



A Review of Ethnomedicinal Plant Resources in Southern Nigeria

K.C. Enebeli-Ekwutoziam, C.B. Aruah, B.O. Ogbonna, U.J. Eze, F.S. Egedeye-Fubura, C.F. Nwankwo, I.N. Oliseyenum, N.W. Udoha, T.N. Afuye, G.N. Asogwa, K.A. Chinweokwu, F.O. Anenih, J.E. Iyamu, I.D. Oboti, N. Nwaizu, J.I. Ajobor, O.Y. Ozadibe, R.A. Otunla, Okoronkwo Bertha Francis and Chukwu Miriam Orji

Correspondence

K.C. Enebeli-Ekwutoziam¹, C.B. Aruah¹, B.O. Ogbonna¹, U.J. Eze¹, F.S. Egedeye-Fubara¹, C.F. Nwankwo¹, I.N. Oliseyenum¹, N.W. Udoha¹, T.N. Afuye¹, G.N. Asogwa¹, K.A. Chinweokwu², F.O. Anenih², J.E. Iyamu², I.D. Oboti², N. Nwaizu², J.I. Ajobor², O.Y. Ozadibe², R.A. Otunla², Okoronkwo Bertha Francis² and Chukwu Miriam Orji²

¹National Biotechnology Development Agency of Nigeria

²National Biotechnology Development Agency of Nigeria, Bioresources Development Centre (Out Station) Ubulu-Uku, Delta State

*Corresponding Author: katstancity@gmail.com

Ethnobotany Research & Applications 22:13 (2021)

Research

Abstract

Background: The inadequate programs established to eradicate numerous health problems in Nigeria have led to little improvement in the health status, especially in southern Nigeria. Southern Nigeria has a high prevalence rate of malaria, typhoid, fevers, colds and chills, catarrh, flu, river blindness, respiratory disorders, eye problems and skin infections. The strain caused by the dire need to provide a financial health coverage for the family, a poorly developed health care systems and functional surveillance has led to the exploration of alternative medicine by the indigenes of southern Nigeria. This study aims at documenting information on the common plant resources employed in the ethnomedicinal practices of the indigenous people of the Southern Nigeria, and to explore ways of sensitizing genuine conservation efforts in the face of threat of genetic erosion posed to these resources due to anthropogenic activities.

Materials and methods: Onsite ethnomedicinal survey in the study area was carried out between September 2019 and November 2020 to document an indigenous medicinal plant traditional knowledge. Interviews were conducted with the aid of a local language interpreter. Data were obtained using 300 semi-structured questionnaires. Consultations were made on all available information about traditional medicinal plants and ethnomedicinal surveys in Southern Nigeria. Online electronic databases including Google scholar, Research Gate, SciFinder, ScienceDirect and Open Thesis were used to search for relevant literature. Ethnomedicinal data were analyzed using the Relative frequency of citation (RFC), Fidelity level (FL), Relative popularity level (RPL), Use value (UV) and Informant Consensus Factor (ICF).

Results: A total of 236 species belonging to 80 families were reported by this study. Fabaceae was the most represented family having thirty (30) plant species. The three (3) regions had varying frequencies of occurring plants species. South-Western Nigeria represented the region with the highest plant occurrence (47%) followed by South-

South (31%). Leaves (42.32%) were the most common parts used in the preparation of herbal remedies. Decoctions (48.89%) were the most common method of plant preparation used in herbal remedies. Regional distribution and occurrence of ethnomedicinal plant resources of Southern Nigeria is reported here for the first time.

Conclusion: Medicinal plants play crucial role in the treatment of various ailments by the indigenous people in Southern Nigeria. This study highlights the level of species richness as well as biodiversity in the study area. Bioactivity and toxicity by *in vitro* and *in vivo* standard tests should be made on herbal drug extracts of the presented species for isolation and possible identification of potentially active compounds

Background

Ethnomedicinal plants are components of effective source of both traditional and modern medicine. In recent times their potency has been proven and approximately 80% of the rural population depend on them as a source of health care (Akinyemi *et al.* 2018 and Abd El-Ghani 2016). Traditional medicine has always been popular among countries of the developing world and its use is becoming acceptable in the industrialized nations (Akinyemi *et al.* 2000).

As defined by WHO (1978), traditional medicine is the total of all knowledge and practical application, whether explicable or not used in diagnosis, prevention, and elimination of physical, mental or social imbalance, and relying exclusively on practice and experience and observations handed down from generation to generation, whether verbally or in writing.

Since ancient times people across the continents including Africa and most notably West Africa, have relied on plants as sources of remedies for the treatment of many diseases (Abd El-Ghani 2016). According to Hostellmann and Marston (2002), orthodox drugs are expensive in developing countries especially West Africa.

Plant genetic resources of Nigeria are a veritable source of therapeutics and pharmaceuticals though the plants are not adequately documented (Gbile & Adesina 1986). Ethnomedicinal practice have long been in existence in southern Nigeria but currently undergoing degradation because of pressure from practitioners of modern medical practice and the lack of proper scientific background in its method of administration. The worldwide renewed interest in traditional medicine is due to insufficient availability of orthodox medicine in poor countries, and the sustenance of healthcare has been achieved by these cultural alternatives (Okujagu 2005). Noteworthy is that despite the renewed interests in the use of ethnomedicinal plants, many of the plants may have gone into extinction long before they are documented (Eke 1999). Over-exploitation of wild population of Plant species, anthropogenic activities and lack of conservation programmes are the major problems encountered with sustainable management of these plant resources, especially in the Southern part of Nigeria (Wambebe 1998).

It has been observed that ethnomedicinal practitioners tend to hold in secret the identity of plants used for different ailment for fear of lack of future patronage should the sufferer learn to cure himself. To mystify their trade, cultivation of the plants is not encouraged, thus all the collections are virtually from the wild. With the passing away of most of these practitioners along with their wealth of knowledge, a huge loss is made in the body of knowledge dealing with the plants that heal. Often, the discerning ones try to relate this important information to a few close relatives where any interest is shown. This mode of transmission is, however, grossly inadequate in that it lacks continuity (Obute and Osuji 2002).

Health information system (HIS) is a structured repository of data, information, or knowledge that provides support in health care delivery or to promote health development. Health care provision in Nigeria is a function of the three tiers of Government, Federal, State and Local Governments (Adeyemo 2005, Omoruan *et al.* 2009, NHIS 1999). The primary health care system in southern Nigeria is managed by Local Government and supported by the southern States Ministry of Health and private medical practitioners (Olanrewaju & Akanni 2010, Adeyemo 2005). There are some challenges related to the Health Information System (Onwujekwe *et al.* 2010, Uzochukwu *et al.* 2015) and this makes the Federal Government unable to take lead roles in directing stakeholders in the health sector and this has resulted to increased levels of fragmentation (Adeyemo 2005).

Population health is determined by environmental, behavioral, genetic, demographic, social, and economic factors. Medical intelligence and surveillance are important components in the health care system and help to control disease outbreak, bio-attack etc. The role of automated based medical intelligence and surveillance systems alongside traditional manual pattern of document retrieval is widespread in Europe and the West. In contrast, the

Nigerian health care system is still poorly developed, and lacks adequate and functional surveillance systems (Menizibeya 2011). Presently, the strain caused by the dire need to provide a financial health coverage for the family, a poorly developed health care system and functional surveillance has led to the exploration of alternative medicine by the indigenes of southern Nigeria (Olanrewaju & Akanni 2010).

The inadequate programs designed to address the numerous health problems in Nigeria have led to little improvement in the health status, especially in southern Nigeria (Kajang & Keswet 2016). From causes such as poor nutrition, poor health facilities, availability of trained medical personnel etc. to mode of living, ways of life and occupational hazards involved in occupations like fishing, wine tapping farming. Environmental factors such as those living in the riverine areas and absence of municipal sewage systems has increased the level of waterborne diseases, and as a result has caused major increase in the health challenges of persons living in these regions.

Southern Nigeria has a high prevalence rate of malaria, as studies have shown that the highest prevalence rates are found in the Niger Delta States, and areas surrounding the confluence of the rivers Niger and Benue. All Nigerians are at risk of malaria and the problem is compounded by the increasing resistance of malaria and the cost of effective drugs (Jimoh *et al.* 2007, Okonko *et al.* 2009, Nnadozie 2015, Ezenduka *et al.* 2017). Other ailments prevalent in the region include typhoid (Ojo *et al.* 2009, Clark *et al.* 2010), fevers, colds and chills, catarrh, flu, river blindness (Murray *et al.* 2013), respiratory disorders, eye problems, worm infection (Gillespie 2018), stomach infections (Bryce, *et al.* 2005, Ryan 2016) and skin infections.

The need to review ethnomedicinal plants in Southern Nigeria and their various uses cannot be overemphasized for a number of reasons which includes, a growing number of household resort to alternative medicine for health provisions, widespread use of plants in folk medicine, need to conserve traditional medicinal plants and proper documentation of knowledge about them in order to curtail their imminent loss or erosion. This study aims at documenting information on the common plant resources employed in the ethnomedicinal practices of the indigenous people of the Southern Nigeria, and to explore ways of sensitizing genuine conservation efforts in the face of the genetic erosion threat posed to these resources due to anthropogenic activities.

Materials and Methods

Demographic Data of Southern Nigeria

The study was carried out in Southern Nigeria (Fig. 1) which is made up of three (3) regions (geopolitical zones) namely: the south–east region (S.E) comprising of Anambra state, Imo state, Abia state, Enugu state, Ebonyi state, south–south region (S.S) comprising of Delta state, Edo state, Bayelsa state, Rivers state, Cross rivers state and Akwa-ibom state, and south–west region (S.W) comprising of Lagos state, Ondo state, Ogun state, Ekiti state, Oyo state and Osun state (Fig. 1). These regions are characterized by high rainfall and high humidity for most of the year with an average annual rainfall of 250 cm near the coastal areas and 150 cm in the northern parts of the region. These regions consisted of different ethnic groups of which six (6) were predominant namely, Yoruba (Y.), Igbo (I.), Edo (E.), Bini (B.), Urhobo (U.), Efik (E.), Ikwerre (IK.), Ibibio (Ib.), Ekpere (Ek.), Kalabari (K.), Ogoni (O.), Oboso-Mbube (O-M.) and Ijaw (Ij.).

Data collection and ethical procedures

The informants were briefed on the objectives of the study and informed consent was obtained from each informant. Onsite ethnomedicinal survey in the study area was carried out between September 2019 and November 2020 to document an indigenous medicinal plant traditional knowledge. Interviews were conducted with the aid of a local language interpreter where necessary. Information such as local names, therapeutic use, plant part used, mode of preparation and regional distribution pattern were obtained through the use of semi-structured questionnaires (Huntington 2000). One hundred questionnaires were administered to the informants in each of the three geopolitical zones which make up Southern Nigeria and this summed up to a total of 300 questionnaires administered for the study. Consultations were made on all available information about traditional medicinal plants and ethnomedicinal surveys in Southern Nigeria. A total of 200 male and female informants from all age-groups were randomly selected for the interview, males comprised 48% and females 52% of which, 80 were traditional herb sellers, 65 community elders and 55 were herbal practitioners (Tables 1 & 2). Sixty informants from the total number of informants were interviewed with the aid of a local language interpreter.

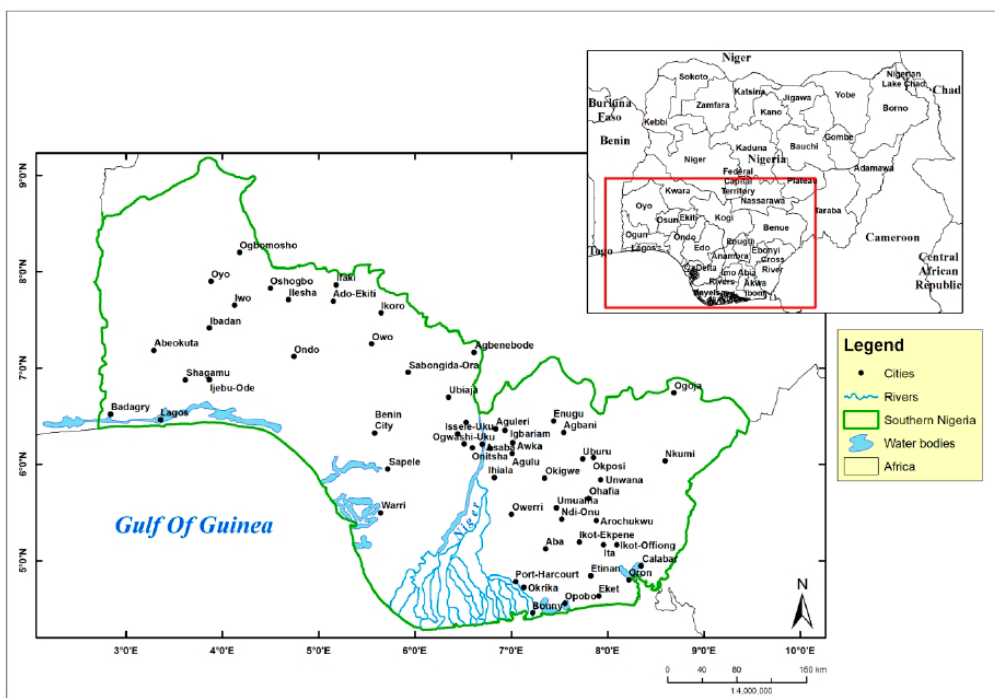


Figure 1. Location of the study area.

Table 1. Demographic data of informant on ethnomedicinal Plant species and their therapeutic application

Respondents	Herbal vendors	Herbal practitioners	Community elders	Total interviewed persons
Male (<40)	10	6	-	16
Male (>40)	25	28	27	80
Female (<40)	12	8	-	20
Female (>40)	33	13	38	84
Total interviews	80	55	65	200
Percentage (%) men	44	62	42	48
Percentage (%) women	56	38	58	52

Table 2. Data on the trade practice of respondents

Respondent	Herbal sellers	Herbal practitioners	Community elders	Total interviewed persons
<40	22	14	-	36
>40	58	41	65	164
Total interviews	80	55	65	200
% <40	27	25	-	18
>40	73	75	100	82

Authentication and validation of species

Medicinal plants reported in the survey were collected, identified using Trees of Nigeria (Keay 1989), flora of Nigeria and West Africa (Hutchinson & Dalziel 1954, 1958, 1968). The identified plants were pressed and deposited at the Bioresources Development Centre, Ubulu-Uku Herbarium (BDU), Delta state. Taxonomic names of plant species were validated from online databases like: The Plant List (<http://www.theplantlist.org/>), International Legume Database and Information Service (<http://www.ildis.org/>) and encyclopedia of life (<https://eol.org/>). Data obtained were collected and tabulated to ascribe botanical names, common names, vernacular names, families of the various plant species as well as their uses.

Online electronic databases including Google scholar, Research Gate, SciFinder, ScienceDirect, IJPURB and Open Thesis were used to search for relevant literature on previous studies. The key words employed in the electronic search criteria were "Ethnomedicinal surveys", locations of the surveys South-South, South-East and South-West Nigeria. The following key words were used alongside ethnomedicinal practices, health information systems, medical intelligence, and surveillance.

Data analysis

Data obtained from the study were cleaned prior processing and were analyzed using Statistical Package for Social Science (SPSS) version 23 and Microsoft Office Excel 2016. Socio-demographic data of the respondents were analyzed using a simple descriptive statistical method and reported in a summary of frequency and percentages. On the other hand, ethnomedicinal data were analyzed using the Relative citation frequency (RFC), Fidelity level (FL), Relative popularity level (RPL), Use value (UV) and Informant Consensus Factor (ICF).

Relative frequency of citation (RFC)

Calculations were made for the local importance of each plant species based on the relative frequency of citation (Tardio *et al.* 2006). The RFC was calculated as follows: number of who mentioned the use of the species (FC) divided by the total number of respondents (N).

$$RFC = \frac{FC}{N}$$

Informant consensus factor (ICF)

Informant consensus factor was calculated in accordance with Herinch *et al.* (1998) for each category of ailment to authenticate the level of agreement by the informants on the reported cures for a group of ailments.

$$ICF = \frac{(N_{ur} - N_t)}{N_{ur} - 1}$$

Where N_{ur} = number of use citations in each category

N_t = number of species used

Fidelity Level

Fidelity Level was calculated in accordance with Alexiades and Sheldon (1996) for the most frequently reported diseases as

$$FL (\%) = \frac{N_p}{N}$$

Where N_p = number of informants that claim a plant use to treat a particular disease N = number of informants that use the plant as medicine in the treatment of any disease

Relative Popularity Level

Relative popularity level was calculated using the formula below in accordance with Ali-Shtayeh *et al.* (2000).

RPL = Number of diseases treated by a specific plant species / Total number of informants for any disease

Use value

Use value for each species was calculated in accordance with Savkin *et al.* (2013) as

$$Use\ value\ (UV) = \frac{\sum u_i}{N}$$

Where u_i = number of uses recorded for each species n = number of diseases treated by the species

Results

A total of 236 species were reported by this study and this is shown in Table 3. Study quality inconsistencies were recorded in line with local and common names, completeness of herbal drug recipe, plant parts used, ailments treated and route of herbal drug preparation. Two hundred informants provided information on herbal remedies used in 22 ethnomedicinal therapeutic applications (Table 5). The use of single plant species (5%) as well as multiple uses of plant species (95%) in the treatment of various ailments is reported. This study revealed important information gaps that should be addressed as well as the need for standardization of ethnomedicinal practices and studies in Southern Nigeria.

Frequency of family occurrence

A total of eighty (80) families were reported in this study. The results obtained from this study revealed, the family of Fabaceae had the highest frequency of occurrence having thirty (30) plant species, followed by Asteraceae with fourteen (14) species, Euphorbiaceae having thirteen (13) species, Rutaceae having nine (9) species, Curcubitaceae (8), Annonaceae, Combretaceae, Rubiaceae and Verbenaceae having (6) species each, as well as Apocynaceae, Lamiaceae, Meliaceae and Sterculiaceae having five (5) species each (Table 3, Fig. 2).

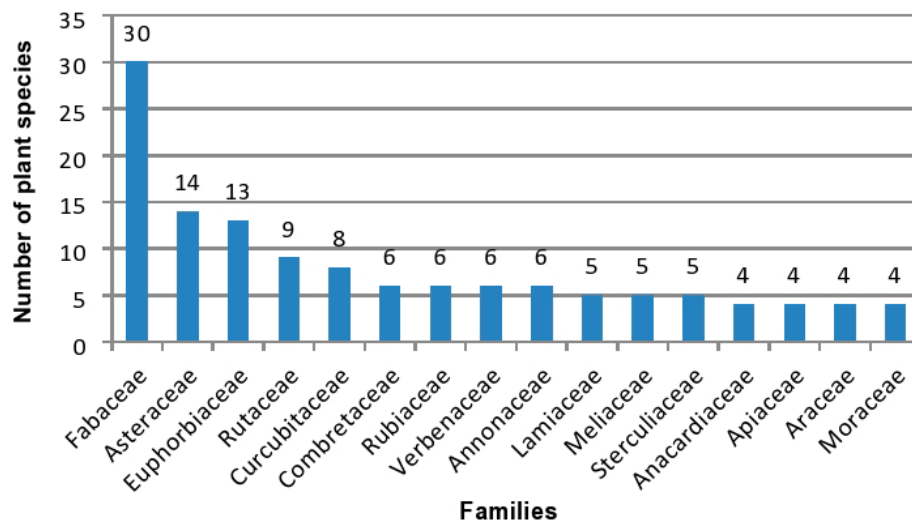


Figure 2. Top sixteen representative families of medicinal plants in Southern Nigeria.

Frequency of plants regional occurrence

In the study area (Southern Nigeria), the three (3) regions had varying frequencies of occurring plants species. South-Western Nigeria represented the region with the highest plant occurrence (47%) followed by South-South (31%) and South-East (22%) (Fig. 3).

Frequency of plants parts used

In the study area, the leaves (42.32%) were the most common parts used in the preparation of herbal remedies followed by the stem/stembark (20.63%), roots (14%), seeds (6.87%), fruits (7.93%), whole plant (3.9%), sap (1.32%), rhizome (0.52%), corms, flowers, oils, pulp, and gum exudates each having 0.26% (Fig. 4).

Frequency of plant preparation

In the study area (Fig. 5), decoction (48.89%) was the most common method of plant preparation used in herbal remedies followed by infusions (15.29%), poultices (11.33%), juice extracts (8.78%), mastication (5%), tinctures (4.53%), macerations (2.54%), baths and remedies (1.98%), aromatherapy and powdered each having 1.41%, compresses and syrups each having (0.84%).

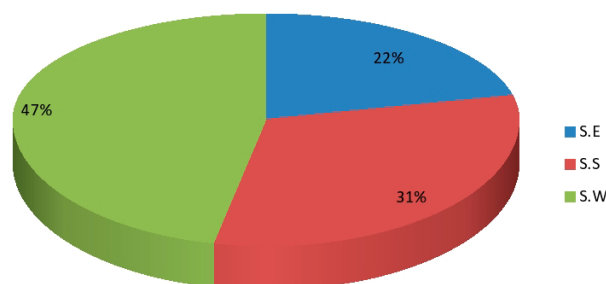


Figure 3. Frequency of plants regional occurrence.

