

# Traditional knowledge of medicinal plants used in Ile-Ife, Southwestern Nigeria

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**Abstract.** Mukaila YO, Oladipo OT, Arogundade OO, Ajao AA-N. 2022. Traditional knowledge of medicinal plants used in Ile-Ife, Southwestern Nigeria. *Asian J Ethnobiol* 5: 71-83. The invaluable importance of traditional herbal medicine has necessitated systematic documentation of medicinal knowledge. This study documented medicinal plants used by the inhabitants of Ile-Ife. Ethnobotanical data were collected through semi-structured interviews with 70 informants. The interview focused on the local names of the plants, medicinal uses, plant parts used, where the plants are sourced, and methods of preparation. The data collected were analyzed and compared with previous studies using quantitative indices. The conservation statuses of the recorded plants were retrieved from IUCN online database. Eighty-seven (87) medicinal plants from 43 families were implicated to be used in Ile-Ife from our survey. Euphorbiaceae was the most implicated family with eight species; herbs (36%) were the dominant plant habit, and the leaf (46%) was the most frequently used plant part. The informants preferred decoction (37%) as the method of preparation. Over 50% of the plants were collected from the wild. The conservation status of the 26 implicated plants in this study has been accessed, 17 plants fall under the least concern (LC) category, while five species are vulnerable (VU). The study highlights the need to intensify studies on the conservation of medicinal plants and also provides baseline data for future pharmacological and phytochemical studies while preserving the cultural medicinal practices of Ile-Ife.

**Keywords:** Conservation, ethnobotany, Ile-Ife, indigenous knowledge, medicinal plants

## INTRODUCTION

Nigeria is a developing country with many rural areas where orthodox medicines are not available or not accessible; traditional medicine is, therefore, the first line of defense for many ailments such as coughs, fevers, headaches, psychosis, etc. Traditional medicine has been reported to be of unquantifiable importance to locals around the world (Van Wyk et al. 2008), but as important as these traditional medicines are, there have been several scientific reports of their side effects (Ekor 2013), which led to the prescription of standardization of herbal medicines by the World Health Organization (WHO 2002). The standardization process consists of several steps, the first of which is the systematic documentation of the medicinal plants and their uses in rural communities around the world.

The importance of documentation of medicinal plants of the world cannot be overemphasized as several reports have confirmed that traditional medicinal knowledge is usually passed down orally and may soon be lost if documentation efforts are not intensified (Van Wyk et al. 2008; Erinoso and Aworinde 2018; Az-Zahra et al. 2021). Furthermore, the preservation and documentation of indigenous uses of plants were also pronounced as one of the cogent priorities for strategic action in plant science at the 19th International Botanical Conference in Shenzhen,

China (Crane et al. 2017). Before and after this pronouncement, there have been several efforts towards documentation of medicinal plants of the world, but it was reported that Nigeria does not have a national herbal pharmacopeia because very few ethnobotanical studies have been undertaken in Nigeria, a problem associated with a lack of funding and expertise in the field (Erinoso and Aworinde 2018).

Ile-Ife is a well-known cultural site in Nigeria and beyond. It is a general belief that Ile-Ife is the ancestral home of the Yoruba people in the southwestern part of Nigeria. The use of herbal medicine in Ile-Ife was reported to be very popular among its residents, owing to the cultural status of the town among the Yorubas (Omisore et al. 2009). Unfortunately, there is no record of in-depth ethnobotanical research in Ile-Ife until now. This research, therefore, aims to document the medicinal plants of Ile-Ife and their corresponding uses. This will serve as baseline data for future phytochemical and pharmacological studies and also preserve the medicinal cultural practices of Ile-Ife. Over-exploitation has been reported as a threat to the medicinal plants of the world (Naguib 2011). The conservation statuses of the recorded medicinal plants were surveyed in this study to unravel whether the use of plants for medicinal purpose in Ile-Ife pose a challenge in terms of extinction risk to the diversity and abundance of the plants in the area.

## MATERIALS AND METHODS

### Study area

The study was carried out in Ile-Ife, a part of the Yoruba-speaking area of southwestern Nigeria, politically designated as the Ife Central Local Government Area of Osun State (Figure 1). Geographically, Ile-Ife is located in the tropical savannah climate zone of West Africa between latitude 7°28'N and 7°45'N and longitude 4°30'N and 4°34'E (Ajala and Olayiwola 2013). Ile-Ife is considered to have the richest cultural heritage in southwestern Nigeria (Omisore et al. 2009). It is made up of rural settlements with agriculture being the prevalent occupation. The annual average temperature is 26.2°C, the average rainfall is between 1000-1250 mm, and the average humidity is 75-100% (Ajala and Olayiwola 2013).

