plants were used to treat common ailments, including malaria, typhoid, jaundice, dysentery, gonorrhoea, cough, skin irritation, measles and hypertension (Table 1). A total of 35 informants were interviewed, predominantly women between 45-60 years. Some were assisted by younger apprentices, most being their offspring. Of the 35 informants, 89 % (31) were females, whereas 11 % (4) were males. It indicates that more women are involved in the oral tradition of indigenous knowledge of plants and trading on these medicinal plants within the markets than men. This corroborates earlier reports by Idu *et al.* (2010) that women are the primary medicinal plant material traders. The gathering of minor forest products or non-timber forest products remains the primary source of the economy of indigenous people (Momohjimoh *et al.*, 2022). The respondents revealed that selling these medicinal plants has been their major income source. Furthermore, it was noted that some respondents were also engaged in diagnosing and prescribing herbal remedies. The capacity of the respondents to perform the aforementioned



duties can be readily traced to the oral tradition; some of the respondents admitted that their knowledge of herbal remedies is a family heritage.

Using plants and their extracts or chemicals derived from them to treat disease is one therapeutic modality that has transcended several generations. It was observed that most plant parts in the market were in dried forms and sold either as single parts or in combination with other plant parts ("concoctions"). Most concoctions consisted of chopped roots, stem barks, fresh or dried leaves and fruits. These were prepared mainly by decoction. Some of the remedies were prepared from a single plant source, e.g., *Alchornea cordifolia* (for treating fever and rheumatism), *Garcinia kola* (for relief of body pain and cough) and *Khaya ivorensis* (as a blood booster). A few others were in combination with other common plants, such as *Vernonia amygdalina* with *Allium sativum* and *Aloe vera* (for dysentery). Generally, the concoctions were prepared on demand, unlike the conventional drugs, produced in advance. Most findings of this study agreed with the previous survey by Idu *et al.* (2010). A few traders could explain that combining certain plants in herbal preparations can probably be adduced to either the synergistic or additive effects of the constituent plants. However, It was noted from the survey that establishing a standard dosage for some of the remedies was difficult as the recommended dose varied from one seller to the other. Additionally, some pharmacognosy drugs of the same species produce conflicting results between clinical trials and previous reports in animal experiments (Villanueva *et al.*, 2017). Hence the World Health Organisation advocates improved efforts toward standardizing herbal products (WHO, 2017).

Most herbs sold in the study area are harvested from the wild. Indeed, market and public demand has been so high that there is a significant risk that many medicinal plants today face either extinction or loss of genetic diversity. Growing demand for medicinal plants and harvesting the bulk of plants traded in these local markets from the wild can increase pressure on wild plant populations. This, combined with shrinking habitats, may lead to several species facing local extinction. This is similar to the earlier observation of Botha *et al.* (2004) when they profiled markets and trade in medicinal plants in the Lowveld of South Africa.

In conclusion, trade in medicinal plants has been part of the economic practice of the indigenous people of Akure. It is a means of sustenance for many rural women. The practice has also endowed many of the sellers with valuable knowledge on the medicinal applications of several herbs. Herbal materials and remedies for common ailments in the community were available within the markets. However, a lack of standard dosage may challenge the efficacy of some of the treatments.

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