Table 3. Ethnomedicinal Plants in Southern Nigeria

	Family	Local name	Common name	Therapeutic usage	Parts used	Method of preparation	Relative frequency of citation (RFC). RFC¼ FC/N (N¼ 200)	Fidelity level	Relative popularity level	Use value	Regional distribution pattern	References
<i>Abrus precatorius</i> L. BDU 106	Fabaceae	Anyannun (K.), Ojuologbo (Y.)	Crab's eye, Bead tree	Malaria, eye infection, skin disease, cough	Leaves	Decoction	0.26	73	0.2	0.07	s.s, s.w	Iyama & Idu 2015
<i>Acacia nilotica</i> (L.) Wild ex Del BDU 133	Fabaceae	Boonii (H.)	Acacia, Egyptian mimosa	Malaria	Seeds	Decoction	0.19	55	0.05	0.02	s.e, s.s, s.w,	Iyama & Idu 2015
<i>Acacia senegal</i> (L.) Wild BDU 51	Fabaceae	Dakwara (H.)	Acacia, Gum Arabic	Malaria	Stembark	Decoction	0.1	60	0.05	0.05	s.e, s.s, s.w	Iyama & Idu 2015
<i>Acalypha fimbriata</i> (Schum & Thonn) Forsk BDU 91	Euphorbiaceae	Abalebaji (K.)	Copper leaves	Heart failure, cough skin disease, boils	Leaves, twig	Juice, decoction	0.11	68	0.2	0.18	s.w	Ajibesin <i>et al.</i> 2008 & 2012
<i>Acanthospermum hispidum</i> D.C BDU 47	Asteraceae	Dagunro (Y.), Gorogoro (U.)	Starburr	Malaria	Leaves	Decoction	0.09	50	0.05	0.05	s.s, s.w	Iyama & Idu 2015
<i>Acanthus montanus</i> (Nees) T. Anders BDU 10	Acanthaceae	Inyinyiogwu (I.), Oga (IK.)	False thistle	Chesty coughs, boils, Chest pain, heart failure, gonorrhoea, wounds	Leaves, roots	Decoction, tincture, poultice	0.22	70	0.3	0.13	s.e, s.s, s.w	Alade <i>et al.</i> 2018, Akwaji <i>et al.</i> 2017
<i>Achyranthes aspera</i> L. BDU 12	Amaranthaceae	Aboro, Abora (Y.)	Prickly chaff flower	Malaria	Leaves, roots	Decoction	0.06	75	0.05	0.08	s.w	Iyama & Idu 2015
<i>Adansonia digitata</i> L. BDU 93	Bombacaceae	Ose (Y.)	Baobab tree	Arthritis, malaria, rheumatism, toothache, asthma, dysentery	Leaves, stembark, seeds, latex, pulp	Decoction, tincture, poultice	0.19	71	0.3	0.15	s.s, s.w	Akwaji <i>et al.</i> 2017, Iyama & Idu 2015, Lawal <i>et al.</i> 2010
<i>Adenopus breviflorus</i> Benth. BDU 160	Cucurbitaceae	Ukuro (EK.)		Convulsion, laxative	Leaves, fruits	Decoction, infusion	0.09	77	0.1	0.11	s.s, s.e	Ajibesin <i>et al.</i> 2008 & 2012
<i>Adenostemma mauritanum</i> DC. BDU 03	Asteraceae	Oforu (IK.)		Malaria, measles	Leaves	Infusion	0.05	60	0.1	0.2	s.s	Ajibesin <i>et al.</i> 2008 & 2012
<i>Afromomum melegueta</i> roscoe K. Schum BDU 31	Zingiberaceae	Ose-oji, (I.), Erhie (U.), Atare (Y.)	Alligator pepper, grains of paradise, guinea grains	Diabetes, female infertility, vermifuge, smallpox, chickenpox, catarrh, chest congestion, malaria, hypertension, measles, sore throat, cholera, aphrodisiac	Leaves, seeds, stembark	Decoction, aromatherapy, mastication, macerations in <i>Mimordica charantha</i> and <i>Sorghum arundinaceum</i>	0.23	78	0.7	0.3	s.e, s.s, s.w	Iyama & Idu 2015, Alade <i>et al.</i> 2018
<i>Ageratum conyzoides</i> L. BDU 184	Asteraceae	Ulanjula, uratanjele (I.), Ogba-Okukpo (K.), Ako-yunyun (Y.)	Goat weed	Wounds, eye infections, malaria, skin diseases	Leaves	Infusion, juice extract	0.19	84	0.2	0.1	s.e, s.s, s.w	Iyama & Idu 2015

<i>Alchornea cordifolia</i> (Schum & Thonn.) Müll.-Arg. BDU 53	Euphorbiaceae	Ubebe (I.), Epai (IK), Epa, Esin (Y.)	Christmas bush	Eye problem, as a detox bitter, wounds, Toothache, hemorrhoid, ringworm, rheumatism, gonorrhea, urethral disease, dysentery	Leaves, stembark, root epidermis	Decoction, juice, mastication, maceration	0.23	76	0.5	0.21	s.e, s.s, s.w	Ariwaodo <i>et al.</i> 2012, Akwaji <i>et al.</i> 2017
<i>Allanblackia floribunda</i> Oliv. BDU 57	Clusiaceae	Egba (I.), Orogboerin (Y.)	Fallow tree	Malaria, tooth ache	Leaves	Decoction	0.07	85	0.1	0.14	s.e, s.w	Akwaji <i>et al.</i> 2017, Iyama & Idu 2015
<i>Allium cepa</i> L. BDU 90	Liliaceae	Alubosa (Y.), Uta (E.)	Onions	Malaria, convulsions, faintings	Leaves, whole bulb, stembark	Decoction, topical application	0.13	50	0.15	0.11	s.s, s.w	Iyama & Idu 2015
<i>Allium sativum</i> L. BDU 35	Amaryllidaceae	Ayuu (Y.), Ayo (U.), Uta (E.)	Garlic, Haemorrhage Plant	Highblood pressure, malaria, fever, indigestion and as a tonic	Leaves, stembark	Decoction, mastication	0.17	88	0.25	0.14	s.s, s.w	Alade <i>et al.</i> 2018
<i>Aloe vera</i> (L.) Burm. f BDU 16	Liliaceae		Barbados Aloe	Malaria, hair growth, wounds, skin infections, dysmenorrhea	Leaves	Decoction	0.07	71	0.3	0.29	s.e, s.s, s.w	Alade & Ajibesin 2017, Iyama & Idu 2015
<i>Alstonia boonei</i> DeWild BDU 44	Apocynaceae	Egbu (I.), Ulodiri (EK), Ahun (Y.)		Tonic, malaria, asthma, cough, rheumatism, gonorrhoea, vermifuge, bladder disease	Leaves, stembark, roots	Decoction, topical applications, poultice	0.22	90	0.4	0.18	s.e, s.w	Ariwaodo <i>et al.</i> 2012, Akwaji <i>et al.</i> 2017
<i>Anacardium occidentale</i> L. BDU 88	Anacardiaceae	Kanshu (I.), Kasu (Y.), Kasiu (IK)	Cashew	Fever, malaria, tooth aches, diarrhea, kidney problem, whooping cough	Leaves, stembark	Decoction, poultice, tincture	0.19	84	0.4	0.18	s.e, s.s, s.w	Akwaji <i>et al.</i> 2017, Iyama & Idu 2015, Lawal <i>et al.</i> 2010
<i>Ananas comosus</i> (L.) Merr. BDU 162	Bromeliaceae	Ope-Oyibo (U.), Ediebo (EK)	Pineapple	Fever, malaria, hepatitis, typhoid, menstrual disorder, waist pain, purgative, expectorant, emmenagogue	Fruits	Decoction	0.15	80	0.5	0.3	s.s	Ariwaodo <i>et al.</i> 2012, Iyama & Idu 2015
<i>Anethum graveolens</i> L. BDU 111	Apiaceae	Udumie (K.)	Dill weed	Laxative, improved lactation	Seeds	Decoction, infusion with honey	0.07	85	0.1	0.14	s.s	Ajibesin <i>et al.</i> 2008 & 2012
<i>Anogeissus leiocarpus</i> (D.C.) Guill. & Perr BDU 64	Combretaceae	Egbo-anyin (Y.)	Axle wood	Malaria	Roots	Decoction	0.05	60	0.05	0.1	s.w	Iyama & Idu 2015
<i>Annona muricata</i> L. BDU 120	Annonaceae	Nangi (K.), Abo (Y.)	Sour sop	Malaria, diarrhea, dysentery, debility, hypertension, heart failure, yellow fever	Leaves	Decoction	0.11	86	0.4	0.32	s.s, s.w	Lawal <i>et al.</i> 2010
<i>Anthocleista djalonenis</i> A. Chev BDU 148	Loganiaceae	Sapo (Y.)	Cabbage tree	Malaria, anti-diuretic, purgative, jaundice	Stembark	Decoction	0.22	90	0.2	0.09	s.w	Iyama & Idu 2015, Lawal <i>et al.</i> 2010

Ethnobotany Research and Applications

<i>Anthonotha macrophylla</i> P. Beauv BDU 79	Fabaceae	Ububa-ikpa (I.), Abata (Y.)		Veneral diseases, vermifuge, intestinal discomfort, analgesic, skin infections, venomous stings, bites	Leaves, stembark, roots, gum exudates	Decoction, infusions, poultices	0.06	75	0.4	0.58	s.e, s.w	Akwaji <i>et al.</i> 2017, Lawal <i>et al.</i> 2010
<i>Artemisia dracunculus</i> L. BDU 25	Asteraceae	Nshegbuawom(O-M.)	Tarragon	Malaria, typhoid, Diabetes, skin disease, cuts, arthritis, laxative, vermifuge	Leaves	Decoction, infusion	0.09	50	0.4	0.44	s.s	Ajibesin <i>et al.</i> 2008 & 2012
<i>Aspilia africana</i> (Pers.) C.D Adams BDU 66	Asteraceae	Oranjila (IK), Ifakop (O-M.)	Haemorrhage plant	Wound clotting and healing, stomach disorders	Leaves	Juice extract	0.15	90	0.15	0.1	s.s	Alade <i>et al.</i> 2018, Ariwaodo <i>et al.</i> 2012
<i>Azadirachta indica</i> Juss. BDU141	Meliaceae	Dongoyaro, Eke-oyibo (Y.)	Neem	Malaria, indigestion, vermifuge	Leaves, twig	Decoction, infusion	0.26	90	0.15	0.05	s.w	Iyama & Idu 2015, Lawal <i>et al.</i> 2010
<i>Bambusa vulgaris</i> L. BDU 123	Poaceae	Abaji- Okporo (I.)	Bamboo	Gonorrhea, hemorrhoids, vermifuge, respiratory disease	Young shoots, leaves	Decoction, tincture, poultice	0.09	50	0.2	0.22	s.e	Ariwaodo <i>et al.</i> 2012, Akwaji <i>et al.</i> 2017
<i>Baphia nitida</i> Lodd. BDU 95	Fabaceae	Abode (EK.), Ibalì (I.), Osun (Y.),	African sandal wood, cam wood	Cough, boil	Leaves, twig, stembark, roots	Mastication, poultice	0.13	92	0.1	0.07	s.e, s.w	Alade <i>et al.</i> 2018, Ariwaodo <i>et al.</i> 2012, Ajibesin <i>et al.</i> 2008 & 2012
<i>Baphia pubescence</i> Hook.F BDU 45	Fabaceae	Awewi, Urohun, Maajigii (Y.)	Benin - camwood	Fever, sores, wounds, ringworm, sterility, dysmenorrhoea, sterility, diarrhea, pain	Leaves, stembark, roots	Decoction, infusion	0.03	50	0.5	1.0	s.w	Lawal <i>et al.</i> 2010
<i>Basella alba</i> L. BDU 33	Basellaceae	Amunututu (Y.), Gbologi (IK)	Ceylon spinach	Laxative, boils, hot flushes	Whole plant	Infusion	0.07	71	0.15	0.21	s.s, s.w	Ajibesin <i>et al.</i> 2008 & 2012
<i>Bixa orellana</i> L. BDU 12	Bixaceae	Ufie, Uhie (I.), Aje (Y.)	Annatto	Diabetes, laxatives, dysentery, diarrhoea, malaria, fevers, scrapes, burns	Leaves, fruits, seeds	Decoction	0.06	75	0.4	0.66	s.e, s.w	Lawal <i>et al.</i> 2010
<i>Brachystegia eurycoma</i> Harms. BDU 148	Fabaceae	Ako, Akolodu (Y.), Okweri (E.), Apaupan (I.), Odukpa (IB.)		Bone strengthening	Seeds	Powdered	0.17	88	0.05	0.02	s.e, s.s, s.w	Lawal <i>et al.</i> 2010
<i>Brassica nigra</i> (L.) W.D.J. Koch BDU 38	Brassicaceae	Ogwunje (K.)	Black mustard	Hypertension, rheumatism, headaches	Leaves, seeds	Infusion, juice mixed with onion juice, poultice	0.11	86	0.15	0.13	s.s	Ajibesin <i>et al.</i> 2008 & 2012
<i>Brassica oleracea</i> L. BDU34	Brassicaceae	Ogbeagu (K.)	Wild cabbage	Stomach ulcer, diabetes, wound	Leaves	Juice, poultice	0.06	75	0.15	0.03	s.s	Ajibesin <i>et al.</i> 2008 & 2012
<i>Caesalpinia bonduc</i> (L.) Roxb BDU 15	Fabaceae	Ayoo (Y.)		Fungal infections, malaria	Leaves, young twigs	Decoction	0.03	50	0.1	0.33	s.w	Lawal <i>et al.</i> 2010
<i>Caladium bicolor</i> (Aiton) Vent. BDU 20	Araceae	Honya (EK.)	Heart of Jesus	Skin diseases, wound	Corm	Poultice	0.06	50	0.1	0.16	s.s	Ajibesin <i>et al.</i> 2008 & 2012
<i>Calendula officinalis</i> L. BDU28	Asteraceae	Ukpuda (IK)	Pot marigold	Urinary tract infection, Inflammation	Leaves	Decoction, poultice	0.07	85	0.1	0.14	s.s	Ajibesin <i>et al.</i> 2008 & 2012
<i>Canavalia ensiformis</i> (L.) DC. BDU 22	Fabaceae	Pokondo (Y.)	Jack bean	Antibiotic, antiseptic	Seeds		0.06	50	0.1	0.16	s.w	Lawal <i>et al.</i> 2010
<i>Canna indica</i> L. BDU 37	Cannaceae	Ido (Y.)	Indian shot	Local birth control, Malaria	Leaves	Decoction	0.03	50	0.1	0.33	s.w	Lawal <i>et al.</i> 2010

<i>Cannabis sativa</i> L. BDU 169	Cannabinaceae	Igbo	Indian hemp plant	Pain, stunted hair growth	Leaves, stem	Aromatherapy, poultice	0.15	90	0.1	0.06	s.s, s.w	Alade&Ajibesin 2017
<i>Carica papaya</i> L. BDU 146	Caricaceae	Okpurukwa (I), Eto-Oyibo (U.)	Papaya, papaw	Kidney detox, malaria, fever, diabetes, cancer, eczema, after-shave bumps, waist pain, syphilis, nematode infestations	Leaves, fruit (ripe and unripe), seeds	Decoction, infusion, macerations in <i>Ocimum gratissimum</i> , <i>Garcinia kola</i> seed	0.23	76	0.6	0.24	s.e, s.s	Alade&Ajibesin 2017
<i>Carpolobia lutea</i> G. Don BDU 28	Polygonaceae	Agba, Angalagala (I), Osunsun (Y.), Ikpafum (IB.)	Cattle stick	Stomach problem, malaria, snake bites, leprosy, fever, ulcer, dermal infection, venereal diseases, sterility, diarrhea, headaches, wounds, rheumatism fever, pain, insanity, aphrodisiac	Leaves, rootbark, roots	Decoction	0.03	50	0.8	2.66	s.e, s.s, s.w	Lawal <i>et al.</i> 2010
<i>Cassia fistula</i> L. BDU 04	Fabaceae	Kasio	Golden shower tree	Purgative, astringent, vermifuge	Fruit	Decoction, tincture	0.13	50	0.15	0.11	s.e, s.s, s.w	Lawal <i>et al.</i> 2010, Soladoye <i>et al.</i> 2014
<i>Cassytha filiformis</i> L. BDU 100	Lauraceae	Ngbuakpu (IK.)	South sea Islanders	Lactation suppressant, vermifuge, jaundice, infertility	Leaves, stem, whole plant	Decoction, infusion, juice extract	0.05	60	0.2	0.4	s.s, s.e	Ajibesin <i>et al.</i> 2008 & 2012
<i>Ceiba petandra</i> (L.) Gaertn. BDU 66	Bombacaceae	Akpu-ogwu, Araba (I.)	White silk cotton tree	Leprosy, tooth ache, mouth problems, conjunctivitis, eye wounds, fever	Leaves, stembark, root	Decoction, baths, compresses	0.07	85	0.4	0.5	s.w	Lawal <i>et al.</i> 2010
<i>Chenopodium ambrosioides</i> L. BDU 68	Chenopodiaceae	Arunpale (Y.)	Sweet pigweed	Anti-hypertensive, gonorrhoea, syphilis, laxative, febrifuge, cough, tuberculosis	Whole plant	Infusion, mastication, maceration	0.1	60	0.4	0.4	s.w	Lawal <i>et al.</i> 2010, Alade & Ajibesin 2017
<i>Chromolaena odorata</i> (L.) R. M. King & Robinson BDU 167	Asteraceae	Nshegbuawom (EK), Obiarakara (I.), Ukuro (O.)	Siam weed, Awolowo weed	Stomach upsets, wounds, tooth aches, malaria. Typhoid, antimicrobial, headache, dysentery, hemorrhoids	Leaves, leaf sap	Decoction, maceration, poultice, compress	0.17	88	0.5	0.26	s.e, s.s	Alade & Ajibesin 2017
<i>Chrysophyllum cainito</i> L. BDU 171	Sapotaceae	Udala (I), Agbalumo, ebo (Y.)	African star apple	Diabetes, larynx inflammation, pneumonia, angina, diarrhoea, dysentery, haemorrhage, gonorrhoea, catarrh of the bladder	Fruit, stembark	Decoction, infusion, mastication	0.13	96	0.5	0.34	s.e, s.w	Lawal <i>et al.</i> 2010
<i>Citrullus colocynthis</i> (L.) Schrad BDU 31	Cucurbitaceae	Egusi	Bitter apple	Syphilis, stomachache, laxative, skin disease	Leaves, fruits, seed shell	Decoction, powder mixed with palm oil	0.19	84	0.2	0.11	s.e, s.s, s.w	Ajibesin <i>et al.</i> 2008 & 2012, Soladoye <i>et al.</i> 2014