### Informants sampling

A reconnaissance survey of the study area led to the identification and selection of 70 informants known among the people of Ile-Ife as having substantial knowledge of medicinal plants. They consist mainly of traditional healers and herb sellers, while some were elderly people known to know medicinal plants.

### Data collection and quantitative analysis

The survey was carried out between November 2018 and September 2019 using semi-structured interviews as described by Martin (1995), and the interviews were

conducted in the local language so that informants could properly express themselves. Before the start of the interview, informants were informed about the scope of the research to gain their confidence. Interviews were conducted individually while there were two separate group interviews. With the help of four informants on separate field walks and a trained taxonomist, all plants mentioned were collected and identified. Voucher specimens were prepared and deposited at the Obafemi Awolowo University Herbarium (IFE). The global conservation status of all the plants mentioned was then surveyed using the IUCN online database (2020).

Frequency Index (Madikizela et al. 2012) was used to identify the most cited plant. It was calculated as follows:

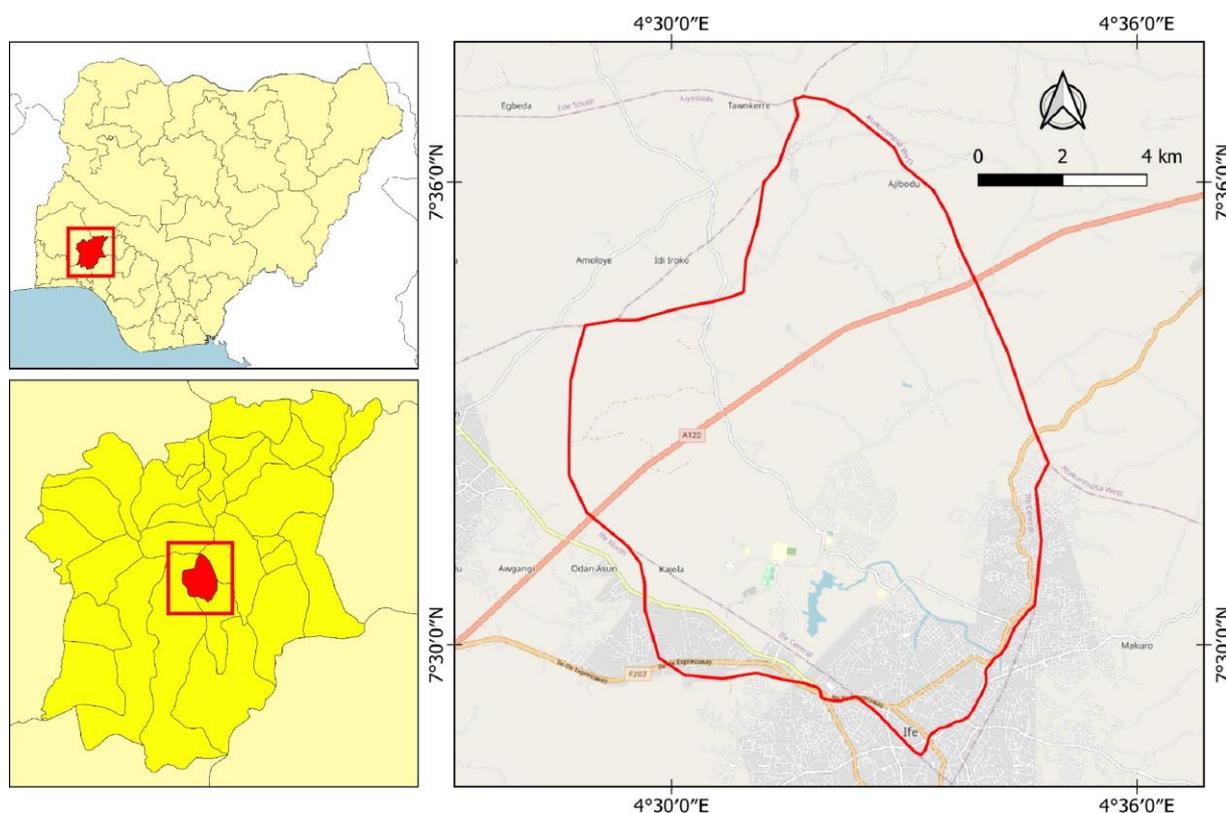
$$FI = \frac{\text{Frequency of citation}}{\text{Total number of informants (70)}} \times 100\%$$