<i>Citrus aurantifolia</i> (Christm) Swing. BDU 11	Rutaceae	Oromankirisi (I), Otie-Ogangan (U.)	Lime	Catarrh, flu, ringworm, eczema, rheumatism, malaria, impotency in men, as mouth wash, stomach trouble, fever	Fruit juice	Aromatherapy, baths, decoction, infusion	0.23	78	0.5	0.21	s.e, s.s	Alade & Ajibesin 2017, Iyama & Idu 2015
<i>Citrus aurantium</i> L. BDU 15	Rutaceae	Osan-ijagoin (Y.)	Sour / Bitter orange	Malaria	Fruits	Decoction	0.07	85	0.05	0.07	s.w	Iyama & Idu 2015
<i>Citrus limon</i> (L.) Burm. F. BDU 60	Rutaceae	Lemonu (I), Alimo-negieghe (E)	Lemon	Digestive disorders, diarrhea, ulcers, excessive weight gain, spots, scabs, wounds scars, malaria, Insect bites	Fruit juice	Decoction, tincture, infusion	0.25	96	0.5	1.41	s.e, s.s	Iyama & Idu 2015
<i>Citrus medica</i> L. BDU 40	Rutaceae			Malaria	Leaves, fruits	Decoction	0.1	70	0.05	0.05	s.s, s.w	Iyama & Idu 2015
<i>Citrus paradisi</i> Macf BDU 151	Rutaceae	Osan-gerepu (Y.)	Grape	Malaria	Fruits	Decoction	0.07	71	0.05	0.07	s.w	Iyama & Idu 2015
<i>Citrus sinensis</i> Osbek BDU 06	Rutaceae	Osan-mimo (Y.)	Sweet orange	Ulcer, sore tuberculosis constipation, malaria, fever, dysentery, headache, tooth ache, vermifuge	Leaves, fruits, stembark	Decoction	0.09	77	0.2	0.22	s.w	Alade & Ajibesin 2017, Ariwaodo <i>et al.</i> 2012, Iyama & Idu 2015
<i>Clausena anisata</i> (Will) Hook-f ex Benth. BDU 130	Rutaceae	Atapari, Obuko (Y.)	Clausena	Malaria	Leaves	Decoction	0.07	71	0.05	0.07	s.w	Iyama & Idu 2015
<i>Cleistopholis patens</i> (Benth.) Engl. & Diels BDU 05	Annonaceae	Out (E) Ojo (I), Orila, Ator- angbo (Y.)	Salt and oil tree	Malaria, fungal infection	Leaves, stembark	Decoction, tincture	0.03	83	0.1	0.33	s.e, s.s, s.w	Akwaji <i>et al.</i> 2017, Iyama & Idu 2015
<i>Clerodendrum paniculatum</i> L. BDU 09	Verbanaceae	Ora-ojola, Adabi (Y.)	Garden Quinine	Malaria	Leaves, roots	Decoction	0.06	50	0.05	0.08	s.w	Iyama & Idu 2015
<i>Cnestis ferruginea</i> DC. BDU 107	Connaraceae	Ukpo-ibieka (E), Usiereebua (EF), Okpenketa (IK), Agwola (U), Akara-oje (Y.)		Eye infection, laxative, fever, toothache, haemorrhoid	Leaves, roots	Infusion	0.13	96	0.25	0.19	s.e, s.s, s.w	Ariwaodo <i>et al.</i> 2012
<i>Cochlospermum tinctorium</i> A. Rich BDU 93	Cochlospermaceae	Feru (Y), Gbutu (E)	Cotton plant	Malaria	Roots	Decoction	0.07	85	0.05	0.17	s.s, s.w	Iyama & Idu 2015
<i>Cocos nucifera</i> L. BDU 76	Araceae	Agbon (Y.)	Coconut	Malaria, teething, convulsions, skin diseases, migraine, fever, poison antedote	Stembark, roots, fruits	Decoction	0.15	90	0.4	0.26	s.w	Alade & Ajibesin 2017, Ariwaodo <i>et al.</i> 2012, Iyama & Idu 2015
<i>Cola acuminata</i> (P. Beauv.) Schott and Endl. BDU 79	Sterculiaceae	Oji-hausa (I), Obi-abata (Y.)	Kola	Malaria	Stembark	Decoction	0.07	85	0.05	0.07	s.e, s.w	Iyama & Idu 2015
<i>Cola millenii</i> K. Schum. BDU 268	Sterculiaceae	Obi-edun (Y.)	Monkey kola	Anti-viral, ringworm, scabies, gonorrhoea, dysentery, ophthalmia	Leaves, fruits		0.11	77	0.3	0.66	s.w	Lawal <i>et al.</i> 2010
<i>Colocasia esculenta</i> (L.) Schott BDU 131	Araceae	Inodin; Ede (EK.)	Cocoyam, taro	Insect bites, sore	Whole plant	Decoction, juice extract	0.03	50	0.1	0.33	s.s	Ajibesin <i>et al.</i> 2008 & 2012

<i>Combretum racemosum</i> P. Beauv. BDU 87	Combretaceae	English christmas rose (IK.), Adallabanya (K.), Okoso (E.), Alagame (I.), Ogan (Y.)	Christmas rose	Skin disease, haemorrhoids, convulsive coughing, tuberculosis, tooth ache	Leaves	Juice extract	0.05	50	0.3	0.5	s.e, s.s, s.w	Ajibesin <i>et al.</i> 2008 & 2012, Ugboogu & Chukwuma 2019
<i>Cordia alliodora</i> L. BDU 20	Boraginaceae	Omo (Y.)	Salm-wood	Fungal infections			0.14	92	0.05	0.03	s.w	Lawal <i>et al.</i> 2010
<i>Corchorus olitorus</i> BDU 07	Tiliaceae	Ahihiara (I.)	Jute vegetable	Irregular menstruation, fever, malaria	Leaves+ rubber plant leaves	Infusion, cold water extract	0.05	60	0.15	0.3	s.e	Iyama & Idu 2015, obute 2005 & 2007
<i>Corylus avellana</i> L. BDU 104	Betulaceae		Hazel	Hemorrhoid menstrual disorder, bleeding	Leaves, flowers	Decoction	0.06	66	0.15	0.3	s.s	Ajibesin <i>et al.</i> 2008 & 2012
<i>Costus afer</i> Ker. BDU 132	Costaceae	Okpete (U.), Ireke-omode (Y.)	Bush cane, common ginger lily	Malaria, nausea, stomachache, aphrodisiac	Leaves, stem bark	Decoction	0.1	80	0.2	0.2	s.s, s.w	Iyama & Idu 2015, Ariwaodo <i>et al.</i> 2012, Ajuru 2018
<i>Costus lucanusianus</i> Braun & Schum BDU 19	Costaceae	Piri-ngwo (IK.)	Bush cane	Measles, eye defects	Stem bark	Baths, compresses, decoction	0.18	80	0.1	0.05	s.e	Obute & Adubor
<i>Crateva adansonii</i> DC. BDU 48	Capparaceae	Amakarode (K.)	Garlic pear tree	Rheumatism, malaria, infertility, stomachache	Leaves, stem bark	Decoction, poultices	0.06	75	0.2	0.33	s.s	Ajibesin <i>et al.</i> 2008 & 2012
<i>Crotalaria retusa</i> L. BDU 120	Fabaceae	Koropo, Alatunse (Y.)	Rattle pea, Rattle Box	Malaria	Leaves, root	Decoction	0.03	50	0.1	0.16	s.w	Iyama & Idu 2015
<i>Croton lobatus</i> L. BDU 71	Euphorbiaceae	Okwe (I.), Ajeofole (Y.)	Lobed croton	Skin disease, rheumatism, scorpions ting, stomachache	Leaves	Decoction, poultice	0.14	75	0.2	0.14	s.e, s.w	Ajibesin <i>et al.</i> 2008 & 2012
<i>Croton zambesicus</i> Müll. -Arg. BDU 78	Euphorbiaceae	Ajekobale (Y.), Alele (O.)		Dysentery, diarrhea	Leaves	Decoction	0.06	75	0.1	0.16	s.s, s.w	Ajibesin <i>et al.</i> 2008 & 2012
<i>Cryptolepis sanguinolenta</i> (Lindl) Schltr BDU 159	Periplocaceae	Gangamau	Cryptolepis	Malaria	Stem bark	Decoction	0.02	75	0.1	0.3	s.s	Iyama & Idu 2015
<i>Curcuma longa</i> L. BDU 83	Zingiberaceae	Buru, Simogo (U.), Laali-pupa (Y.)	Turmeric	Malaria	Rhizome	Decoction, infusion	0.03	83	0.1	0.16	s.s, s.w	Iyama & Idu 2015
<i>Cucumis sativus</i> L. BDU 247	Cucurbitaceae		Cucumber	Arthritis, pain	Fruits	Juice extract	0.07	85	0.1	0.14	s.w	Akwaji <i>et al.</i> 2017
<i>Cucurbita maxima</i> Duch. BDU 198	Cucurbitaceae	Akumocha (IK.)	Pumpkin	Skin disease	Leaves	Juice extract	0.1	60	0.05	0.05	s.s	Ajibesin <i>et al.</i> 2008 & 2012
<i>Cymbopogon citratus</i> (DC.) Stapf. BDU 217	Poaceae	Obiete/Ebitien (U.), Ewe-tea, Kooko-oba (Y)	Lemon grass	Typhoid fever, cough, malaria pneumonia, as an astringent, diuretic, antiseptic	Leaves + bark of <i>Alstonia oonei</i> , grapefruits, pineapple, pawpaw and garlic	Decoction	0.25	96	0.4	0.14	s.s, s.w	Iyama & Idu 2015
<i>Dacryoides edulis</i> (D. Don) Lam. BDU s129	Burreraceae	Ube (I.), Elemi (Y.), Eben (IK.)	Native pear	Skin parasites/disease, hypertension, cough, heat conditions, malaria	Leaves, stem resins, fruits	Decoction	0.2	95	0.3	0.13	s.e, s.s, s.w	Iyama & Idu 2015
<i>Daucus carota</i> L. BDU 14	Apiaceae	Nsoro (IK.)	Wild carrot	Eye infection	Root	Decoction	0.11	95	0.05	0.05	s.s	Ajibesin <i>et al.</i> 2008 & 2012

<i>Dalbergia lactea</i> Vatke BDU 152	Fabaceae	Ojiji, abinrere (Y.)	Dalbergia	Sore throat, pimples, skin disease	Stem		0.03	83	0.15	0.5	s.w	Lawal <i>et al.</i> 2010
<i>Dalbergia latifolia</i> Roxb. BDU 244	Fabaceae	Ogun-aja (Y.)	Indian rosewood	Yellow fever			0.05	60	0.05	0.1	s.w	Lawal <i>et al.</i> 2010
<i>Daniella ogea</i> Harms. BDU 453	Fabaceae	Iyaa (Y.)		Nerves soothing, back pain			0.06	75	0.1	0.16	s.w	Lawal <i>et al.</i> 2010
<i>Dennettia tripetala</i> Bak. BDU 61	Annonaceae	Nimi (I.), Ata-igberi (Y.)	Pepper Fruit	Malaria, colds	Leaves, Fruits	Decoction, mastication	0.23	93	0.1	0.04	s.e, s.w	Iyama & Idu 2015
<i>Dialium guineense</i> Willd. BDU 27	Fabaceae	Ugbe-him (IK.)	Velvet Tamarind	Malaria, diarrhea, stomachache, toothache	Leaves	Infusion	0.11	95	0.2	0.18	s.s	Akwaji <i>et al.</i> 2017
<i>Diodia scandens</i> Sw BDU 96	Rubiaceae	Onaedi (I.)		After birth womb cleansing in females, vermifuge	Leaves + <i>Napoleonai mperialis</i>	Infusion	0.1	60	0.1	0.1	s.e	Obute 2005 & 2007
<i>Dioscorea dumetorum</i> (Knuth) Pax BDU 202	Dioscoreaceae	Ona ochao (I.), E suru- igbo (Y.)	African bitter Yam	Malaria, abdominal pain	Leaves	powdered	0.03	83	0.1	0.33	s.e, s.w	Iyama & Idu 2015
<i>Dioscorea rotundata</i> Poir BDU 98	Dioscoreaceae	Fingi (K.)	White yam, West African yam	Burns, skin disease	Leaves	Infusion	0.02	75	0.1	0.5	s.s	Ajibesin <i>et al.</i> 2008 & 2012
<i>Distemonanthus benthamianus</i> Baill. BDU 62	Fabaceae	Anyarhan (B.), Osashi (IK.)	African satinwood	Skin disease, boils, malaria, tonic for pregnant women	Stembark	Decoction with <i>Pterocarpus erinaceus</i> , mastication, poultice	0.06	66	0.2	0.33	s.s	Ugbogu & Chukwuma 2019
<i>Dracaena arborea</i> (Wild.) BDU 30	Dracaenaceae	Odo (IK.)	African dragon tree	Stomachache, boils	Leaves, stembark	infusion, poultice	0.11	95	0.1	0.09	s.s	Akwaji <i>et al.</i> 2017
<i>Elaeis guineensis</i> Jacq. BDU 01	Araceae	Nkwu, akwu (I.), Obaekpe (U.), Ope, Eyin (Y.)	Oil palm	Antidote for poison, skin troubles, convulsions, colds, persistent coughs, fibroids, malaria, dysmenorrheal	Oil, unripe kernel, leaves	Aromatherapy, decoction, mastication, syrups	0.22	99	0.4	0.18	s.s, s.w, s.e	Iyama & Idu 2015, Lawal <i>et al.</i> 2010
<i>Eleusine indica</i> (Linn) Gaertn. BDU 33	Poaceae	Ichite (I.)	Goose grass, wiregrass	Anti-inflammatory, convulsions, cough	Roots		0.1	95	0.15	0.15	s.e	Akwaji <i>et al.</i> 2017
<i>Emilia coccinea</i> (Sims) G. Don. BDU 247	Asteraceae	Ntiene (EK.)	Tassel flower	Ear and eye infection, Measles, skin diseases, sores	Leaves	Juice extract	0.09	88	0.3	0.27	s.s	Ajibesin <i>et al.</i> 2008 2012
<i>Emilia sonchifolia</i> (L.) DC BDU 02	Asteraceae	Ogbunizu (I.), Odundunodo (Y.)	Yellow tassel flower	Anticoagulant in wound treatment, malaria	Leaves, whole plant	Decoction, topical application of leaf juice extract,	0.05	70	0.1	0.2	s.e, s.w	Iyama & Idu 2015
<i>Enantia chlorantha</i> OI BDU 03	Annonaceae	Awopa (Y.)	African yellow wood	Malaria	Stembark	Decoction, infusion, powdered	0.14	92	0.05	0.04	s.w	Iyama & Idu 2015
<i>Erythrina abyssinica</i> L. BDU 84	Fabaceae	Ologbosere, Lakale, Majiriya (Y.)		Yellow fever			0.03	66	0.05	0.16	s.w	Lawal <i>et al.</i> 2010
<i>Erythrina senegalensis</i> D.C BDU 159	Fabaceae	Ologbo-sere (Y.), Onugobi (IK.), Echichi (EK.)	Parrot tree	Malaria, stomachaches, jaundice, gonorrhoea, ulcers	Leaves, roots	Decoction, leaf juice extract	0.22	90	0.3	0.11	s.s, s.w	Akwaji <i>et al.</i> 2017, Ajibesin <i>et al.</i> 2008 & 2012, Iyama & Idu 2015

<i>Equisetum arvense</i> L. BDU 168	Equisaceae	Orueteri (K.)	Horse Tail	Asthma, cough, urinary tract infection	Leaves	Decoction, infusion	0.02	75	0.15	0.8	s.s	Ajibesin <i>et al.</i> 2008 & 2012
<i>Eucalyptus camaldulensis</i> Dehn BDU 157	Myrtaceae		Eucalyptus	Malaria, colds, convulsions, respiratory disorders, allergies	Leaves, stem bark	Decoction	0.09	88	0.3	0.27	s.e, s.s, s.w	Iyama & Idu 2015
<i>Euphorbia hirta</i> L. BDU 189	Euphorbiaceae	ogwuasma, ahihiaugwa (I.), Okwungwo (IK.)	Australian asthma plant, garden spurge, spurge weed	Asthma, catarrh, eczema, immune builder, malaria	Leaves	Decoction, topical application, aromatherapy	0.14	97	0.3	0.18	s.e, s.s	Akwaji <i>et al.</i> 2017, Iyama & Idu 2015
<i>Ficus asperifolia</i> Miq. BDU 51	Moraceae	Ipin (Y.)		Hypertension			0.02	50	0.05	0.3	s.w	Lawal <i>et al.</i> 2010
<i>Ficus exasperate</i> Vahl BDU 167	Moraceae	Epin (Y.)	Sandpaper tree	Malaria, female infertility	Leaves	Decoction	0.06	91	0.1	0.16	s.w	Iyama & Idu 2015, Soladoye <i>et al.</i> 2014
<i>Fluerya aestuans</i> (L) Gaud ex mig BDU 112	Urticaceae	Ipe-eri (Y.)	Old woman smokes tobacco	Malaria	Roots	Decoction	0.03	83	0.05	0.16	s.w	Iyama & Idu 2015
<i>Foeniculum vulgare</i> Mill. BDU 122	Apiaceae	Icheje (IK.)	Fennel	Eye infection, cough	Seeds	Infusion, drops, poultice	0.06	66	0.1	0.16	s.s	Ajibesin <i>et al.</i> 2008 & 2012
<i>Funtumia africana</i> (Benth). Stapf. BDU 127	Apocynaceae	Ako-ire (Y.)	Male Funtum	Malaria	Roots	Infusion	0.13	96	0.05	0.04	s.w	Iyama & Idu 2015
<i>Funtumia elastica</i> (Preuss) Stapf BDU 179	Apocynaceae	Mini-eme (IK.)	Bush rubber tree	Hemorrhoids, jaundice, impotence	Stem bark	Infusion, poultice	0.08	94	0.15	0.18	s.s	Akwaji <i>et al.</i> 2017
<i>Garcinia kola</i> Heckel BDU 93	Clusiaceae	Akuilu, agbuilu (I.), Aka (U.), Orogbo (Y.)	Bitter cola	Bronchitis, throat infection, malaria, asthma, cough	Seeds, roots	Infusion, mastication	0.15	80	0.3	0.2	s.s, s.e, s.w	Atade & Ajibesin 2017, Soladoye <i>et al.</i> 2014
<i>Gliricidia sepium</i> Jacq. BDU 97	Fabaceae	Agunmaniye (Y.)		Rheumatism			0.07	50	0.05	0.07	s.w	Lawal <i>et al.</i> 2010
<i>Glycine max</i> L. BDU 79	Fabaceae	Mmanuagwa (EK.)	Soy bean	Measles, hepatitis, diabetes	Seeds	Decoction, poultices of oil extract	0.06	50	0.15	0.3	s.s	Ajibesin <i>et al.</i> 2008 & 2012
<i>Glyphaea brevis</i> (Spreng.) Monach BDU 201	Tiliaceae	Atori (Y.)	Masque- rade stick	Malaria, female infertility, fever, diarrhea, tooth ache	Leaves, stem bark	Decoction	0.02	50	0.3	1.3	s.w	Ariwaodo <i>et al.</i> 2012, Iyama & Idu 2015, Lawal <i>et al.</i> 2010, Soladoye <i>et al.</i> 2014
<i>Gmelina arborea</i> Roxb. BDU 41	Verbenaceae	Igi Melina	Beechwood	High blood pressure, diarrhoea			0.09	66	0.1	0.11	s.w	Lawal <i>et al.</i> 2010
<i>Gongronema latifolium</i> Benth. BDU126	Asclepiadaceae	Utazi (I.)	Amaranth globe	Malaria, womb stabilization after birthing, diabetes, hypertension, vermifuge, anaemia	Leaves	Decoction with <i>Citrus</i> <i>aurantifolia</i> juice and Pine juice, juice extract	0.13	96	0.4	0.26	s.e	Iyama & Idu 2015, Soladoye <i>et al.</i> 2014
<i>Gossypium barbadense</i> L. BDU119	Malvaceae	Ewe-owu (Y.)	West Indian Cotton	Dysmenorrheal, malaria	Leaves	Decoction	0.07	85	0.1	0.14	s.w	Iyama & Idu 2015
<i>Gossypium hirsutum</i> L. BDU 115	Malvaceae	Ela-owu (Y.)	Cotton	Malaria	Leaves	Decoction	0.03	50	0.05	0.16	s.w	Iyama & Idu 2015s