Diversity of uses and its evenness were calculated with the Shannon-Wiener index as described by Begossi (1996) using the following equations:

$$\text{Diversity of uses } (H') = -\sum [P_i \times \ln P_i]$$

$$\text{Evenness} = H' \div H_{\max}$$

Where  $P_i$  is the number of individual citations per species and  $H_{\max}$  was calculated as the natural logarithm of the total number of informants.



**Figure 1.** A map of the study area in Ile-Ife, Southwestern Nigeria

Informant Consensus Factor (ICF) (Trotter and Logan 1986) was calculated to assess the agreement on the therapeutic efficacy of plants in each disease category.

$$FIC = \frac{N_{ur} - N_t}{N_{ur} - 1}$$

Where  $N_{ur}$  = Number of use record for a particular disease category, and  $N_t$  = Total number of plants mentioned by all informants for the disease category.

Rahman Similarity Index (RSI) (Rahman et al. 2019) was used to compare the result of the study with other studies from the region.

$$RSI (\%) = \frac{d}{a + b + c - d} \times 100\%$$

Where a = number of species unique to the present study, b = number of species unique to the cited study, c = number of species common to both studies and d = common species used to treat similar ailments.

### Ethical approval

The study was approved by the Postgraduate Committee of Obafemi Awolowo University, Ile-Ife. Informants were aware of the planned use of information and consent was given that the information could be published. Each participant was also compensated accordingly. The ethical principles of data collection concerning traditional resource rights as stated in the latest edition of the International Society of Ethnobiology (2006) were followed.

## RESULTS AND DISCUSSION

### Informants

The 70 informants consist of 39 men and 31 women residing within the community, all of whom were above the age of 30. Most of the informants (52.9%) attained the primary level of education, while 34.3% had no formal education. Twenty-seven of the informants were herbalists, while 19 herb-sellers were interviewed and seven of them claimed to be unskilled staff of the Obafemi Awolowo University, Ile-Ife (Table 1).

### Medicinal plants of Ile-Ife

The 70 informants reported 87 medicinal uses of plants for various illnesses. The 87 plants belonging to 43 families. The plants' families, botanical names, authorities, vernacular names, habits, plant parts used, and method of preparation appear in Table 2. This is an indication that traditional medicine is still well practiced in the research area, as similar studies from other parts of the country recorded lower numbers of plant species. For example, Kayode et al. (2008) reported 44 species from Ilesa, which is a neighboring community; Alade and Ajibesin (2017) reported 36 species from Ijaw; Idu et al. (2014) reported 63 species from Idoma, while Ampitan (2013) reported 27 plant species from Bui, with a RSI of 7.92, 15.38, 9.40, and

4.00 respectively. The low index of the study from Bui (4.00) is because it is a location in the northern part of the country with different climatic conditions and floristic composition.

Regarding the number of medicinal plants, Euphorbiaceae is represented with the highest number of species (8), followed by Fabaceae and Malvaceae (6 species each), Asteraceae and Cucurbitaceae (5 species each), and Poaceae (4 species), while 27 species are the sole representatives of their families. This is consistent with the results of a previous study in Keffi (Mowobi et al. 2016), where Euphorbiaceae was the most represented family. Even though plants from the families Fabaceae and Asteraceae are usually the most cited in ethnobotanical surveys (Ajao et al. 2019, Farooq et al. 2019), there have been several reports of the presence of varieties of metabolites and phytochemicals of medicinal importance in many plants of the family Euphorbiaceae (Mwine and Van Damme 2011), which could account for their superior abundance in this study.

*Telfairia occidentalis* Hook. F. in the family Cucurbitaceae has the highest frequency index as the most mentioned plant. This may be related to the fact that the plant, in addition to being used as medicine, is a widely eaten vegetable in the study area. The value for the index of diversity of uses of the recorded plants is 4.24 with an evenness of 0.99. This shows a relatively high diversity of use when compared to sites with known high biodiversity like Brazil and Thailand, with an index of 4.80 and 4.97, respectively (Begossi 1996). Also, the evenness is higher than those of both sites.