<i>Harungana madagascariensis</i> Lamex Poir BDU 116	Hypericaceae	Otori (I.), Amuje, Asurje (Y.), Uwara (U.)	Dragon's blood tree	Skin disease, itches, leprous spots malaria	Plant sap, leaves, stem bark	Decoction, topical application	0.15	80	0.2	0.13	s.e, s.s, s.w	Iyama & Idu 2015
<i>Heliotropium indicum</i> L BDU110	Boraginaceae	Akuko (Y.), Azu (EK.)	Heliotrope, Cock's comb	Malaria, convulsion, toothache, Scorpion sting, insect bites, boils	Leaves, whole plant	Decoction,, infusion	0.02	50	0.3	1.5	s.s, s.w	Iyama & Idu 2015
<i>Hyptis suaveolens</i> (L.) Poit BDU 138	Lamiaceae	Jogbo (Y.)	Hyptis	Malaria	Leaves	Decoction	0.05	70	0.05	0.1	s.w	Iyama & Idu 2015
<i>Icacina trichanta</i> Oliv. BDU 137	Icacinaceae	Mbia (IK.), Gbegbe (Y.), Osun (B.)	Icacina	Malaria, asthma, rheumatism, toothache, purgative	Leaves, fruit	Decoction, juice	0.11	95	0.3	0.22	s.s, s.w	Ariwaodo <i>et al</i> 2012, Iyama & Idu 2015, Ugbogu & Chukwuma 2019
<i>Ipomoea batatas</i> L. BDU 121	Convolvulaceae	oboribo	Sweet Potato	Vitamin deficiency	Whole tuber	Meals	0.03	66	0.05	0.16	s.e, s.s, s.w	Oke <i>et al</i> 1999
<i>Ipomoea involucreta</i> P. Beauv BDU 129	Convolvulaceae	Fiflori (K.), Mgban-ala (I.), Alukorese (Y.)		Asthma, malaria, rheumatism	Leaves, stem	Decoction, infusion	0.06	50	0.15	0.03	s.e, s.s, s.w	Ariwaodo <i>et al</i> 2012, Ajibesin <i>et</i> <i>al.</i> 2008 & 2012
<i>Ipomoea mauritiana</i> Jacq. BDU 146	Convolvulaceae	Mgban-ala (O.), Atewo (Y.)	Morning glory, Palm of monkey hand	Asthma	Roots	Decoction	0.06	50	0.05	0.08	s.s, s.w	Ajibesin <i>et al</i> 2008 & 2012
<i>Irvingia gabonensis</i> (Aubry- LeComteex O'Rorke) Bail. BDU 189	Irvingiaceae	Agbono	West African bush mango	Stomachache, skin disease, infertility, as vermifuge	Leaves, stem bark, seeds	Decoction, infusion, poultice	0.11	86	0.2	0.18	s.s, s.w	Ariwaodo <i>et al</i> 2012, Akwaji <i>et</i> <i>al.</i> 2017
<i>Jatropha curcas</i> J.L. Ellis & Saroja BDU 149	Euphorbiaceae	Oluluidu (O.), Ishakpa (U.), Lapalapa-funfun (Y.)	Boundary stick, Physic nut, Pig nut	Anaemia, malaria, as blood booster,	Leaves, stem bark, roots	Decoction, juice extract, mastication, poultices, soups,	0.21	95	0.3	0.11	s.s, s.w	Alade & Ajibesin 2017, Akwaji <i>et</i> <i>al.</i> 2017
<i>Jatropha gossypifolia</i> L. BDU 150	Euphorbiaceae	Botuje-pupa (Y.)	Wild cassava	Malaria	Leaves	Juice extract	0.1	75	0.05	0.05	s.w	Iyama & Idu 2015
<i>Kalanchoe pinnata</i> (Lam.) Pers. BDU 169	Crassulaceae	Oken (U.); Obekpokpa (U.), Nkwaaka (EK.)	Resurrectio n plant	Fever, excision of umbilical cord, persistent cough, Ear infection, boils, convulsion	Leaves, roots	Decoction, juice extract,	0.13	80	0.3	0.23	s.s	Alade & Ajibesin 2017, Ariwaodo <i>et al.</i> 2012
<i>Khaya grandifolia</i> C. DC. BDU 268	Meliaceae	Oganwo (Y.)	Mahogany	Malaria, hemorrhoid	Stembark	Decoction, infusion	0.1	80	0.15	0.15	s.w	Iyama & Idu 2015, Ariwaodo <i>et al.</i> 2012
<i>Khaya ivoriensis</i> A. Chev BDU 158	Meliaceae	Oganwo (Y.)	African Mahogany	Malaria	Stembark	Decoction	0.14	75	0.05	0.03	s.w	Iyama & Idu 2015
<i>Kigelia africana</i> (Lamb) Benth BDU 165	Bignoniaceae		Sausage tree	Malaria, female infertility	Roots	Infusion	0.09	77	0.1	0.11	s.e, s.s, s.w	Iyama & Idu 2015, Soladoye <i>et</i> <i>al.</i> 2014
<i>Lannea taraxalifolia</i> A. Rich BDU 170	Anacardiaceae	Yanrin (Y.)		Dislocation			0.06	75	0.05	0.08	s.w	Lawal <i>et al.</i> 2010
<i>Lantana camara</i> L. BDU 153	Verbanaceae	Ewon-agogo (Y.)	Wild Sage	Malaria	Leaves	Decoction	0.06	75	0.05	0.08	s.w	Iyama & Idu 2015
<i>Lawsonia inermis</i> L. BDU 177	Lythraceae	Laali (Y.)	Henna plant	Malaria, skin care	Leaves	Decoction	0.03	50	0.1	0.33	s.w	Iyama & Idu 2015

<i>Lecaniodiscus cupanoides</i> Planch ex Benth BDU 161	Sapindaceae	Akika (Y.)	Lecaniodiscus	Malaria, fever, purgative, typhoid, jaundice, cough	Leaves, stem bark, seeds, roots	Decoction	0.1	80	0.3	0.6	s.w	Ariwaodo <i>et al.</i> 2012, Iyama & Idu 2015
<i>Lippia multiflora</i> Poir BDU 141	Verbanaceae	Efinrin-gorogoro, Efinrin-oko (Y.)	Sweet leaf	Malaria	Whole plant	Decoction	0.06	50	0.1	0.08	s.w	Iyama & Idu 2015
<i>Lophira alata</i> Banks ex Gaertn. f. BDU 155	Ochnaceae	Pahan (Y.)	Iron wood	Malaria	Stem bark	Decoction	0.03	50	0.1	0.16	s.w	Iyama & Idu 2015
<i>Ludwigia hyssopifolia</i> (G. Don) Exell BDU 144	Onagraceae	Bini-sensen (B.)	Water primrose	Malaria	Leaves	Decoction	0.06	75	0.1	0.08	s.s	Iyama & Idu 2015
<i>Luffa cylindrical</i> (L.) M.J. Roem BDU 165	Cucurbitaceae	Aniamme (IK.)	Sponge guord	Cough, laxative, emetic	Leaves, stem, seeds, roots	Decoction, infusion	0.06	50	0.15	0.3	s.s	Ajibesin <i>et al.</i> 2008 & 2012
<i>Mallotus cordifolia</i> Muell. arg BDU 134	Euphorbiaceae	Ebewosa (B.)		Malaria	Leaves	Decoction	0.05	80	0.05	0.1	s.s	Iyama & Idu 2015
<i>Mangifera indica</i> L. BDU 170	Anacardiaceae	Mangoro (I.), Mankwo (IK.), Imagolo (U.)	Mango	Malaria, typhoid fever, diabetes, memory enhancer, headache, jaundice, skin disease, astringent, sore throat, dysentery	Leaves, stem, bark, fruits	Baths, decoction, maceration, meals	0.25	60	0.55	0.22	s.e, s.s	Alade & Ajibesin 2017, Ariwaodo <i>et al.</i> 2012, Akwaji <i>et al.</i> 2017
<i>Manihot esculenta</i> Crantz BDU 172	Euphorbiaceae	Akpu, jigbo, Ugboro, jiaphu (I.), Imidaka (U.)	Cassava	Eye problems, wound healing, chronic otitis	Leaves, juvenile roots	Leaf juice extract, root decoction	0.1	75	0.15	0.15	s.e, s.s	Alade & Ajibesin 2017
<i>Mansonia altissima</i> A. Chev. BDU 55	Sterculiaceae	Ofun (Y.)	African black walnut	Constipation, leprosy, yaws, scabies, syphilis	Twig bark, stem bark, roots	Decoction, infusion	0.11	95	0.3	0.22	s.w	Lawal <i>et al.</i> 2010
<i>Milicia excelsa</i> (Welw.) C.C. Berg BDU 183	Meliaceae	Oje (I.), Iroko (Y.)	Iroko	Malaria, rheumatism, nausea, abdominal pain, insomnia	Stem bark, roots	Decoction	0.07	50	0.3	0.4	s.e, s.w	Ariwaodo <i>et al.</i> 2012, Iyama & Idu 2015, Lawal <i>et al.</i> 2010
<i>Microdesmis puberula</i> Hook. f. ex Planch BDU 166	Euphorbiaceae	Uperi (I.), Ido-apata (Y.)	Microdesmis	Malaria	Leaves	Decoction	0.03	50	0.05	0.16	s.e, s.w	Iyama & Idu 2015
<i>Milletia griffoniana</i> Bail. BDU 122	Fabaceae	Ito (Y.)		General weakness			0.07	50	0.05	0.06	s.w	Lawal <i>et al.</i> 2010
<i>Momordica balsamina</i> L. BDU 173	Cucurbitaceae	Sibifuka, Akbandene (I.), Ejirin (Y.)		Haemorrhoid	Whole plant	Decoction	0.06	75	0.05	0.08	s.e, s.w	Ajibesin <i>et al.</i> 2008 & 2012
<i>Momordica charantia</i> L. BDU 248	Cucurbitaceae	Aloose (O.), Akbandene (IK.), Ejirin-were (Y.)	African cucumber, balsam pear	Malaria, ulcers, burns, skin infections, diabetes, convulsion, vermifuge, aphrodisiac, gonorrhoea, yaws, boils, malignant ulcers, diabetes, gastrointestinal problems, viral diseases, female infertility, malaria	Leaves	Decoction, juice extract	0.11	95	0.4	0.32	s.e, s.w	Ajibesin <i>et al.</i> 2008 & 2012, Ariwaodo <i>et al.</i> 2012, Iyama & Idu 2015, Soladoye <i>et al.</i> 2014
<i>Mondia whitei</i> (Hook. f.) Skeels BDU 186	Periplocaceae	Isirigun (Y.)	Mondi	Malaria	Whole plant, roots	Decoction	0.06	50	0.05	0.08	s.w	Iyama & Idu 2015

<i>Morinda lucida</i> Benth BDU 305	Rubiaceae	Oruwo (Y.), Njisi (I).	Brimstone tree	Malaria, female infertility	Leaves, stembark	Decoction, juice extract	0.11	50	0.1	0.09	s.e, s.w	Iyama & Idu 2015, Soladoye <i>et al.</i> 2014
<i>Morinda morindiodes</i> (Barker). Milne-Redh BDU 277	Rubiaceae	Poju-owiwi, Oju-ologbo (Y.)	Morinda	Malaria	Leaves, stembark	Decoction	0.05	90	0.05	0.1	s.w	Iyama & Idu 2015
<i>Moringa oleifera</i> Lam. BDU 197	Moringaceae	Ewe-igbale (Y.)	Horse radish tree	Malaria, vitamin supplement, acute rheumatism	Leaves	Decoction, maceration	0.25	60	0.2	0.08	s.w	Alade & Ajibesin 2017, Iyama & Idu 2015, Lawal <i>et al.</i> 2010
<i>Musa acuminata</i> L. BDU 198	Musaceae		Dwarf banana	Diabetes	Fruits		0.03	50	0.05	0.16	s.e	Akwaji <i>et al.</i> 2017
<i>Musa paradisiaca</i> L. BDU 107	Musaceae	Mbana (I); Ogede (Y.)	Plantain	Malaria, infertility	Leaves, stembark, fruits	Decoction	0.06	50	0.1	0.16	s.e, s.w	Alade & Ajibesin 2017, Iyama & Idu 2015
<i>Musa sapientum</i> L. BDU 31	Musaceae	Ogede-were (Y.)	Banana	Malaria	Leaves	Decoction	0.05	70	0.05	0.1	s.w	Lawal <i>et al.</i> 2010
<i>Musanga cecropioides</i> R. Br. ex Tedlie BDU 212	Moraceae	Agbawo, Oro (Y.)	Cork wood, Umbrella tree	Malaria, dysentery, cough, vermifuge	Leaves, stembark, roots	Decoction	0.1	75	0.2	0.2	s.w	Ariwaodo <i>et al.</i> 2012
<i>Napoleona imperialis</i> P. Beauv. BDU 240	Lecythidaceae	Nnekeloche, abakalabaka (I.)	Vogel's Napoleona	Blood clot removal in freshly birthed women, vermifuge, gonorrhoea, fevers	Leaves, stem, roots	Decoction, infusion	0.15	80	0.2	0.13	s.e	Obute 2005 & 2007
<i>Nasturtium officinale</i> R. Br BDU 401	Brassicaceae	Aguba (IK.)	Watercress	Impotence	Leaves	Decoction	0.02	50	0.05	0.3	s.s	Ajibesin <i>et al.</i> 2008
<i>Nuclea diderrichii</i> (De Wild) Merr BDU 408	Rubiaceae	Ope (U.), Opepe (Y.)	African peach	Malaria	Stembark	Decoction	0.06	50	0.05	0.08	s.s, s.w	Iyama & Idu 2015
<i>Nuclea latifolia</i> (Smith) Bruce BDU 452	Rubiaceae	Egbesi (Y.)	African peach	Malaria, fevers, blennorrhoea, colic, constipation, jaundice, otitis, dysmenorrhoeal	Leaves, stembark, roots	Decoction, tincture	0.21	95	0.4	0.19	s.s, s.w	Akwaji <i>et al.</i> 2017, Iyama & Idu 2015
<i>Newbouldia laevis</i> (Beauv.) Seeman ex Bureau BDU 399	Bignoniaceae	Ogirisii (O.), Oke-ogirishi (I.), Akoko (Y.)	Smooth Newbouldia, Tree of life, Fertility tree	Eye problems. childbirth, constipation, malaria, septic wounds, convulsion, epilepsy, bleeding, migraine, eye infection, skin disease, infertility	Leaves, stembark, roots	Decoction, infusion, topical application of leaf juice, poultice	0.19	71	0.6	0.28	s.e, s.s, s.w	Ariwaodo <i>et al.</i> 2012, Iyama & Idu 2015, Lawal <i>et al.</i> 2010
<i>Ocimum gratissimum</i> L. BDU 470	Lamiaceae	Nchuanwu (I.), Eran, Ufuo-oyibo (U.), Efinrin-ajase (Y.)	Tea bush, Scent leaf	Constipation, Diabetes Miletus, vermifuge, malaria	Leaves, leaf extract + <i>Viscum album</i>	Decoction, infusion	0.25	60	0.2	0.08	s.e, s.s, s.w	Iyama & Idu 2015, Alade & Ajibesin 2017
<i>Palisota hirsuta</i> (Thumb.)K. Schum. BDU 350	Commelinaceae	Ikpereaturu(I), Asatie (EK.)	Palisota	Rheumatism, arthritis, malaria, boils, gonorrhoea	Leaves, stem	Decoction, infusion, poultice	0.09	77	0.3	0.14	s.e,s,s	Iyama & Idu 2015
<i>Parinari macrophylla</i> Sabine BDU 352	Rosaceae	Abere (Y.)	Neouoil tree	Malaria	Seeds	Decoction	0.06	50	0.05	0.08	s.w	Iyama & Idu 2015
<i>Parkia bicolor</i> A. Chev. BDU 125	Fabaceae	Iru (Y.)		Diarrhea, dysentery			0.07	85	0.1	0.14	s.e	Lawal <i>et al.</i> 2010

<i>Parquetinainigrescens</i> (Afzel) Bullock BDU 246	Periplocaceae	Ewe-ogbo (Y.)	African parquetina	Malaria	Leaves	Decoction, infusion	0.06	75	0.05	0.08	s.w	Iyama & Idu 2015
<i>Pastinaca sativa</i> L. BDU 313	Apiaceae	Udeghe (K.)	Parsnip	Cough, hypertension	Leaves	Decoction	0.06	50	0.1	0.16	s.s	Ajibesin <i>et al.</i> 2008 & 2012
<i>Pentaclethra macrophylla</i> Benth. BDU 227	Fabaceae	Ugba (I.)	African oil bean tree	Stuttering, skin diseases, convulsion, gonorrhoea, infertility, wound, itching	Leaves, pod, seeds, stem bark	Poultice of oil extract	0.09	72	0.4	0.44	s.e	Akwaji <i>et al.</i> 2017
<i>Peperomia pellucida</i> (L.) H.B. & K. BDU 318	Piperaceae	Rinrin (Y.)	Silver Bush	Malaria	Leaves	Decoction	0.11	86	0.1	0.4	s.w	Iyama & Idu 2015
<i>Pergularia daemia</i> (Forsk.) Choiv BDU 341	Asclepiadaceae	Utazei (I.), Jagborokun, rogbo-aguntan (Y.)	Pergularia	Malaria, boils, typhoid, cough	Leaves	Decoction of leaves + <i>Carica papaya</i> , <i>Vernonia amygdalina</i> , <i>Ananas comosus</i> and <i>Chromolaena odorata</i> juice, infusion, maceration, poultice	0.21	95	0.2	0.10	s.e, s.w	Iyama & Idu 2015
<i>Persea americana</i> Mill BDU 211	Lauraceae	Ube-oyibo (I.), Pia (Y.), Ur-uwon (U.)	Avocado pear	Malaria, typhoid, diabetes, high blood pressure	Leaves, stem bark, seeds	Decoction, juice extract	0.17	98	0.2	0.11	s.e, s.s, s.w	Iyama & Idu 2015, Akwajiet <i>et al.</i> 2017
<i>Petivera alliacea</i> L. BDU 206	Phytolaccaceae	Awogba (Y.)	Skunk weed, Gully-root	Malaria	Leaves	Decoction	0.02	50	0.1	0.3	s.w	Iyama & Idu 2015
<i>Phyllanthus amarus</i> Schum et Thonn BDU 215	Euphorbiaceae	Eyin-olobe (Y.)	Small leaf, stone breaker	Malaria	Leaves	Decoction, infusion	0.02	75	0.1	0.3	s.w	Iyama & Idu 2015
<i>Phyllanthus muellerianus</i> (O. Ktz) Exell BDU 239	Euphorbiaceae	Egun-eja (Y.)	Myrobalan	Malaria	Leaves	Maceration	0.09	50	0.1	0.06	s.w	Iyama & Idu 2015
<i>Physalis angulata</i> L. BDU 315	Solanaceae	Koropo (Y.)	Ground angular cherry	Malaria	Leaves	Decoction	0.07	50	0.1	0.07	s.w	Iyama & Idu 2015
<i>Picralima nitida</i> (Stapf) Th. & H. Dur BDU 200	Apocynaceae	Erin, Eso-abere (Y.)	Picralima	Malaria	Seeds	Decoction	0.06	50	0.1	0.08	s.w	Iyama & Idu 2015
<i>Piper guineense</i> Schum. & Thonn BDU 279	Piperaceae	Iyere (Y.), Ebe-ahanbi (B.)	Climbing black pepper	Malaria, female infertility, newly birthed women, stomachache	Fruits	Decoction	0.18	80	0.2	0.11	s.w	Akwaji <i>et al.</i> 2017, Iyama & Idu 2015, Soladoye <i>et al.</i> 2014, Ugbogu & Chukwuma 2019
<i>Piper nigrum</i> Schum. & Thonn. BDU 191	Piperaceae	Uziza (I.)		After birth womb stabilizer treatment in women	Leaves and seeds	Decoction, tinctures	0.17	88	0.1	0.02	s.e	Obute 2005 & 2007
<i>Prosopis africana</i> Guill & Perr BDU 113	Fabaceae	Ayan (Y.)		Pile			0.13	50	0.1	0.04	s.w	Lawal <i>et al.</i> 2010
<i>Prunus domestica</i> L. BDU 108	Rosaceae	Pulomu (I.)	Plum	Eczema	Leaf ash	Poultice, topical application	0.06	75	0.1	0.08	s.e	Ajuru 2018

<i>Psidium guajava</i> L. BDU 255	Myrtaceae	Gova (I.), Igobe (U.); Gilofa (Y.)	Guava	Anaemia, malaria, diarrhea, dysentery, spews, stools, fever, pain, female infertility	Leaves, bark, root	Decoction, maceration	0.23	65	0.5	0.19	s.e, s.s, s.w	Alade & Ajibesin 2017, Iyama & Idu 2015, Soladoye s. 2014, Lawal <i>et al.</i> 2010
<i>Pterocarpus osun</i> Craib BDU 152	Fabaceae	Osun (Y.)	Camwood	Umbilical cord antiseptic, rheumatism, eczema, gonorrhoea, candidiasis, acne, amenorrhoea	Leaves, stem, stem bark, heartwood, roots	Baths, poultice, powdered	0.22	90	0.4	0.15	s.w	Akwaji <i>et al.</i> 2017, Lawal <i>et al.</i> 2010
<i>Pterocarpus santalinoides</i> D.C BDU 266	Fabaceae	Nturukpa (I.), Gbengben (Y.),	Winged fruit	Malaria, anti-ageing	Leaves, stem	Decoction	0.09	72	0.1	0.11	s.e, s.w	Iyama & Idu 2015
<i>Pycanthus angolensis</i> (Welw) Warb. BDU 174	Myristicaceae	Akomu (Y.)	African nutmeg	Malaria, purgative, enema, skin disease	Leaves, stem bark	Decoction	0.05	60	0.2	0.4	s.w	Akwaji <i>et al.</i> .2017, Iyama & Idu 2015
<i>Pyrenacantha staudtii</i> Engl BDU 341	Icacinaceae	Arorodegbo, Oroto- agba (Y.)	Pyrenacant ha	Malaria	Leaves	Juice extract	0.06	50	0.05	0.08	s.w	Iyama & Idu 2015
<i>Ricinus communis</i> L. BDU 386	Euphorbiaceae	Ogiriario (O.), Ecastor (U.), Laa (Y.)	Castor bean	As purgative, stomachaches, as vermifuge skin disease	Leaves, seeds	Decoction, juice, syrup, topical application	0.27	80	0.2	0.07	s.s, s.w	Soladoye <i>et al.</i> 2014
<i>Ruawolfia vomitoria</i> Afzel BDU 262	Apocynaceae	Asofeyeje (Y.), Donuinya (K.)	Serpent wood, Swizzle stick	Malaria, skin disease, small pox, stomachache, gonorrhoea, waist pain, urogenital tract infection, hemorrhoid	Leaves, roots	Decoction, infusion	0.18	80	0.4	0.22	s.s, s.w	Akwaji <i>et al.</i> 2017, Iyama & Idu 2015
<i>Rytigynia nigerica</i> (S. Moore). Robyns BDU 188	Rubiaceae	Elegun-oko (Y.)	Rytigynia	Malaria	Stem bark, roots	Decoction	0.08	75	0.05	0.06	s.w	Iyama & Idu 2015
<i>Sansevieria trifasciata</i> Prain BDU 209	Agavaceae	Angolo (IK.)	Mother-in- Law's tongue	Eye problem	Leaves	Infusion, tincture	0.03	50	0.05	0.16	s.s	Ajuru 2018
<i>Securidaca longipedunculata</i> Frer BDU 300	Polygalaceae	Ofodo, Ipeta (Y.)	Violet tree	Malaria	Roots	Powdered	0.07	85	0.05	0.07	s.w	Iyama & Idu 2015
<i>Senna alata</i> (L.) Roxb. BDU 377	Fabaceae	Sokien-inyanya (K.), Nduruchi (IK.)	Candle bush, ringworm bush	Eczema, ringworm, abscess, inflammation, skin disease, bleeding, dysentery, female infertility, vermifuge	Leaves, roots	Infusion, juice extract poultice	0.13	50	0.4	0.3	s.s	Alade & Ajibesin 2017, Ariwaodo <i>et al.</i> 2012, Soladoye <i>et al.</i> 2014
<i>Senna fistula</i> L. BDU 358	Fabaceae	Aidan-toro (Y.)	Pudding stick, Golden Shower,	Malaria	Roots	Decoction	0.05	70	0.05	0.1	s.w	Iyama & Idu 2015
<i>Senna hirsuta</i> (L.) Irwin & Barneby BDU 340	Fabaceae	Oziza (I.)	Shower tree	Eye ache, ear ache, antimicrobial, skin infection, purgative	Leaves	Juice extract, poultice	0.06	75	0.3	0.41	s.e	Ariwaodo <i>et al.</i> 2012

<i>Senna occidentalis</i> (L.) Link. BDU 101	Fabaceae	Akidiagbara (I.), Ewe (Y.)	Negro coffee, coffee senna	Abscess, inflammation, skin disease, bleeding	Leaves, roots	Infusion, poultices,	0.08	88	0.2	0.4	s.s	Aja <i>et al.</i> 2017
<i>Senna podocarpa</i> Guill. & Perr. BDU 266	Fabaceae	Asunwonibile (Y.)	Senna	malaria	Leaves, stembark	Decoction	0.04	75	0.05	0.13	s.w	Iyama & Idu 2015
<i>Senna siamea</i> Lam. BDU 261	Fabaceae	Kasia		Malaria, laxatives	Leaves, stembark	Decoction	0.07	50	0.1	0.14	s.e, s.s, s.w	Iyama & Idu 2015, Lawal <i>et al.</i> 2010
<i>Scoparia dulcis</i> L. BDU 318	Plantaginaceae	Anyimdede (O-M.)	Sweet-broom, licorice weed	Cough, antisickling, memory enhancer	Leaves	Juice extract	0.11	95	0.15	0.13	s.s	Babawale <i>et al.</i> 2016, Abere <i>et al.</i> 1993
<i>Sida acuta</i> Burm. f. BDU 269	Malvaceae	Udo, Nsiinyinya(I.)	Broom weed	Malaria	Stem	Decoction	0.09	77	0.05	0.06	s.e	Iyama & Idu 2015
<i>Solanum lycopersicum</i> L. BDU 134	Solanaceae	Tomatos (I.)	Tomatoes, vine berry	Ear ache	Leaves, fruit	Juice extract poultice	0.06	50	0.1	0.16	s.e, s.w	Afolayan 2020
<i>Solanum nigrum</i> L. BDU 220	Solanaceae	Ebe-ape (U.), Anara (O.)	Black/ Common Nightshade	Malaria, eye infection, jaundice, convulsion,	Whole plants, leaves	Decoction	0.14	75	0.2	0.14	s.s	Ajibesin <i>et al.</i> 2008 2012, Iyama & Idu 2015
<i>Solenostemon monostachyus</i> (P. Beauv.) Briq. BDU 391	Lamiaceae	Egba (IK.)		Measles, malaria	Leaves	Decoction	0.07	50	0.1	0.14	s.s	Ajibesin <i>et al.</i> 2008 & 2012
<i>Sorghum bicolor</i> (L.) Moench BDU 376	Poaceae	Poroporo-okababa (Y.)	Guinea corn	Malaria, female infertility	Leaves	Decoction	0.22	90	0.05	0.02	s.w	Iyama & Idu 2015, Soladoye <i>et al.</i> 2014
<i>Spathodea campanulata</i> P. Beauv BDU 169	Bignoniaceae	Oruru, mojutoro (Y.)	African tulip, Scarlett bells	Malaria	Stembark	Decoction	0.03	50	0.05	0.16	s.w	Iyama & Idu 2015
<i>Sphenocentrum jollyanum</i> Pierre BDU 229	Menispermaceae	Akerejupon (Y.)	Sphenocentrum	Malaria, female infertility	Roots	Decoction	0.03	50	0.1	0.33	s.w	Iyama & Idu 2015, Soladoye <i>et al.</i> 2014
<i>Spondias mombin</i> L. BDU 347	Anacardiaceae	Iyeye (Y.), Aginiran (O.)	Hogplum	Malaria, gonorrhoea, dysentery, toothache, diabetes, diuretic, female infertility, cold	Leaves, stembark	Decoction	0.14	71	0.5	0.32	s.s, s.w	Ariwaado <i>et al.</i> 2012, Iyama & Idu 2015, Soladoye <i>et al.</i> 2014
<i>Stachytarpheta cayennensis</i> (L.C. Rich) Schua BDU 194	Verbanaceae	Ebe (U.), Obibo (Y.), Mbeku (K.)	Rats' rail Vervaine, Blue Snakeweed	Malaria	Leaves	Decoction	0.05	60	0.1	0.2	s.s, s.w	Ajibesin <i>et al.</i> 2008 & 2012, Iyama & Idu 2015, Lawal <i>et al.</i> 2010
<i>Stachytarpheta indica</i> (L.) Vahl BDU 181	Verbanaceae	Otuidun (O-M.)	Rooter comb	Fever, malaria	Leaves	Juice extract	0.16	90	0.1	0.06	s.s, s.w	Ajibesin <i>et al.</i> 2008 2012, Iyama & Idu 2015
<i>Sterculia setigera</i> Dell. BDU 139	Sterculiaceae	Ose-aware, kukuki (Y.)		Constipation			0.12	50	0.05	0.04	s.w	Lawal <i>et al.</i> 2010
<i>Stellaria media</i> (L.) Vill. BDU250	Caryophyllaceae	Ahiliaokuko (IK.)	Chickweed	Cough, debility, asthma	Leaves	Decoction	0.06	83	0.15	0.3	s.s	Ajibesin <i>et al.</i> 2008 & 2012
<i>Synedrella nodiflora</i> Gaertn BDU133	Asteraceae	Aluganbi (Y.).	Synedrella	Malaria, sores, skin infection	Leaves	Decoction	0.1	90	0.15	0.15	s.w	Ariwaado <i>et al.</i> 2012, Iyama & Idu 2015

<i>Talinum fruticosum</i> (L.) Juss. BDU 79	Portulacaceae	Segi-beleke	Waterleaf, Ceylon spinach	Boils, measles	Leaves	Juice extract, decoction	0.15	93	0.1	0.06	s.s	Akwaji <i>et al.</i> 2017
<i>Telfairia occidentalis</i> Hook. f. BDU 170	Cucurbitaceae	Ugu (I.)	Fluted pumpkin	Dizziness, blood detox, anaemia, acne, headaches, blood tonic, female infertility, convulsion	Leaves, fruits	Juice extract, poultice	0.3	90	0.4	0.13	s.e	Ariwaado <i>et al.</i> 2012, Soladoyeet <i>et al.</i> 2014
<i>Terminalia avicennioides</i> Guill. & Perr. BDU 319	Combretaceae	Idi (Y.)	Baushe	Malaria, female infertility	Leaves, stembark	Decoction	0.1	90	0.1	0.10	s.w	Iyama & Idu 2015, Soladoyeet <i>et al.</i> 2014
<i>Terminalia catappa</i> L. BDU 320	Combretaceae	Furuntu (Y.), Ebelebo (E.)	Indian almond	Malaria	Leaves	Decoction	0.06	50	0.05	0.08	s.s, s.w	Iyama & Idu 2015
<i>Terminalia ivoriensis</i> A. Chev BDU 324	Combretaceae	Afara-dudu (Y.)	Black afara	Malaria, tranquilizer	Leaves, stembark	Decoction	0.09	50	0.1	0.16	s.w	Iyama & Idu 2015, Lawal <i>et al.</i> 2010
<i>Terminalia superba</i> Engl. & Diels BDU 308	Combretaceae	Egae (O.), Afara (Y.)	Shingle wood, yellow pine	Skin diseases, eye infection, diarrhea, dysentery, malaria, hepatitis, yellow fever	Leaves, stem, roots	Decoction, baths and remedies	0.14	96	0.4	0.3	s.s, s.w	Akwaji <i>et al.</i> 2017
<i>Tetracarpidium conophorum</i> Hutch. & Dalz. BDU 376	Euphorbiaceae	Ukpa (IK.), Okeokpikirinya (I), Awusa (Y.), Okhue (B.)	Nigerian walnut, conophor tree	Haemorrhoids, stomach disorders, high blood pressure, laxative, male and female fertility issues, tonic, aphrodisiac, snake anti- venom	Leaves, seeds, stembark	Infusion, juice extract, mastication	0.19	84	0.4	0.21	s.s, s.e, s.w	Ajibesin <i>et al.</i> 2008 & 2012
<i>Theobroma cacao</i> L. BDU 343	Sterculiaceae	Koko (Y.)	Cocoa	Malaria, gingivitis, toothaches, stimulant	Stembark, roots	Decoction	0.09	88	0.2	0.22	s.w	Ariwaado <i>et al.</i> 2012, Iyama & Idu 2015
<i>Thymus vulgaris</i> L. BDU 290	Lamiaceae	Nch-anwu (I), Efinrinwewe (Y.), Akuko (IK.)	Curry leaf	Antibiotic, carminative, dysentery, stomachache, hemorrhoid	Leaves	Mastication	0.07	85	0.3	0.42	s.e,s.w	Ajibesin <i>et al.</i> 2008 & 2012
<i>Tithonia diversifolia</i> (Helmsl.) A. Gray BDU 368	Asteraceae	Jogbo-agbale (Y.)	Tree marigold	Malaria	Leaves	Decoction	0.06	50	0.05	0.08	s.w	Iyama & Idu 2015
<i>Treculia africana</i> Decne. BDU 278	Moraceae	Afon (Y.)	African Bread fruit	Malaria, diabetes, laxatives, antihemithics, cough	Stembark	Decoction	0.15	93	0.3	0.16	s.w	Akwaji <i>et al.</i> 2017, Iyama & Idu 2015, Lawal <i>et al.</i> 2010
<i>Trema orientalis</i> (L.) Blume BDU 271	Ulmaceae	Afefe (Y.), Elemukien (O.)	Charcoal tree, gunpowder tree	Malaria, debility, skin disease, cough, dysentery	Leaves, stembark	Decoction, infusion, poultice	0.06	50	0.3	0.41	s.w	Ajibesin <i>et al.</i> 2008 & 2012, Iyama & Idu 2015
<i>Trichilia monadelpha</i> (Thonn) J.J. De Wilde BDU 279	Meliaceae	Akorere (Y.)		Malaria	Stembark	Infusion	0.07	50	0.05	0.08	s.w	Iyama & Idu 2015
<i>Tridax procumbens</i> L. BDU 347	Asteraceae	Sabaruma (Y.), Mbuli (IK.)	Tridax	Malaria, skin diseases, stomachache, back ache	Leaves	Decoction, infusion	0.11	82	0.2	0.18	s.s, s.w	Ariwaado <i>et al.</i> 2012, Iyama & Idu 2015
<i>Triumfetta cordifolia</i> A. Rich BDU 355	Tiliaceae	Abiko (B.), Akee-eri (Y.)		Malaria	Leaves	Decoction	0.09	50	0.05	0.05	s.s, s.w	Iyama & Idu 2015

<i>Tussilago farfara</i> L. BDU232	Asteraceae	Odoupo (EK.)	Coltsfoot	Miscarriage	Leaves	Decoction	0.05	80	0.05	0.1	s.s	Ajibesin <i>et al.</i> 2008 & 2012
<i>Urena lobata</i> L. BDU 290	Malvaceae	Odoazezo (I), Akeriri (Y.)	Congo jute, Caesar weed	Malaria	Leaves	Decoction	0.07	85	0.05	0.07	s.e, s.w	Iyama & Idu 2015
<i>Uvaria chamae</i> P. Beauv BDU 316	Annonaceae	Mmimi-ohia (I), Mfee (IK.)	Cluster pear	Malaria, hemorrhoids, boils, wound	Leaves, stembark, roots	Decoction	0.07	85	0.2	0.28	s.e,s.s	Iyama & Idu 2015
<i>Vernonia amygdalina</i> L. BDU 265	Asteraceae	Onugbu (I), Origbo (U.), Mbum(O-M.)	Bitter leaf	Measles, smallpox, chicken pox, diarrhea, dysentery, hemorrhoid, inflammation, diabetes, malaria, constipation, antifungal, hypertension	Leaves, leaf sap, root epidermis	Hand crushing of leaves to obtain juice that is either used as decoction, tincture, maceration and as poultice made with crude chalk	0.25	80	0.6	0.24	s.e, s.s	Alade & Ajibesin 2017, Lawal <i>et al.</i> 2010
<i>Vitex doniana</i> L. BDU 280	Lamiaceae	Ufuru (O-M.)	Black plum	Fever, tooth decay	Leaves, stem	Juice extract, mastication	0.13	73	0.1	0.07	s.s	Ajibesin <i>et al.</i> 2008 & 2012, Akwaji <i>et al.</i> 2017
<i>Vitellaria paradoxa</i> G.F. Gaertn- BDU 204	Sapotaceae	Okume (I); Ori-oyo, Emi-emi, emi (Y.)	Shea butter	Analgelsic	Fruit	Poultice	0.09	66	0.05	0.06	s.e, s.s, s.w	Lawal <i>et al.</i> 2010
<i>Ximenia americana</i> L. BDU 280	Olacaceae	Out-ugba, Otua (I), Igo (Y.)	Wild Lime, Seaside plum	Malaria	Stembark, roots	Decoction	0.05	90	0.05	0.1	s.e, s.w	Ajibesin <i>et al.</i> 2008 & 2012, Iyama & Idu 2015
<i>Xylopiya aethiopica</i> (Dunal) A. Rich BDU 355	Annonaceae	Enyi (K), Eri-alamo (Y.)	Ethiopian pepper	Malaria, womb stabilization, Cough, rheumatism, diarrhea, dysentery, female infertility, vaginal infection	Leaves, fruit, seeds, stembark	Decoction, tincture, mastication, poultice	0.14	81	0.4	0.72	s.s, s.w	Akwaji <i>et al.</i> 2017, Iyama & Idu 2015, Soladoye <i>et al.</i> 2014
<i>Zanthoxylum lepreurii</i> Guill. & Perr. BDU253	Rutaceae	Ata (Y.)	Fagara	Malaria, toothache	Stembark, roots	Tincture	0.06	50	0.1	0.16	s.w	Iyama & Idu 2015
<i>Zanthoxylum zanthoxyloides</i> Lam. BDU 135	Rutaceae	Ata (Y.)	Fagara	Asthma, antisickling	Stem, roots	Decoction, tincture, mastication	0.15	80	0.1	0.06	s.w	Lawal <i>et al.</i> 2010
<i>Zingiber officinale</i> Roscoe BDU 244	Zingiberaceae	Ajo, Ata-ile (Y.)	Ginger	Malaria, female infertility, cough, catarrh	Rhizome	Decoction	0.23	65	0.2	0.08	s.w	Alade & Ajibesin 2017, Iyama & Idu 2015, Soladoye <i>et al.</i> 2014

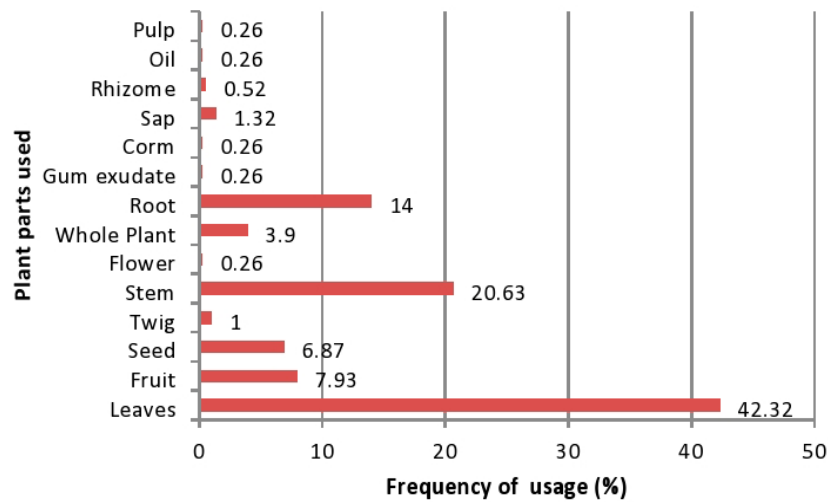


Figure 4. Frequency of plant parts usage

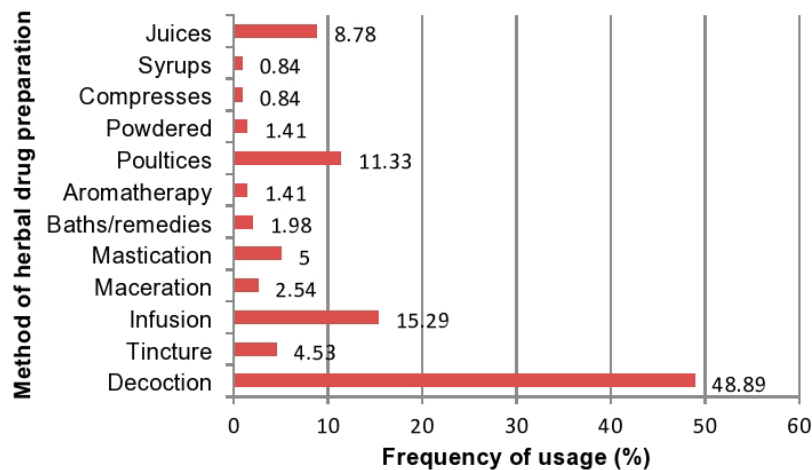


Figure 5. Method of preparation of herbal remedies.

Frequency of plant therapeutic use

Malaria showed a higher frequency (25.94%) in plant therapeutic applications, followed by skin troubles (10.9%), stomach ailments/ vermifuge (10.8%), respiratory ailments (7.38%), dental carries/ analgesic (4.86%), infertility/ fibroid (4.5%), antiviral (3.96%), bone related issues and sexually transmitted disease each having a value of 3.6%, hemorrhoids, eye troubles and heart disease each having a value of 2.7% respectively (Table 3).

Relative frequency of citation (RFC)

This is a statistical indicative of how users frequently cite a plant for different diseases. The RFC value for the species in southern Nigeria ranged between 0.02- 0.30 (Table 4). The highest RFC values for species was reported for *T. occidentale* (0.30), *R. communis* (0.27), *A. precatorius* and *A. indica* (0.26), *C. limon*, *C. citratus*, *M. indica*, *M. oleifera*, *O. gratissimum* and *V. amygdalina* (0.25 each), *A. melegueta*, *A. cordifolia*, *C. papaya*, *C. aurantifolia*, *D. tripetala*, *P. guajava* and *Z. officinale* (0.23 each), *A. montanus*, *A. boonei*, *A. djalensis*, *E. guineense*, *E. senegalensis* and *P. osun* (0.22 each). On the other hand, the highest RFC values for ethnomedicinal applications (Table 4) was reported for malaria (1.0), skin troubles, stomach troubles/ vermifuge (0.4 for each) and respiratory ailments (0.25).

Table 4. Ethnomedicinal application of medicinal plants in Southern Nigeria

Ethnomedicinal applications	Frequency of citation of ailments (FC)	Relative frequency of citation (RFC) $RFC = \frac{FC}{N}$ (N = 200)
Malaria	200	1.0
Typhoid	9	0.04
Respiratory diseases	50	0.25
Heart diseases	17	0.08
Bone issues	23	0.12
Skin troubles	77	0.4
Infertility/Fibroid	30	0.15
Convulsions, fainting, stuttering, epilepsy	12	0.06
Stomach troubles /vermifuge	80	0.4
Diabetes	16	0.08
Antiviral	25	0.13
Antibacterial	14	0.07
Antifungal	12	0.06
Aphrodisiac	5	0.03
Eye troubles	17	0.09
Dental cares/ analgesic	32	0.16
Sexually transmitted diseases	23	0.12
Haemorrhoids	17	0.09
Astringent	3	0.02
Insanity/Insomnia	6	0.03
Asperity, anemia, low immunity & sickling	20	0.1
Hair growth	2	0.01
Dysmenorrheal, amenorrhea & blennorrhagia	12	0.06
Womb fixing & poor lactation	13	0.07
Anti-venoms	8	0.04
Earache & infection	6	0.03
Vaginal/Urogenital infection	6	0.03
Renal ailment/diuretic	7	0.04

Informant consensus factor (ICF)

Malaria and renal ailment (Table 5) had the highest value (0.28), followed by stomach troubles/vermifuge, womb fixing and poor lactation (0.25 each), earache/infection, insanity, insomnia and memory enhancer, vaginal and urogenital infection (0.20 each).