**Table 1.** Demographic characteristics of informants

Characteristics	Frequency	Percentage
Sex		
Male	39	55.7
Female	31	44.3
Age (years)		
31-40	14	20.0
41-50	31	44.3
51-60	19	27.1
Greater than 60	6	8.6
Education level		
None	24	34.3
Adult education	3	4.3
Primary level	37	52.9
Secondary level	6	8.6
Occupation		
Farmers	6	8.6
Herbalists	27	38.6
Herb-sellers	19	27.1
Driver	3	4.3
Trader	8	11.4
Unskilled university staff	7	10.0

### Ailments treated with the medicinal plants

The reported medicinal plants were used to treat several ailments. It was observed in some cases that the physical properties of plant extracts were related to the ailments they are used to treat. For example, the majority of the herbal remedies used as blood tonics have a characteristic red or blood-like colour after preparation, while some informants mentioned that the diabetes ailment is caused by the consumption of excess sugar and could be cured with any plant that has a bitter taste. This phenomenon was reported in the previous literature (Cotton 1996) and referred to as 'the doctrine of signature, which is widely accepted.

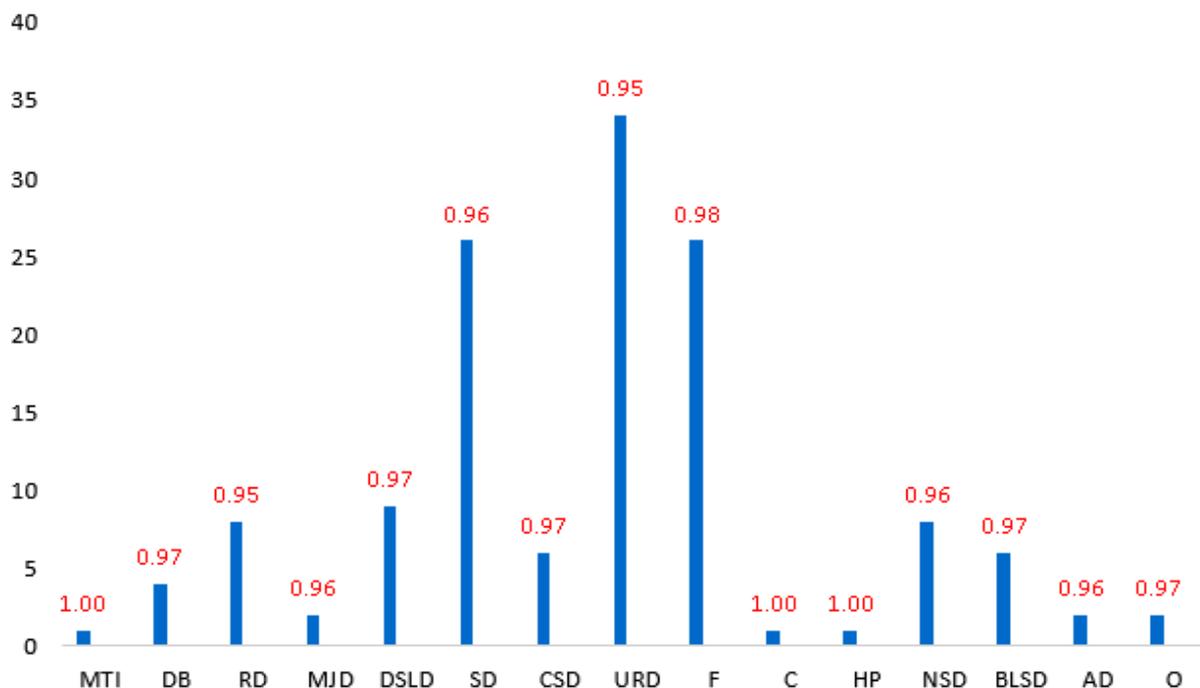
Another noteworthy field experience was the underlining spirituality of some of the remedies. For example, some informants stressed that plants are not to be collected at night because the plants will be "sleeping" and therefore impotent or inactive for their purpose if collected then. This is true when viewed from the physiological angle, as plants do not photosynthesize at night. Also, in the treatment of gonorrhoea with the decoction of the fruits of *Citrullus colocynthis* (L.) Schrader, *Ananas comosus* (L.) Merr., *Citrus aurantifolia* (Christm.) Swingle, *Xylopi aethiopica* (Dunal.) A. Rich, and potash. The plant materials must be arranged in the pot accordingly, starting with *C. colocynthis*, and water from the pot must not pour out of it while cooking, else, the preparation loses its potency. This spiritual aspect of herbal remedies is called Shamanism (Cotton 1996).