Fidelity level (FL)

Fidelity levels (FL) of the 236 species are presented in Table 3. The results are justified by the relative importance of the species to the indigenes in the study area and the therapeutic effectiveness of the plant species. High FL is an indicative of a particular disease in an area and the use of a species for its cure (Bibi *et al.* 2014). Species with high FL values are as follows: *Elaeis guineense* (99), *Euphorbia hirta* (97), *Chrysophyllum cainito*, *Citrus limon*, *Cnestis ferruginea*, *Cymbopogon citratus*, *Funtumia africana*, *Gongronema latifolium*, *Terminalia superba* (96 each), *Dacryoides edulis*, *Dacus carota*, *Dialium guineense*, *Dracaena arborea*, *Eleusine indica*, *Jatropha curcas*, *Mansonia altissima*, *Momordica charantia*, *Nauclea latifolia*, *Pergularia daemia*, *Scoparia dulcis* (95 each), *Alstonia boonei*, *Anthocleista djalensis*, *Aspilla africana*, *Azadirachta indica*, *Cannabis sativa*, *Cocos nucifera*, *Erythrina senegalensis*, *Morinda morindiodes*, *Pterocarpus osun*, *Sorghum bicolor*, *Stachytarpheta indica*, *Syndrella nodiflora*, *Telfairia occidentalis*, *Terminalia avicennioides*, *Ximenia americana* (90 each) respectively.

Relative popularity level (RPL)

A total of 88 species were frequently cited by the respondents for treating various diseases but only 15 species had high relative popularity level (RPL) and these include: *Abrus precatorius* (0.8), *Afromomum melegueta* (0.7), *Carica papaya*, *Newbouldia laevis* and *Vernonia amygdalina* (0.6 each), *Alchornea cordifolia*, *Ananas comosus*, *Baphia pubescence*, *Chromolaena odorata*, *Chrysophyllum cainito*, *Citrus aurantifolia*, *Citrus limon*, *Dalbergia lactea*, *Psidium guajava*, *Spondias mombin* (0.5 each) respectively. Species most frequently cited by the respondents were accepted as popular while those not frequently cited were viewed as unpopular.

Table 5. Informant consensus factor (ICF) values for 22 different diseases categories

Category of diseases	Number of species	Percentages (%) of species	Number of use citation	Percentages (%) of use citation	ICF value
Malaria	144	61	200	28.7	0.28
Typhoid	8	3.38	9	1.3	0.11
Respiratory disorders	41	17.37	50	7	0.18
Heart related ailment	15	6.4	17	2.44	0.13
Arthritis, rheumatism & bone cares	20	8	23	3.29	0.13
Skin troubles	61	26	77	11	0.22
Infertility	25	11	30	4.3	0.17
Convulsion, fainting, epilepsy & stuttering	10	4	12	1.71	0.18
Stomach troubles	60	25	80	11.49	0.25
Asperity, anemia, low immunity & sickling	17	7	20	2.86	0.15
Dysmenorrheal, amenorrhea & blennorrhea	10	4	12	1.71	0.13
Womb fixing & poor lactation	10	4	13	1.86	0.25
Earache & infection	5	2.1	6	0.85	0.2
Diabetes	14	6	16	2.29	0.13
Viral infection	22	9	25	3.58	0.13
Eye trouble	15	6.35	17	2.43	0.13
Tooth ache & pain	27	11	32	4.58	0.16
Sexually transmitted diseases	20	8	23	3.95	0.13
Hemorrhoid	15	6	17	2.44	0.13
Insanity, insomnia, memory enhancer	5	2	6	0.86	0.2
Vaginal & Urogenital infection	5	2.1	6	0.86	0.2
Renal ailment	6	2.5	7	1	0.28

Use value (UV)

The relative importance of any species is revealed by its use value (Vendruscolo and Mentz 2006). A high use value was given by *Carpolobia lutea* (2.66), *Heliotropium indicum* (1.5), *Citrus limon* (1.41), *Glyphaea brevis* (1.3), *Baphia pubescence* (1.0), *Xylopia aethiopica* (0.72), *Bixa orellana* (0.66), *Anthonotha macrophylla* (0.58), *Ceiba petandra*, *Combretum racemosum*, *Dalbergia lactea* and *Dioscoreae rotundata* (0.5 each) respectively.

Discussion

Southern Nigeria has a high prevalence rate of malaria, typhoid, fevers, colds and chills, catarrh, flu, river blindness, respiratory disorders, eye problems and skin infections. In the past, programs established to eradicate numerous health problems in Nigeria have been inadequate. These have led to little improvement in the health status, especially in southern Nigeria. The study was undertaken to document information on the common plant resources employed in the ethnomedicinal practices of the indigenous people of the southern Nigeria, and to explore ways of sensitizing genuine conservation efforts.

Socio-demographic information and gender-based assessment on the use of medicinal plants by respondents

A high percentage was reported for persons above the age of 40 on the use of medicinal plant (82%) when compared to those below that age (18%). Also, herbal practitioners <40 (25%) and herbal practitioners >40 (75%), herbal vendors < 40 (27%) and herbal vendors > 40 (73%). This may be attributed to a lack of interest in

ethnomedicine by the younger generation due to westernization and a poor communication between the older and younger generation. Similar trends in the area have been reported by Iyama & Idu 2015.

The statistical results show that both male and females make use of medicinal plants. However, women had a higher knowledge of medicinal uses of plants (52%) in the study area than men (48%). This agrees with earlier studies carried out in the area (Iyama & Idu 2015).

Regional biodiversity of southern Nigeria

Biodiversity involves different spheres of biological variety including inter alia, species richness, taxonomic richness, genetic differences in each taxon, communities, ecosystems and landscapes inhabited by organisms and the indigenous knowledge of nature possessed by the indigenes living on the land (Kunwar *et al.* 2009, Ubom 2010). This review has attempted to assess the ethnomedicinal plant resources in southern Nigeria, highlighting the medicinal uses, mode of preparation and administration of herbal drugs. It also indicates the level of species richness as well as biodiversity in the study area. A total of 236 plant species belonging to 80 families were reported in this research review and these plants have shown certain adaptations to the region. Fabaceae family had the highest occurrence of plant species which numbered 30, Asteraceae 14 and Euphorbiaceae 13. South-Western Nigeria had the highest regional occurrence of plant species of about 47%, south-south 31% and south-east 22%. This suggests a relationship between the use of these medicinal plants, their distribution pattern and level of abundance in Southern Nigeria. Earlier research have reported legumes as having a high level of abundance and wide distribution across the ecological zones of Nigeria (Ayodele & Yang 2012, Iyama & Idu 2015). Furthermore, ethnomedicinal uses of many species reported in this review have been reported by past research (Ariwaodo *et al.*, 2012, Ajibesin *et al.*, 2008, Iyama & Idu, 2015). The high level of plant species in the South-west of Nigeria may stem from low rate of hydrocarbon mining and crude oil exploratory activities as in the south-south and, gullies and hills in the south-east. Also, it may be due to the high level of preservation of ancient sacred grooves, and forest landscapes or sanctuaries by the indigenes of south-western Nigeria for fetish or superstitious reasons.

Therapeutic application of medicinal plants

Medicinal plants play crucial role in the treatment of various ailments by the indigenous people in Southern Nigeria. Enormous health challenges and lack of adequate resources to access primary health care by the indigenes of southern Nigeria have made community elders with vast knowledge on the collection and administration of medicinal plants collaborate to provide treatment with the use of these plants. Basic factors that have promoted the use of these ethnomedicinal plants are affordability and availability, which are favored by the climate, soil type, swamps, water, and sunlight and so are easily cultivated within this region (Ajibesin *et al.* 2012).

Decoction (48.9%) was the most common method of herbal drug preparation in the study area. Treasure *et al.* 2021 reported similar findings in the study area on the use of decoction prepared by boiling or steeping the plant material in water.

A higher frequency of use (25.94%) was reported for malaria in plant therapeutic applications. Southern Nigeria is a coastal region noted for its tropical rainforest, high amount of rainfall and sunshine. A major challenge the area has to deal with is problems of poor drainage and waste disposal systems. The higher relative frequency of citation for malaria may arise from high level of infestation and numerous breeding grounds for mosquitoes in the area due to poor drainage and waste disposal systems.

Table 6. Pharmacological applications of Ethnomedicinal Plants of southern Nigeria

Plants/ Family	Relative frequency of citation (RFC)	Ethnomedicinal applications/ biological activities	Isolated Phytochemicals / Enzymes	Stage of clinical trial	References
<i>Brachystegia eurycoma</i> (Fabaceae)	0.17	Analgesic, anti-inflammatory, antimicrobial, wound healing, antioxidant, blood glucose lowering, liver enzyme lipid profile, gastrointestinal modulating, growth inhibitory, cytotoxic activities	-	Ivt	Atawodi 2017
<i>Tetracarpidium conophorum</i> (Euphorbiaceae)	0.19	Detoxification of venoms, anti-diarrhea activity, male fertility enhancing activities, antioxidant activities, anti-chelating activity, anti-ulcer and wound healing activities, treats stomach disorders, controls high blood pressure	Isolectins from T. conophorum seed extracts, polyphenolic compounds (3-galactoside, lactoside, 3-pentoside, 3-arabinoside, quercetin, p-coumaric-acid and 3 and 5-caffeoylquinic acids), alkaloids, steroids and a moderate concentration of tannins	Ivt	Animashaun <i>et al.</i> 1994, Amaral <i>et al.</i> 2004, Periera <i>et al.</i> 2007, Olabinrin <i>et al.</i> 2010, Ezealisiji <i>et al.</i> 2014 a&b, Ikpeme <i>et al.</i> 2014, Nwachoko & Jack 2015, Chikezie 2017
<i>Azadirachta indica</i> (Meliaceae)	0.26	Malaria fever, jaundice, syphilis, anthelmintics, skin disease, eczema, ringworm, emetic, laxative, sore throat, antifungal, immunostimulant, antibacterial, antiviral, antimicrobial, measles	Over 135 compounds have been isolated and are mainly grouped into two major classes: isoprenoids and its derivatives—gedunin—possess anti-malarial properties	Ivt, ivv	Udeinya 1993, Dhara <i>et al.</i> 1999, Adesegun & Coker 2001, NNMDA 2005 & 2008, Udeinya <i>et al.</i> 2006, Odugbemi 2008, Alshawsh <i>et al.</i> 2009
<i>Cymbopogon citratus</i> (Poaceae)	0.25	Malaria, cough, sprains, lumbago, stomach tonic, stimulant, cold, chest pains, rheumatic joints, diaphoretic, diuretic, ringworm	Terpenoids, aldehydes, Essential oils like geraniol	Ivt, ivv	Bidla <i>et al.</i> 2004, Tchoumboungang <i>et al.</i> 2005, Odugbemi 2008), NNMDA 2008
<i>Mangifera indica</i> (Anacardiaceae)	0.25	Malaria, yellow fever, anemia, liver disease, diarrhea, diabetes, skin lesion, high blood pressure, hemorrhage, emmenagogue,	Xanthone Glycosides – Mangiferin, saponins, steroids and tannins	Ivt	Awe 1998, NNMDA 2005&2008, Aiyeloja & Bello 2006, Odugbemi 2008

		insomnia, insanity, anthelmintics, antimicrobials, astringent, asthma, cough			
<i>Carica papaya</i> (Caricaceae)	0.23	Malaria, gonorrhoea, syphilis, amebic dysentery, roundworms, abortifacients, emmenagogue, diabetes, medicinal recipes, hemostatic, hernia, infections of urinogenital systems, blennorrhagia, orchitis, papain enzyme as meat tenderizer, convulsion, mental disorder	Papain	lvt	Bhat & Surolia 2001, Odugbemi, 2008, Awrioro 2010
<i>Psidium guajava</i> (Myrtaceae)	0.23	Malaria fever, diarrhea, stomachache, cough, laxative, dysentery, irregular menstruation sore throat, laryngitis, skin ulcers, astringent, antispasmodic, rheumatism, epilepsy, cholera, convulsions, mouth swelling	Flavonoids, carbohydrates, saponins, anthraquinones and terpenoids	lvt	Nundkumar & Ojewole 2002, NNMDA 2005 & 2008, Obute 2006
<i>Citrus aurantifolia</i> (Rutaceae)	0.23	Fever, jaundice, stomach ache, antimicrobials, abdominal ulcer, gonorrhoea, carminative, hypertensive, flavoring agents, measles, cough, toothache, anthelmintics, scurvy, insecticides	Alkaloids, saponins, flavonoids and glycosides	lvt	Obute 2006, Odugbemi <i>et al.</i> 2007 & 2008, NNMDA (2013), Bapna <i>et al.</i> 2014.
<i>Enantia chlorantha</i> (Annon-aceae)	0.14	Malaria, typhoid fever, antimicrobials, jaundice, rickettsia, infective hepatitis, hemostatic, uterus stimulant, ulcer	Alkaloids, Phenolics	lvv	NNMDA 2008, Odugbemi 2008, Ayoade & Musbau 2010.
<i>Vernonia amygdalina</i> (Asteraceae)	0.25	Malaria, itching, ring worms, weak erection, tonic, astringent, diarrhea, antimicrobials, nervous diseases, gingivitis, toothache,	Bitter sesquiterpenes lactones compounds, (i.e. vernolide, vernodalin, hydroxyvernolide and the steroid	lvt	Tona <i>et al.</i> 2004, NNMDA 2005, Odugbemi 2008, Omoregie <i>et al.</i> 2011

		stomachache, impotency, laxative, acute pains, piles, rashes, hemostatic, diabetes, pneumonia, enema	related constituents), vernonioside B1 and vernonoid B1		
<i>Morinda lucida</i> (Rubiaceae)	0.11	Malaria, typhoid fever, yellow fever, cerebral congestion, dysentery, dressing of wound, diabetes, heart disease, stomachache, purgative, emetic, diuretic, jaundice, flatulence, anti-cancer, low sperm count, analgesic, laxative, trypanocidal activity, ulcers, leprosy gonorrhoea	Damnacanthal	lvt, ivv	Awe & Makinde 1998, NNMDA 2005 & 2008, Odugbemi <i>et al.</i> 2007.
<i>Ocimum gratissimum</i> (Lamiaceae)	0.25	Fever, cough, convulsion, cold, catarrh, bronchitis, colic, chest pain, diarrhea, miscarriage, nasal bleeding, insect repellent, antimicrobials, anthelmintics, hypertension, diabetes, piles, antibacterial	Essential oils	lvt	Ngemenya <i>et al.</i> 2004, Olorunniyi & Morenikeji 2013
<i>Chromolaena odorata</i> (Asteraceae)	0.17	Malaria fever, typhoid fever, diabetes, diuretic, rheumatic pains, tumor, anti-inflammation, stomach pain, antimicrobial, dysentery, headache, toothache, hemostatic, skin diseases	Quercetin-4'-methyl ether	lvv	Odugbemi 2007 & 2008, Ukpai & Amaechi 2012, Olorunniyi & Morenikeji 2013, Ezenyi <i>et al.</i> 2014
<i>Anacardium occidentale</i> (Anacardiaceae)	0.19	Malaria, typhoid fever, white coating of the tongue, toothache, sore gums, dysentery, purgative, elephantiasis, leprosy, ringworms, scurvy, diabetes, warts, anthelmintics, caries	Tannins	lvt	Odugbemi 2007 & 2008, Razalia <i>et al.</i> 2008, Olorunniyi & Morenikeji 2013
<i>Ananas comosus</i> (Bromeliaceae)	0.15	Malaria, Typhoid fever, cough, anthelmintics, digestive	Bromelian	1vt, ivv	Rajendra <i>et al.</i> 2012, Olorunniyi & Morenikeji 2013

		problems, fibrinolytic action, inhibiting platelet aggregation, interfering with the growth of malignant cells, removing skin (debridement), anti-inflammatory, enhancing drug absorption, purgative, emmenagogue, vermifuge, enzyme bromelaine for meat tenderizer, treats angina pectoris, bronchitis, sinusitis, surgical trauma, osteoarthritis, cardiovascular disease			
<i>Persea americana</i> (Lauraceae)	0.17	Malaria, hypertension, analgesic, anti-inflammatory, anti-convulsant, hypoglycaemic, vasorelaxant, diuretic, parasitic skin diseases, peptic ulcer, aphrodisiac, insomnia, gastrointestinal disorders.	1,2,4-dihydroxy derivatives aliphatic alcohols, called avocadenols	lvt	Dike <i>et al.</i> 2012, Falodun <i>et al.</i> 2014
<i>Nauclea latifolia</i> (Rubiaceae)	0.21	Febrile conditions, cough, antifungal, thrush, jaundice, piles, emetic, menstrual disorders, stomach disorders, measles, sore.	Flavonoids, saponin, terpenoids and tannin, Alkaloids.	lvt	Benoit-Vicala <i>et al.</i> 1998, Traore <i>et al.</i> 2000, Odugbemi 2008
<i>Alstonia boonei</i> (Apocynaceae)	0.22	Malaria fever, anti-inflammatory, stomach pain, tonic, anthelmintics, yellow fever, filaria worms, breast development, antidote.	Alkaloid-alstonine, Terpenoids	lvt, subsequently compounded into tablets after testing	Tantchou <i>et al.</i> 1986, Okpekon <i>et al.</i> 2004, NNMDA 2005 & 2008, Obute 2006, Odugbemi 2008, Majekodunmi <i>et al.</i> 2008

The relative frequency of citation value for the species in southern Nigeria ranged between 0.02- 0.30. However, the highest RFC values for species were reported for *T. occidentale* (0.30). In ethnomedicinal applications, the highest relative frequency of citation value was reported for malaria (1.0). Relative frequency of citation in ethnomedicinal studies is used to select plant species having high medicinal values for intensive research and drug discovery (Malik *et al.* 2019).

Among the 64 most cited species in this study, 18 species have been investigated for their medicinal potencies based on reports obtained from previous studies on *in vitro* and *in vivo* activities of these plant species (Table 4). Earlier documentation have shown *Azadirachta indica* contains phytochemicals such as alkaloids, flavonoids, terpenoids, saponins, tannins, phenols and cardiac glycosides (Ayeni and Yahaya, 2010), *Chromolaena odorata* contains Quercetin-4'-methyl ether (Odugbemi, 2007 & 2008), *Cymbopogon citratus* contains alkaloids, saponins, tannins, anthraquinones, steroids, phenols and flavonoids (Asaolu *et al.* 2009), and *Tetracarpidium conophorum* contains Isolectins isolated from seed extracts, polyphenolic compounds such as 3-galactoside, lactoside, 3-pentoside, 3-arabinoside, quercetin, p-coumaric-acid and 3- and 5-caffeoylquinic acids, alkaloids, steroids and a moderate concentration of tannins (Amaral *et al.* 2004). In same vein, *Vernonia amygdalina* have been reported to contain Bitter sesquiterpenes lactones compounds such as vernolide, vernodaline, hydro-xyvernolide and the steroid related constituents, vernonioside B1 and vernonoid B1. Dike *et al.* 2012 stated various protective and therapeutic effects associated with these phytochemicals.

Plants therapeutic uses in southern Nigeria were mostly in the treatment of malaria, skin troubles, stomach ailments and vermifuge, respiratory ailment, dental cares and as analgesic. Plant species reported in the review are either administered singly or in combination with other plants of similar medicinal value in treatment of ailments to provide synergy for total elimination of disease-causing pathogens and aid quick recovery.

Decoction, infusion, poultices, and juices were the most used route in herbal drug preparation. However, plants had high incidence of oral consumption as decoction. The decoctions are usually boiled and drunk, this may indicate that the active ingredients found in most of the plants are not volatile.

Different parts of the medicinal plants are usually employed in preparation of herbal remedies. The parts of medicinal plants mostly used in herbal drug preparation were leaves, followed by stem bark and root. Several studies have reported similar observation (Asase *et al.* 2010, Nguta *et al.* 2010, Ighere *et al.* 2011, Olorunnisola *et al.* 2013, Traore *et al.* 2013, Iyama & Idu 2015). A higher preference towards leaves may be resultant of common knowledge of leaves as the main photosynthetic organs in plants. Also, leaves act as storehouse for end products of photosynthesis or exudates which may contain more bioactive secondary metabolites for protection against predators such as Herbivores. Some of these compounds may be of medicinal value to the human body (Bhattarai *et al.* 2006). It has been established that the use of leaves poses less threat to the continued existence of plant species when compared to the use of underground parts like roots, stem, bark, or the use of entire plants (Zheng & Xing, 2009, Iyama & Idu 2015).

The major issues that pose certain limitations on the use of plant as drugs are lack of information on the social, biochemical, and economic benefits that could be derived from the industrial utilization of medicinal plants, poor incentives for standardization of product, little information on the market potential and trading possibilities of these medicinal plants (Oladeji 2016).

Previous studies or documentation

Several studies have been made on the ethnomedicinal plants in selected areas (Ighere *et al.* 2011, Nwazuoma & Dappa 2013, Odugbemi *et al.* 2017, Anowi & Christian 2019, Chijindu *et al.* 2020, Chukwuma *et al.* 2020) or for specific uses (Iyama & Idu 2015, Babawale *et al.* 2018, Ayeni & Aliyu 2018, Chinedu & Uyanwa 2019, Afolayan *et al.* 2020) across southern Nigeria in the past but not for the whole of southern Nigeria. Ethnomedicinal applications, biological activities, isolated phytochemicals, and active compounds as well as the status of scientific validation of the 18 listed plants, are shown in Table 4. These plants have been previously reported to contain various phytochemicals. Phytochemical extractions like Isolectins from *Tetracarpidium conophorum* seed extracts, polyphenolic compounds like 3-galactoside, lactoside, 3-pentoside, 3-arabinoside, quercetin, p-coumaric-acid and 3- and 5-caffeoylquinic acids (*Tetracarpidium conophorum*), tannins (*Anacardium occidentale*, *Azadirachta indica*, *Mangifera indica*, *Nauclea latifolia*, and *Tetracarpidium conophorum*), alkaloids (*Alstonia boonei*, *Azadirachta indica*, *Nauclea latifolia*, *Citrus aurantifolia*, *Enantia chlorantha* and *Tetracarpidium conophorum*), saponins (*Citrus aurantifolia*, *Psidium guajava*, *Nauclea latifolia* and *Mangifera indica*), glycosides (*Citrus aurantifolia* and *Mangifera*

indica), terpenoids (*Alstonia boonei*, *Cymbopogon citratus*, *Psidium guajava*, *Vernonia amygdalina* and *Nauclea latifolia*), flavonoids (*Citrus aurantifolia*, *Psidium guajava* and *Nauclea latifolia*), polyphenolic compounds (*Tetracarpidium conophorum*), steroids (*Tetracarpidium conophorum*), essential oils (*Cymbopogon citratus* and *Ocimum gratissimum*).

Conclusion

Bioactivity and toxicity by in vitro and in vivo standard tests should be made on herbal drug extracts of the presented species for scientific validation of their efficacy, as well as isolation and possible identification of potentially active compounds. This holds a ray of hope for compounding of phyto-drugs in an era of growing resistance of pathogenic organisms to chemically synthesized drugs. Increased anthropogenic activities in the coming years could emerge as a potential threat to conservation of biodiversity of plant species in southern Nigeria. Hence, a call is made for conservation of these species for their perpetuation.

Declarations

List of abbreviations: HIS: Health Information System, NHIS: National Health Insurance Scheme, S.E: South–East, S.S: South South, S.W: South West, E: Edo, Y: Yoruba, I: Igbo, B: Bini, U: Urhobo, E: Efik, IK: Ikwerre, IB: Ibibio, EK: Ekpere, K: Kalabari, O: Ogoni, O-M: Oboso-Mbube, IJ: Ijaw, BDU: Bioresources Development Centre Ubulu-Uku Herbarium, FC: citation frequency, N: total number of respondents, ICF: Informant consensus factor, Nur: Number of use citations for a disease category, Nt: Number of species used by informants in a given use category, FL: Fidelity level, RPL: Relative popularity value, UV: Use value.

Ethics approval and consent to participate: Informed prior consent was obtained from all respondents before commencement of the interview. Data were collected with respect to confidentiality, anonymity and consent.

Consent for publication: Not applicable

Availability of data and materials: The data was not deposited in public repositories.

Competing interests: The authors declare no conflict of interest.

Funding: This research did not receive any grant in any manner from funding agencies in the public, commercial, or not-for-profit sectors.

Authors' contributions: Enebeli-Ekwutoziam Katherine Chinwe, Aruah Blessing Chinenye, Ogbonna Blessing Onyemaechi, Eze Uju Judith, Egedeye-Fubura Fubaraye Sokari, Nwankwo Chigozie Fredrick, Oliseyenum Nelly Ifeoma, Udoha Ngozi Winfred, AfuyeTubosun Nathaniel, Asogwa Grace Nkechi: Study design, ethnomedicinal surveys conduction, active participation in structuring of the methodology, manuscript writing, data analysis and interpretation. Enebeli-Ekwutoziam Katherine Chinwe, Aruah Blessing Chinenye, Egedeye-Fubura Fubaraye Sokari, Study conception and supervision, methodology description and botanical identification. Chinweokwu Kris Ada, Anenih Farida Onose, Iyamu James Ekhorutormwen, Oboti Feyinwa Deborah: Contribution to the study design and authorizations of different community heads to conduct the surveys. Nwaizu Nkechi, Ajabor James Ifeanyi, Ozadibe Ogechukwu Yvonne, Otunla Racheal Abosede, Okoronkwo Bertha Francis, Orji Miriam: Work supervising, contribution to methodology, manuscript improving and review-editing. All authors read, reviewed, and approved the manuscript.

Acknowledgements

The authors wish to acknowledge the support provided by the management of Bioresources Development Centre Ubulu-Uku –National Biotechnology Development Agency. The authors extend gratitude to Mrs. Enebeli-Ekwutoziam, K.C. for editing the manuscripts and carrying out statistical analysis of research data, and Ms. Aruah, C.B. for proofreading the manuscripts.

Literature cited

Abd El-Ghani, MM, 2016. Traditional medicinal plants of Nigeria: an overview. Agriculture and Biology Journal of North America 7(5):220-247. doi:10.5251/abjna.2016.7.5.220.247.

Abebe, D, Ayehu, A. 1993. Medicinal Plants and Enigmatic Health Practices of Northern Ethiopia. B.S.P.E., Addis Ababa, Ethiopia.

Abere, TA, Okoye, J, Agroreyo, FO. 2015. Antisickling and toxicological evaluation of the leaves of *Scoparia dulcis* Linn. (Scrophllariaceae). BMC Complementary and Alternative Medicine Journal 15: 414. doi:10.1186/s12906-015-0928-5.

- Adesegun SA, Coker HAB. 2001. Plants used in tradition medicine against malaria. *Nigerian Journal of Pharmacology* 32:50-62.
- Adeyemo DO. 2005. Local Government and Health care delivery in Nigeria: A case study. *Journal of Human Ecology* 18:149-60. doi: 10.1080/09709274.2005.11905822.
- Afolayan ID, Sulaiman KA, Okunade WT. 2020. Ethnobotanical survey of plants used in cancer therapy in Iwo and Ibadan, South-Western of Nigeria. *Journal of Pharmacy and Pharmacognosy Research* 8(5):346-367. <http://jppres.com/jppres> (Accessed 22/07/2021).
- Aiyelaja AA, Bello OA. 2006. Ethnobotanical potentials of common herbs in Nigeria: a case study of Enugu state. *Journal of Educational Research and Reviews* 1:16-22. <http://academicjournals.org/ERR2> (Accessed 22/07/2021).
- Aja PM, Ugwu OPC, Keke K, Ibere JB, Ekpono EU. 2017. Phytochemical Analysis of *Senna occidentalis* leaves. *IDSOR Journal of Applied Sciences* 2(1):75-91. www.idosr.org (Accessed 1/08/2021).
- Ajibesin KK, Danladi NB, Uwemedimo FU. 2012. Ethnomedicinal survey of plants used by the indigenes of Rivers State of Nigeria. *Pharmaceutical Biology*, 50 (9), 1123-1143. doi: 10.3109/13880209.2012.661740.
- Ajibesin KK, Ekpo BA, Bala DN, Essien EE, Adesanya SA. 2008. Ethnobotanical survey of Akwa Ibom State of Nigeria. *Journal of Ethnopharmacology* 115:387-408. doi: 10.1016/j.jep.2007.10.021.
- Ajuru MG. 2018. Ethnobotanical inventory of Oguru-ama Town, Degema Local Government Area, Rivers State, Nigeria. *Journal of Advances in Biology and Biotechnology* 19(2):1-13. doi: 10.9734/JABB/2018/13576.
- Akinyemi O, Oyewole SO, Jimoh KA. 2018. Medicinal plants and sustainable human health: a review. *Horticulture International Journal* 2(4):194-195. doi: 10.15406/hij.2018.02.00051.
- Akwaji PI, Eyamand EO, Bassey RA. 2017. Ethnobotanical Survey of Commonly Used Medicinal Plants in Northern Cross River State, Nigeria. *World Scientific News* 70(2):140-157. www.worldscientificnews.com (Accessed 1/8/2021).
- Alade G, Oladele A, Okpako E, Ajibesin K, Olanrewaju A. 2018. A Survey of plants used for family planning in Bayelsa State, southern Nigeria. *Journal of Intercultural Ethnopharmacology* 7(1):25-44. doi:10.5455/jice.20171202114930.
- Alade GO, Ajibesin, KK. 2017. Herbal medicine cleric's knowledge in sub-urban centre in Niger-Delta Nigeria: a pilot study. *Journal of Pharmacy and Pharmacognosy Resesearch* 5 (4):200-216. <http://jppres.com/jppres> (Accessed 1/8/2021).
- Alshawsh MA, Mothana RA, Al-shamahy HA, Salah F, Lindequist AU. 2009. Assessment of anti-malaria activity against *Plasmodium falciparum* and phytochemical screening of some Yemeni medicinal plants. *Evidence Based. BMC Complementary and Alternative Medicine* 6:453-456. doi: 10.1093/ecam/nem148.
- Amaral JS, Seabra RM, Andrade PB, Valentao P, Pereira JA, Ferreres F. 2004. 'Phenolic profile in the quality control of walnut (*Juglans regia* L.) leaves. *Food Chemistry* 88:373-379. doi: 10.1016/j.foodchem.2004.01.055.
- Alexiades MN, Sheldon JW. 1996. Selected guidelines for ethnobotanical research: A Field Manual. Boranx, NY: the New York Botanical Garden, U.S.A.
- Ali-Shtayeh MS, Yaniv Z, Mahajna J. 2002. Ethnobotanical survey in the Palestinian area: a classification of the healing potentials of medicinal plants. *Journal of Ethnopharmacology* 71:221-232. doi: 10.1016/s0378-8741(00)00316-0.
- Animashaun T, Togun RA, Hughes RC. 1994. Characterization of isolectins in *Tetracarpidium conophorum* seeds (Nigerian Walnut), *Glycoconj Journal* 11(4):299-303. doi: 10.1007/BF00731202.
- Anowi CF, Christian UI. 2019. Ethnobotanical surveys of medicinal plants used by the natives of Umuahia, Abia State, Nigeria for the management of diabetes. *IOSR Journal of Pharmacy and Biological Sciences* 14:05-37. <http://www.iosrjournals.org/iosr-jpbs/papers/Vol14-issue5/Series-1/B1405010537.pdf> (Accessed 30/6/2021).
- Ariwaodo JO, Chukwuma EC, Adeniji KA, 2012. Some medicinal plant species of Asamagbe stream bank vegetation, Forestry Research Institute of Nigeria, Ibadan. *Ethnopharmacology Research and Applications* 10:541-549. https://www.researchgate.net/publication/281443566_13_JO_Ariwaodo_EC_Chukwuma_KA_Adeniji_2012_Some_Medicinal_Plant_Species_of_Asamagbe_Stream_Bank_Vegetation_Forestry_Research_Institute_of_Nigeria_Ibadan_Ethnobotany_Research_Applications_10_541-549 (Accessed 1/8/2021).

- Asase A, Akwetey GA, Achel DC. 2010. Ethnopharmacological use of herbal remedies for the treatment of malaria in the Dangme West District of Ghana. *Journal of Ethnopharmacology* 129:367-376. doi: 10.1016/J.JEP.2010.04.001.
- Asaolu, MF, Oyeyemi, OA, Olanlokun, JO. 2009. Chemical compositions, phytochemical constituents, and *in vitro* biological activity of various extracts of *Cymbopogon citratus*. *Pakistan Journal of Nutrition* 8(12):1920-1922. doi: 10.3923/pjn.2009.1920.1922.
- Atawodi SE, Illiemene UDE. 2017. Evaluation of *Brachystegia eurycoma* Harmsseed dietary inclusion in the prevention of colon carcinogenesis. *Annals of oncology* 259. doi: 10.1093/annonc/mdx261.257.
- Avwioro G. 2010. Effectiveness of some medicinal plant decoction in the treatment of malaria in Nigeria. *Annals of Biology Research* 1 (2):230-237. www.scholarsresearchlibrary.com (Accessed 1/8/2021).
- Awe SO. 1998. Anti-plasmodial and antipyretic screening of *Mangifera indica* extract. *Phytotherapy Research* 12:437. doi: 10.1002/(SICI)1099-1573(199809)12:6<437::AID-PTR313>3.0.CO;2-C.
- Awe SO, Makinde JM. 1998. Effect of petroleum ether fractions of *Morinda lucida* on, *Plasmodium berghei* in mice. *Pharmaceutical Biology* 36:301-304. doi: 10.1076/phbi.36.4.301.4581.
- Ayeni EA, Aliyu N. 2018. Ethnobotanical survey and documentation of healing river sources among the Yoruba people (Ijesha Land) Nigeria. *Journal of Complementary Medicine Research* 8:59-70. doi: 10.5455/jcmr.20180504090258.
- Ayeni KE, Yahaya SA. 2010. Phytochemical screening of three medicinal plants: neem leaf (*Azadirachta indica*), hibiscus leaf (*Hibiscus rosa-sinensis*) and Speargrass leaf (*Imperata cylindrical*). *Continental Journal of Pharmaceutical Science* 4:47-50. [https://wiloludjournal.fandom.com/wiki/Continental_J_Pharmaceutical_Sciences_Volume_4_\(2010\)](https://wiloludjournal.fandom.com/wiki/Continental_J_Pharmaceutical_Sciences_Volume_4_(2010)) (Accessed 1/8/2021).
- Ayoade AA, Musbau AA. 2010. Antimalaria bioactivity of *Enantia chlorantha* stem bark. *Medicinal Plants: Phytochemistry, Pharmacology and Therapeutics* 1 (2010), 441-447. <https://basicmedicalkey.com/bioactivity-of-enantia-chlorantha-stem-bark/> (Accessed 1/8/2021)
- Ayodele AE, Yang Y. 2012. Diversity and distribution of vascular plants in Nigeria. Qingdao Publishing House, Qingdao, China.
- Babawale B, Taiye FR, Adetunji OS. 2016. Ethnobotanical survey of plants used as memory enhancer in 3 states of southwestern Nigeria. *Journal of applied pharmaceutical science* 6(09):209-214. doi: 10.7324/JAPS.2016.60931.
- Balick MJ, Cox PA. 1996. Plants, culture, and people. WH Freeman & Co., Scientific American New York, United States of America.
- Bapna S, Ramaiya M, Chowdhary A. 2014. Brine shrimp toxicity and invitro antimalarial activity of Citrus aurantifolia (Christm.) Swingle against *Plasmodium falciparum* 3D7. *IOSR Journal of Pharmaceutical and Biological Science* 9 (5):24-27. doi: 10.9790/3008-09512427.
- Benoit-Vicala F, Valentina A, Cournaca V, Pelissier Y, Malliea M, Bastidea JM. 1998. In vitro anti-plasmodial activity of stem and root extracts of *Nauclea latifolia* S.M. (Rubiaceae). *Journal of Ethnopharmacology* 61:173-178. doi: 10.1016/s0378-8741(98)00036-1.
- Bhat GP, Suroliya N. 2001. *In vitro* anti-malaria activity of extracts of three plants used in the traditional medicine of India. *Am. J. Trop. Med. Hyg* 65(4):304-8. doi: 10.4269/ajtmh.2001.65.304.
- Bhattarai S, Chaudhary RP, Taylor RS. 2006. Ethnomedicinal plants used by the people of Manang district, central Nepal. *Journal of Ethnobiology and Ethnomedicine* 2:41 doi: 10.1186/1746-4269-2-41.
- Bibi T, Ahmad M, Tareen RB, Tareen NM, Jabeen R, Rehman S, Sultana S, Zafar M, Yaseen G. 2014. Ethnobotany of medicinal plants in district Mastung of Balochistan province- Pakistan. *Journal of Ethnopharmacology* 157:79-89. doi: 10.1016/j.jep.2014.08.042.
- Bidla G, Titanji VPK, Jako B, Ghazali GE, Bolad A, Berzins, K. 2004. Anti-plasmodial activity of seven plants used in African folk medicine. *Indian Journal of Pharmacology* 36, 245-246. <http://www.bioline.org.br/request?tc08032> (Accessed 1/8/2021).

- Bryce J, Boschi-Pinto C, Shibuya K. 2005. Who estimates the cause of death in children? Lancet PubMed, 365:1147-52. doi: 10.1016/S0140-6736(05)71877-8.
- Burkhill HM. 1995. The useful plants of west tropical Africa. 2nd Edition, Volume 3, Royal Botanic Gardens, Kew, Richmond, UK.
- Chijindu PCI, Okpoma, MO, Atubi O. 2020. Ethnobotanical survey of medicinal plants used in Erhuwaren community in Ughelli south local government area of Delta state. Unilag Journal of Medicine, Science and Technology (UJMST) (CEBCEM Special Edition) 8(1):176-206. <http://journals.unilag.edu.ng/index.php/ujmst/citationstylelanguage/get/turabian-fullnote-bibliography?submissionId=1025> (Accessed 1/8/2021).
- Chikezie UN. 2017. Phytochemical and proximate composition of *Tetracarpidium conophorum* (African Walnut) seeds. International Journal of Research Studies in Biosciences 5(10):25-31. doi:10.24297/JBT.V7I1.6411.
- Chinedu F, Uyanwa IC. 2019. Ethnobotanical survey of medicinal plants used by the natives of Umuahia, Abia State, Nigeria for the management of diabetes. IOSR Journal of Pharmacy and Biological Sciences 14(5):05-3. doi: 10.9790/3008-1405010537.
- Chukwuma EC, Chukwuma DM, Adio AF. 2020. Flora diversity of Ijero Local Government Area of Ekiti State, Southwestern Nigeria. Tropical Plant Research 7(1):5-64. doi: 10.22271/tpr.2020.v7.i1.009.
- Clark TW, Daneshvar C, Pareek M, Perera N, Stehenson I. 2010. Enteric fever in a United Kingdom regional infectious diseases unit. A 10 years retrospective review. Journal of Infection 60(2):91-8. doi: 10.1016/j.jinf.2009.11.009.
- Dhara R, Zhang K, Talwar GP, Gargb S, Kumara N. 1999. Inhibition of the growth and development of asexual and sexual stages of drug-sensitive and resistant strains of the human malaria parasite *Plasmodium falciparum* by Neem (*Azadirachta indica*) fractions. J. Ethnopharmacol. 61, 31-39. doi: 10.1016/s0378-8741(98)00012-9.
- Dike IP, Obembe OO, Adebisi FE. 2012. Ethnobotanical survey for potential anti-malarial plants in South-Western Nigeria. Journal of Ethnopharmacology 144:618-626. doi: 10.1016/j.jep.2012.10.002.
- Duchelle AE. 2007. Observations on natural resource use and conservation by the shuar in Ecuador's cordillera Del condor. Ethnobotany Research and Application 5:5-23. doi: s10.17348/ERA.5.0.5-23.
- Eke P. 1999. Intergroup Relation In: Introduction to Nigerian socio-cultural heritage. Edited by Anikpo, MOC, Atemie JD, Osia International publishing company, Nigeria.
- Ezealisiji KM, Ijeomah SC, Agbo MO. 2014a. Anti-ulcer activity of African walnut, *Tetracarpidium conophorum* nuts against gastric ulcers in Rats. Asian Pacific Journal of Tropical Disease 4(1):670-673. doi: 10.1016/S2222-1808(14)60772-6.
- Ezealisiji KM, Omotosho AE, Udoh R, Agbo MO. 2014b. Wound healing activity of n-hexane and methanol extracts of *Tetracarpidium conophorum* (Mull. Arg.) Hutch (African Walnut) in Wistar rats. Malaysia Journal of Pharmaceutical Sciences 12(1):79-88. https://www.researchgate.net/publication/273313981_wound_healing_activity_of_n-hexane_and_methanol_extract_of_tetracarpidium_conophorum_mull_arg_hutch_african_walnut_in_wistar_rats (Accessed 7/6/2021).
- Ezenyi IC, Salawu OA, Kulkarni R, Emeje M. 2014. Antiplasmodial activity aided isolation and identification of quercetin-4'-methyl ether in *Chromolaena odorata* leaf fraction with high activity against chloroquine resistant *Plasmodium falciparum*. Parasitology Research 113(12):4415-4422. doi:10.1007/s00436-014-4119-y.
- Ezenduka CC, Fallieros DR, Godman BB. 2017. Evaluating the treatment cost for uncomplicated malaria at a public healthcare facility in Nigeria and its implications. Pharmacoeconomics 1:185-194. doi: 10.1007/s41669-017-0021-8.
- Falodun A, Imieje V, Erharuyi O, Ahomafor J, Jacob MR, Khan SI, Hamann MT. 2014. Evaluation of three medicinal plants extracts against *Plasmodium falciparum* and selected microorganisms. African Journal of Traditional, Complementary and Alternative Medicine 11(4):142-146. doi: 10.4314/ajtcam.v11i4.22.
- Gbille ZO, Adesina SK. 1986. Nigerian flora and its pharmaceutical potentials. Journal of Ethnopharmacology 19:1-16. doi: 10.1016/0378-8741(87)90135-8.
- Giday M, Asfaw Z, Elmqvist T, Woldu Z. 2003. An ethnobotanical study of medicinal plants used by the Zay people in Ethiopia. Journal of Ethnopharmacology 85:43-52. doi: 10.1016/s0378-8741(02)00359-8.