The ailments were grouped into categories according to the WHO international classification of ailments (WHO 1987). The result revealed the highest number of plants

(34) used for Urinary and Reproductive Diseases (URD), followed by fevers (F) and skin diseases (SD), treated with 26 plants each, while there were no plants in the eye-ear infection category (Figure 2). The abundance of the URD plants is linked to the fact that most diseases in the category infect the majority of the people in the age bracket of the informants. Inadequate toilet facilities and polygamy may have also played a vital role in spreading the diseases in this category. Fevers have been reported to account for over 39% of deaths in Nigeria (Muhammad et al. 2017). Figure 2 also contains the results of the Informant Consensus Factor (ICF) for each ailment category. The ICF values range between 0.95 for the URD category and 1.00 for the Mouth-Throat Infections (MTI), Cancer (C), and Hair Problems (HP) categories since they only have one cited plant. These values are high compared to other studies (Faruque et al. 2018; Farooq et al. 2019), which indicates that medicinal knowledge is being shared within the study area.

### Habits of the medicinal plants

An analysis of the growth forms of the recorded medicinal plants revealed that herbs were the most represented with 31 species, followed by trees with 29 species. Climbers and shrubs were represented with 17 and 10 species, respectively. Other studies have reported the abundance of herbs as the most used in herbal medicines (Mahwasane et al. 2013; Teklehaymanot 2009). The prevalence of the herbaceous life form was attributed to easing of collection (Ajao et al. 2019), while that of the tree is because they are obtainable in all seasons (Tariq et al. 2017).



**Figure 2.** The number of plants used for each disease category and their corresponding ICF values. Note: MTI mouth-throat infections; DB, diabetes; RD, respiratory disorders; MJD, Muscular and Joint disorders; DSL D, digestive system and Liver diseases; SD, skin diseases; CSD, circulatory system diseases; URD, urinary and reproductive diseases; F, fever; C, cancer; HP, hair problems; NSD, nervous system disorders; BLSD, blood and lymphatic system diseases; AD, antidote; O, others