- Gillespie S. 2018. What are intestinal worms? In: Healthline, Reviewed by Sampson S. <https://www.healthline.com/health/intestinal-worms> (Accessed 3/8/2021).
- Gill LS. 1992. Ethnomedicinal uses of Plants in Nigeria. Uniben Press, Benin City, Nigeria.
- Heinrich M, Ankli A, Frei B, Weimann C, Sticher O. 1998. Medicinal plants in Mexico: Healers' consensus and cultural importance. *Social Science & Medicine* 47(11):1859-1871. doi: 10.1016/s0277-9536(98)00181-6.
- Hostellmann K, Marston A. 2002. Twenty years of research into medicinal plants: results and perspectives. *Phytochemistry Reviews* 1:275-285. doi:10.1023/A:1026046026057.
- Huntington HP. 2000. Using traditional ecological knowledge in science: methods and applications. *Ecological applications* 10(5):1270-1274. doi: 10.2307/2641282.
- Hutchinson J, Dalziel JM. 1954. Flora of West Tropical Africa. Vol 1 part 1, 2nd Edition. The White Frairs Press, Limited, London, UK.
- Hutchinson J, Dalziel JM. 1958. Flora of West Tropical Africa. Volume 1 part 2. The White Frairs Press, Limited, London, UK.
- Hutchinson J, Dalziel JM. 1968. Flora of West Tropical Africa. Volume 3 part 1. The White Frairs Press, Limited, London, UK.
- Idowu OA, Soniran OT, Ajana O, Aworinde DO. 2009. Ethnobotanical survey of anti-malarial plants used in Ogun State, Southwest Nigeria. *African Journal of Pharmacy and Pharmacology* 4:055-060. doi: 10.5897/AJPP.9000138.
- Idu M, Ndukwu BC, Osemwegie OO. 2007. Ethnofloristic studies of Ethiope Council Area of Delta State, Nigeria. *Journal of Plant Science* 2:1-13. doi: 10.3923/jps.2007.1.13.
- Idu M, Onyibe HI, Timothy O, Erhabor JO. 2008. Ethnomedicinal flora of otuo people of Edo State, Nigeria. *Asian Journal of Plant Science* 7:8-12. doi: 10.3923/ajps.2008.8.12.
- Ighere, DA, Ajiboye TO, Edagbo DE, Borokini TI, Alowonle AA, Micheal C, Giwa A, Adeyemo A. 2011. Ethnobotanical survey of local herbs used for the treatment of malaria fever among the Urhobo people in Delta State, Nigeria. *International Journal of Current Research* 3:336-339. <http://www.journalcra.com> (Accessed 1/8/2021).
- Ikpeme EV, Ekaluo UB, Udensi O, Ekerette EE, Ekpo PB, Asuquo BO. 2014. Sperm quality and hormone profile of male albino rats fed with seeds of African walnut (*Tetracarpidium conophorum*, Mull.). *Annual Research and Review in Biology* 4(9):1379-1386. doi: 10.9734/ARRB/2014/5426.
- Iwu MM. 1993. Handbook of African Medicinal Plants. CRC Press, Inc., Corporate Blvd., Florida, USA.
- Iyamah PC, Idu M. 2015. Ethnomedicinal survey of plants used in the treatment of malaria in Southern Nigeria. *Journal of Ethnopharmacology* 173:287-302. doi: 10.1016/j.jep.2015.07.008.
- Jimoh A, Sofola O, Petu A, Okorosobo T. 2007. Quantifying the economic burden of malaria in Nigeria using the willingness to pay approach. *Cost Effect. Resource Allocation* 5:6-13. doi: 10.1186/1478-7547-5-6.
- Kajang YG, Keswet LA. 2006. Health challenges in the present democratic era in Nigeria: the place of technology. *International Journal of Technical Research and Applications* 4 (1):124-129. <http://hdl.handle.net/123456789/1443> (Accessed 7/6/2021).
- Keay RWJ. 1989. Trees of Nigeria. Clarendon Press, Oxford, Great Britain.
- Khan TI, Dular AK, Deepika MS. 2003. Biodiversity conservation in Thar Desert, with emphasis on endemic and medicinal plants. *Environmentalist* 23:137-144. doi: 10.1023/A:1024835721316.
- Kunwar RM, Uprety Y, Burlakoti C, Chowdhary CL, Bussmann RW. 2009. Indigenous use and ethnopharmacology of Medicinal plants in far-West Nepal. *Ethnobotany Research and Applications* 7:5-28. https://www.researchgate.net/publication/229062180_Indigenous_Use_and_Ethnopharmacology_of_Medicinal_Plants_in_Far-West_Nepal (Accessed 1/8/2021).
- Lawal IO, Uzokwe NE, Igboanugo ABI, Adio AF, Awosan EA, Nwogwugwu JO, Faloye B, Olatunji BP, Adesoga AA. 2010. Ethnomedicinal information on collation and identification of some medicinal Plants in Research Institutes

- of South-West Nigeria. *African Journal of Pharmacy and Pharmacology* 4 (1):001-007. https://academicjournals.org/journal/AJPP/edition/January_2010 (Accessed 3/8/2021).
- Majekodunmi SO, Adegoke OA, Odeku OA. 2008. Formulation of the extract of the stem bark of *Alstonia boonei* as tablet dosage form. *Tropical Journal of Pharmaceutical Research* 7(2):987-994. doi: 10.4314/tjpr.v7i2.14683.
- Menizibeya OW. 2011. The Nigerian health care system: Need for integrating adequate medical intelligence and surveillance systems. *Journal of pharmacy and bioallied sciences* 3(4): 470-478. doi: 10.4103/0975-7406.90100.
- Murray P. 2013. *Medical microbiology*, 7th Ed. Elsevier Saunders, Philadelphia, U.S.A.
- Mustapha AA, Fawibe OO, Ajiboye AA, Agoobla DA. 2014. Ethnobotanical survey of medicinal plants used in the treatment of diabetes in Irepodun Local Government of Osun State of Nigeria. *Greener Journal of Biological Sciences* 4(2):059-068. doi: 10.15580/GJBS.2014.2.010314006.
- National Health insurance scheme decree No35 of 1999 Laws of the Federation of Nigeria. <https://www.ilo.org> (Accessed 1/8/2021).
- Ndukwu BC, Ben-Nwadibia NB. 2005. Ethnomedicinal aspects of plants used as spices and condiments in the Niger Delta Area of Nigeria. *Ethnobotanical Leaflets* 19(10):1-32 <https://opensiuc.lib.siu.edu/eb/vol2005/iss1/10> (Accessed 1/8/2021).
- Nguta JM, Mbaria JM, Gakuya DW, Gathumbic PK, Kiamad SG. 2010. Traditional antimalarial phytotherapy remedies used by the South Coast community, Kenya. *Journal of Ethnopharmacology* 131:256-267. doi: 10.1016/j.jep.2010.06.031.
- Ngemenya MN, Tane P, Berzins K, Titanji VPK. 2004. Antiplasmodial activity of some medicinal plants used in Cameroon: preliminary toxicity studies of highly active plant extracts, in proceedings of the 11th Annual Conference of The Cameroon Bioscience Society, December 2004.
- Nigeria Health Information System Policy. FMOH, September, 2014. <https://ehealth4everyone.com/wpcontent/uploads/2015/09/Nig-Health-Info.pdf> (Accessed 1/8/2021)
- Nigeria National Health Conference Communique, Abuja Nigeria. <https://www.ngnhc.org> (Accessed 18/11/2020).
- Nigeria Natural Medicine Development Agency (NNMDA). 2005. *Medicinal Plants of Nigeria South-west Nigeria*, vol. 1, NNMDA, Lagos, Nigeria.
- Nigeria Natural Medicine Development Agency (NNMDA). 2008. *Medicinal Plants of Nigeria Southeast Zone*, vol. I, Lisinda Consulting, Lagos, Nigeria.
- Nigeria Natural Medicine Development Agency (NNMDA). 2013. *Medicinal Plants of Nigeria South-South Zone*, vol. I, Koredex Associates, Lagos, Nigeria.
- Nnadozie O. 2015. Estimating malaria burden in Nigeria: a geostatistical modeling approach. *Geospatial Health* 205(10):306. doi: 10.4081/gh.2015.306.
- Nundkumar N, Ojewole JAO. 2002. Studies on antiplasmodial properties of some South African plants used as antimalaria remedies in Zulu folk medicine. *Experimental and Clinical Pharmacology* 24(7):397-401. doi: 10.1358/mf.2002.24.7.696540.
- Nwachoko N, Jack IR. 2015. Phytochemical screening, and anti-diarrhea activities of *Tetracarpidium conophorum* induced in albino rats. *Sky Journal of Biochemistry Research* 4(4):21-24. <http://www.skyjournals.org/SJBR> (Accessed 2/8/2021).
- Nwauzoma AB, Dappa MS. 2013. Ethnobotanical studies of Port Harcourt metropolis, Nigeria. *International Scholarly Research Notices Botany* 1-11. doi:10.1155/2013/829424.
- Obute G. 2005. Ethnomedicinal plant resources of south-eastern Nigeria. *Ethnobotanical Leaflets* 2005(1):5. <https://opensiuc.lib.siu.edu/eb/vol/2005/iss1/5> (Accessed 30/6/2021)
- Obute GC. 2007. Ethnomedicinal plant resources of South Eastern Nigeria. *African Journal of Interdisciplinary Studies* 3(1):90-94. <https://opensiuc.lib.siu.edu/eb/vol2005/iss1/5> (Accessed 9/12/2020).

- Obute GC, Osuji LC. 2002. Environmental awareness and dividends: a scientific discourse. *African Journal of Interdisciplinary studies* 3(1):90-94.
- Odugbemi T. 2008. *A Textbook of Medicinal Plants from Nigeria* Lagos. University of Lagos Press, Nigeria.
- Odugbemi TO, Oduunayo R, Akinsulire I, Albinu E, Fabeku PO. 2007. Medicinal plants useful for malaria therapy in okeigbo, Ondo State, southwest, Nigeria. *African Journal of Traditional Complementary and Alternative Medicine* 4(2):191-198. doi: 10.4314/AJTCAM.V4I2.31207
- Ojo OE, Oyekunle MA, Ogunleye AO, Otesile EB. 2009. *E. coli* 0157:H7 in food animals in part of S/Western Nigeria: Prevalence and in vitro antimicrobial susceptibility. *Tropical veterinarian* 26 (3 & 4):23-30. <https://scholar.google.com/citations?user=DTDK8LoAAAAJ&hl=en> (Accessed 6/7/2021)
- Oke JM, Oladosun B, Okunola MC. 1999. Sweet potato (*Ipomea batatas*) tuber – potential oral anti-diabetic agent. *African Journal of Biomedical Research* 2(1):13-17. <https://www.ajol.info/index.php/ajbr/article/view/140557> (Accessed 3/8/2021).
- Okonko IO, Soleye FA, AmusanTA, Ogun AA, Udeze AO, Nkang AO, Ejembi J, Faleye TOC. 2009. Prevalence of malaria *Plasmodium* in Abeokuta, Nigeria. *Malaysian Journal of Microbiology* 5:113-8. doi:10.21161/MJM.16509.
- Okpekon T, Yolou S, Gleye C, Roblot F, Loiseau P, Bories C, Grellier P, Frappier F, Laurens A, Hoquemiller R. 2004. Antiparasitic activities of medicinal plants used in Ivory Coast. *Journal of Ethnopharmacology* 90: 91-97. doi: 10.1016/j.jep.2003.09.029.
- Okujagu TF. 2005. Welcome address at the Zonal training for traditional medicine practitioners, Port- Hacourt, Nigeria. Nigeria Natural Medicine Development Agency, Federal Ministry of Science and Technology.
- Olabinrin BM, Eniyansoro OO, Okoronkwo CO, Olabinrin PF, Olaleye MT. 2010. Evaluation of chelating ability of aqueous extract of *Tetracarpidium conophorum* (African walnut) *in vitro*. *International Journal of Applied Research in Natural Products* 3(3):13-18. https://journaldatabase.info/articles/evaluation_chelating_ability_aqueous.html (Accessed 3/7/2021).
- Oladeji O. 2016. The characteristics and roles of medicinal plants: some important medicinal plants in Nigeria. *Natural Products: An Indian Journal* 12 (3):102. <https://www.tsjournals.com/articles/the-characteristics-and-roles-of-medicinal-plants-some-important-medicinal-plants-in-nigeria.html> (Accessed 3/8/2021).
- Oladunmoye MK, Kehinde FY. 2011. Ethnobotanical survey of medicinal plants used in treating viral infections among Yoruba tribe of southwestern Nigeria. *African Journal of Microbiology Research* 5(19): 2991-3004. doi: 10.5897/AJMR10.004.
- Olanrewaju O, Akanni OL. 2010. Health expenditure and health status in Northern and Southern Nigeria: a comparative analysis using NHA framework. Paper presented at the 2010 CSAE conference held at St. Catherine College, University of Oxford, Oxford, UK.
- <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.192.6678&rep=rep1&type=pdf> (Accessed 9/12/2020).
- Olorunnisola OS, Adetutu A, Balogun EA, Afolayan AJ. 2013. Ethnobotanical survey of medicinal plants used in the treatment of malaria in Ogbomoso, South-west, Nigeria. *Journal of Ethnopharmacology* 150: 71-78. doi: 10.1016/j.jep.2013.07.038.
- Olorunniyi OF, Morenikeji OA. 2013. The extent of use of herbal medicine in malaria management in Ido/Osi Local Government Area of Ekiti State, Nigeria. *Journal of Medicinal Plants Research* 7(42):3171-3178. doi: 10.5897/JMPR2013.5101.
- Olowokudejo JD, Kadiri AB, Travih VA. 2008. Ethnobotanical survey of herbal markets and medicinal plants in Lagos, Nigeria. *Ethnobotanical Leaflets* 12:851-65. <https://opensiuc.lib.siu.edu/ebl/vol2008/iss1/116> (Accessed 3/8/2021).
- Omoriegbe ES, Pal A, Sisodia B. 2011. *In vitro* antimalarial and cytotoxic activities of leaf extracts of *Vernonia amygdalina* (Del.). *Niger. Journal of Basic and Applied Sciences* 19(1):121-126. doi: 10.4314/njbas.v19i1.69356.
- Omoruan AI, Bamidele AP, Phillips OF. 2009. Social Health Insurance and sustainable health reforms in Nigeria. *EthnoMedicine* 3:105-10. doi:10.1080/09735070.2009.11886346.

- Onwujekwe OE, Obikeze EN, Ogonnia GO, Onoka CA. 2010. Investigating determinants of out-of-pocket spending and strategies for coping with payments for health care in southeast Nigeria. *BMC Health Services Research* 10(67):1472-6963. doi:10.1186/1472-6963-10-67.
- Periera JA, Oliveira SA, Valentao P, Andrade PB, Ferreira IC, Ferreres F. 2007. Walnut (*Juglans regia* L.) polyphenolic compounds, antibacterial activity and antioxidant potentials of different cultivars, *Food and Chemical Toxicology* 45(11):2287-2295. doi: 10.1016/J.FCT.2007.06.004.
- Peters RH. 1991. *A critique for Ecology*. Cambridge University Press, New York, U.S.A.
- Rajendra P, Sapna J, Shraddha K, Ajay K. 2012. Properties and therapeutic application of bromelian: A review. *Biotechnology Research International* 2012:1-6. doi: 10.1155/2012/976203.
- Razalia N, Razaba R, Junita SM, Aziz AA. 2008. Radical scavenging and reducing properties of Cashew shoots (*Anacardium occidentale*). *Food Chemistry* 111:38-44. doi: 10.1016/J.FOODCHEM.2008.03.024.
- Ryan J, 2018. *Boards and Beyond: infectious Disease*. Create Space Independent Publishing Platform, U.S.A.
- Savikin K, Zdunic G, Menkovic N, Zivkovic J, Cujic N, Terescenko M, Bigovic D. 2013. Ethnobotanical study on traditional use of medicinal plants in SouthWestern Serbia, Zlatibor district, *Journal of Ethnopharmacology* 146:803-10. doi: 10.1016/j.jep.2013.02.006.
- Soladoye MO, Chukwuma EC, Sulaiman OM, Feyisola RT. 2014. Ethnobotanical survey of plants used in the traditional treatment of female infertility in southwestern Nigeria. *Ethnobotany Research and Applications* 12:081-090. doi:10.17348/ERA.12.0.081-090.
- Soladoye MO, Lewis GP. 2003. A checklist of Nigerian Legumes. *CENRAD Natural Resources Research Assessment and Conservation Series 03*, Ibadan, Nigeria, West Africa.
- Tantchou TPK, Aldivo J. 1986. Studies on Cameroonian medicinal plants 1: antimalarial activity of the extracts of *Alstonia boonei* and *Guibourtia tessmanii* on the Vietnam Smith strain of *Plasmodium falciparum*. *Revue Scientifique et Technique Office International Des Epizooties* III (3 and 4):69-77.
- Tardio J, Pardo-De-Santayanna M, Morales R. 2006. Ethnobotanical review of wild edible plants in Spain. *Botanical Journal of the Linnean Society* 152:27-71. doi: 10.1111/J.1095-8339.2006.00549.X.
- Tona L, Cimanga RK, Mesia K, Musuamba CT, De Bruyne T, Apers S, HernansN, Van Miert S, Pieters L, Totte J, Vlietinck AJ. 2004. *In vitro* antiplasmodial activity of extracts and fractions from seven medicinal plants used in the Democratic Republic of Congo. *Journal of Ethnopharmacology* 93:27-32. doi: 10.1016/j.jep.2004.02.022.
- Traore F, Gasquet M, Laget M, Guiraud H, Di-Giorgio C, Azas N, Doumbo O, Timon-David P. 2000. Toxicity and genotoxicity of antimalarial alkaloid rich extracts derived from *Myrtagyna inermis* O. Kuntze and *Nauclea latifolia*. *Phytotherapy Research* 14:608-611. doi: 10.1002/1099-1573(200012)14:8<608:aid-ptr667>3.0.co;2-d.
- Treasure IO, Adjene JO, Odigie MO. 2020. Ethnobotanical survey of medicinal plants in Ughelli North Local Government Area of Delta State. *Journal of Medicine: Study and Research* 3(14):1-9. doi: 10.24966/MSR-5657/100014.
- Ubom RM. 2010. Ethnobotany and biodiversity conservation in the Niger Delta, Nigeria. *International Journal of Botany* 6(3):310-322. doi:10.3923/IJB.2010.310.322.
- Udeinya IJ, Brown N, Shu EN, Udeinya FI, Quakeyie I. 2006. Fractions of an antimalarial neem-leaf extract have activities superior to chloroquine and are gametocytocidal. *Annals of Tropical Medicine and Parasitology* 100:17-22. doi: 10.1179/136485906X78508.
- Ugbogu OA, Chukwuma EC. 2019. Ethnobotany of Okomu Forest Reserve, Edo, State, Nigeria. *Journal of Applied Sciences and Environmental Management* 2397:1391-1401. doi: 10.4314/jasem.v23i7.31.
- Uzochukwu BSC, Ughasoro MD, Etiaba E, Okwuosa C, Envuladu, E, Onwujekwe OE. 2015. Health care financing in Nigeria: Implications for achieving universal health coverage. *Nigerian Journal of Clinical Practice* 8(4):437-444. doi: 10.4103/1119-3077.154196.
- Wambebe C. 1998. Development of standardized phytomedicines. *African Journal of Pharmaceutical Research and Development* 3:1-11.

WHO. 1978. Alma Ata Declaration Primary Health Care. Health for all Series No. 1.

WHO. 1978. The promotion and development of traditional medicine. Technical Report No.622, Geneva, Switzerland.

Zheng X, Xing F. 2009. Ethnobotanical study on medicinal plants around Mt. Yinggeling, Hainan Island, China. *Journal of Ethnopharmacology* 124:197-210. doi: 10.1016/j.jep.2009.04.042.