**Table 2.** List of medicinal plants and their conservation status

Scientific name	Family	Vernacular (Yoruba) name	Source	Voucher specimen number	Plant habit	Plant part used	Mode of use	Conservation status	Frequency index (%)
<i>Amaranthus spinosus</i> L.	Amaranthaceae	<i>Tete elegun</i>	Wild	IFE17849	Herb	Leaf	A mixture of the leaf paste and local soap is used to bath children having teething problem	NA	9
<i>Crinum jagus</i> (Thompson) Dandy	Amaryllidaceae	<i>Ogede odo, isu merii</i>	Cultivated wild	IFE17895	Herb Climber	Bulb	1. Juice from the heated bulb is mixed with honey and used for convulsion 2. Water decoction of the bulb and <i>Xylopiya aethiopica</i> is used to treat convulsion	NA	47
<i>Anacardium occidentale</i> L.	Anacardiaceae	<i>Kashu</i>	Cultivated wild	IFE17908	Tree	Seed	Water decoction of the seed is used for diseases related to high blood pressure	NA	12
<i>Mangifera indica</i> L.	Anacardiaceae	<i>Mongoro</i>	Cultivated Wild	IFE17874	Tree	Leaf, Stem bark	Decoction of the leaf and stem bark in fermented maize water is used to treat chronic malaria	DD	90
<i>Spondias purpurea</i> L.	Anacardiaceae	<i>Iyeye</i>	Wild	IFE17879	Tree	Fruit, stem bark	1. Powder of the dried fruits and <i>Xylopiya aethiopica</i> is mixed with palm kernel oil to treat dandruff 2. Water decoction of the stem bark and potash is used to treat fibroid	LC	33
<i>Xylopiya aethiopica</i> (Dunal.) A. Rich	Annonaceae	<i>Eru alamo, Eru awonka</i>	Wild	IFE17825	Tree	Fruit	1. Water decoction of the fruit is used for gonorrhoea 2. Powdered fruit is mixed with Sulphur and added to body cream to treat skin diseases	LC	79
<i>Alstonia boonei</i> De Willd.	Apocynaceae	<i>Ahun</i>	Wild	IFE17914	Tree	Stem bark	1. Water decoction of the bark is used for malaria 2. Infusion of the stem bark in palm wine is used to treat malaria 3. Infusion of the stem bark in local gin is rubbed on the body to treat measles	VU	69
<i>Calotropis procera</i> (Aiton) W.T.Aiton	Apocynaceae	<i>Bomubomu</i>	Cultivated	IFE17912	Shrub	Leaf, latex	1. The latex is applied topically for boil 2. Leaf is macerated in water and used to treat measles 3. The latex is used to treat toothache	NA	76
<i>Rauvolfia vomitoria</i> Afzel.	Apocynaceae	<i>Asofeyeje, Oloora</i>	Wild	IFE17897	Shrub	Leaf, stem bark, root	1. Infusion of stem bark in alcohol is used to treat pile and backache 2. Decoction of leaf and root is used to treat yellow fever 3. Powdered dry root is swallowed with water to treat insomnia	LC	73
<i>Anchomanes difformis</i> (Blume) Engl.	Araceae	<i>Isu ogirisako</i>	Wild	IFE17899	Herb	Tuber	The tuber is cut, infused in water, and taken to treat stroke	LC	10
<i>Caladium bicolor</i> (Aiton) Vent.	Araceae	<i>Eje jesu</i>	Wild	IFE17832	Herb	Leaf	Leaf is macerated in fermented maize water to treat stomach ulcers	NA	16
<i>Elaeis guineensis</i> Jacq.	Arecaceae	<i>Ope-eyin</i>	Cultivated Wild	IFE17913	Tree	Root	Decoction of the root and potash is used to treat hernia	LC	19

<i>Ageratum conyzoides</i> (L.) L.	Asteraceae	<i>Imi-esu, Apasa, Rerin-komi</i>	Wild	IFE17827	Herb	Leaf whole plant	1. Leaf juice is applied to the minor wounds to stop bleeding 2. Decoction of the whole plant is used to bath baby to prevent measles 3. Maceration of the leaves in fruit juice of <i>Citrus aurantifolia</i> is used to treat female infertility	LC	70
<i>Bidens pilosa</i> L.	Asteraceae	<i>Molaganran</i>	Wild	IFE17926	Herb	Leaf	Decoction of leaf is used to treat rheumatism	NA	17
<i>Chromolaena odorata</i> (L.) R. King & H. Rob.	Asteraceae	<i>Akintola</i>	Wild	IFE17882	Herb	Leaf	1. Leaf maceration is used for diarrhea 2. Leaf maceration is used for malaria	NA	81
<i>Melanthera scandens</i> (Schumach. & Thonn.) Roberty	Asteraceae	<i>Ako yunrun</i>	Wild	IFE17845	Herb	Leaf	Leaf maceration is used for diarrhea	NA	23
<i>Vernonia amygdalina</i> Del.	Asteraceae	<i>Ewuro</i>	Cultivated	IFE17880	Herb	Leaf	1. Leaf maceration is used for diabetes 2. Leaf juice is mixed with palm oil and drunk to treat measles 3. Leaf is squeezed and stuffed in the nostrils to control epistaxis	NA	91
<i>Kigelia africana</i> (Lam.) Benth.	Bignoniaceae	<i>Pandoro</i>	Wild	IFE17864	Tree	Fruit, root	1. Decoction of the fruits is used for convulsion 2. Infusion of fruit in salty water is used for dizziness 3. Dried root is ground and mixed with palm oil to treat dizziness 4. Infusion of root in palm wine is used to treat yellow fever	LC	50
<i>Newbouldia laevis</i> Seem.	Bignoniaceae	<i>Akoko</i>	Wild	IFE17907	Shrub	Leaf	1. Decoction of stem bark is used for hypertension 2. Decoction of the leaves with the fruits of <i>Citrus aurantifolia</i> is used to treat yellow fever 3. Leaf is macerated with water and taken orally to stop menstruation after pregnancy	NA	57
<i>Bixa orellana</i> L.	Bixaceae	<i>Ewe aje</i>	Wild	IFE17883	Shrub	Leaf	1. Leaf juice is used for eczema 2. Decoction of the leaf with fruits of <i>Citrus aurantifolia</i> and fermented maize water is used to treat malaria	NA	47
<i>Ananas comosus</i> (L.) Merr.	Bromeliaceae	<i>Ope oyinbo</i>	Cultivated	IFE17894	Herb	Fruit	1. Decoction of fruit is taken for gonorrhoea 2. Decoction of unripe fruit is used to ease difficult labor	NA	47
<i>Carica papaya</i> L.	Caricaceae	<i>Ibepe</i>	Cultivated Wild	IFE17858	Tree	Leaf, fruit, root	1. Coldwater infusion of the fruits is used for malaria 2. Decoction of unripe fruit is used to ease difficult labor 3. Decoction of the root and the root of <i>Parkia biglobosa</i> (Jacq.) R.Br. ex G.Don. is used to treat malaria	VU	87

<i>Garcinia kola</i> Heckel	Clusiaceae	<i>Orogbo</i>	Cultivated wild	IFE17851	Tree	Fruit, root	1. Fruits are chewed for cough 2. Decoction of the root and stem bark is used for cough	VU	77
<i>Cnestis ferruginea</i> Vahl ex DC	Connaraceae	<i>Akara aje</i>	Wild	IFE17829	Tree	Fruit	Fruits are chewed to paste and then applied to snakebite wounds	NA	6
<i>Kalanchoe pinnata</i> (Lam.) Pers.	Crassulaceae	<i>Abamoda</i>	Wild	IFE17909	Herb	Leaf	Decoction of leaf with salty water is used to treat cough	NA	3
<i>Lagenaria breviflora</i> (Benth.) Roberty	Cucurbitaceae	<i>Taagiri</i>	Wild	IFE17893	Climber	Fruit	Decoction of the fruit and the leaves of <i>Newbouldia laevis</i> is used to treat measles	NA	20
<i>Citrullus colocynthis</i> (L.) Schrader	Cucurbitaceae	<i>Bara</i>	Cultivated wild	IFE17850	Climber	Leaf, pod, fruit	1. Leaves are macerated in local gin and drunk for gonorrhoea 2. Decoction of the fruit, fruits of <i>Ananas comosus</i> , <i>Citrus aurantifolia</i> , <i>Xylopi aethiopica</i> , and potash is taken to treat gonorrhoea	NA	54
<i>Luffa cylindrica</i> (L.) M. Roem	Cucurbitaceae	<i>Kankan ayaba</i>	Wild	IFE17898	Climber	Fruit	Fresh fruits are heated then squeezed to produce juice which is topically applied to stretch marks	NA	41
<i>Momordica charantia</i> L.	Cucurbitaceae	<i>Ejinrin wewe, igbole aja</i>	Wild	IFE17843	Climber	Leaf	1. Leaf is macerated in water to treat pile and also used as aphrodisiac 2. Leaf is macerated in salty water and used for syphilis	NA	69
<i>Telfairia occidentalis</i> Hook. F.	Cucurbitaceae	<i>Apiroko</i>	Cultivated	IFE17902	Climber	Leaf	Maceration of leaf with malt drinks is drunk to improve blood level	NA	99
<i>Euphorbia lateriflora</i> Schum. & Thonn.	Euphorbiaceae	<i>Enu opiri</i>	Wild	IFE17896	Herb	Leaf, latex	1. The latex is applied to whitlow 2. Leaf is macerated and used to bath to treat skin diseases	NA	20
<i>Alchornea cordifolia</i> Mull Arg.	Euphorbiaceae	<i>Isin</i>	Wild	IFE17846	Shrub	Fruit	Fruits are chewed to treat cough	LC	4
<i>Euphorbia hirta</i> L.	Euphorbiaceae	<i>Kannajogbe</i>	Wild	IFE17870	Herb	Whole plant	Whole plant juice is applied to a fresh wound, especially cuts	NA	4
<i>Jatropha curcas</i> L.	Euphorbiaceae	<i>Botuje, Lapalapa funfun</i>	Shrub	IFE17900	Shrub	Leaf	1. Leaf is macerated in saltwater and drunk for dysentery 2. Leaf is macerated and mixed with local chalk and taken orally to prevent miscarriage	LC	50
<i>Jatropha gossypifolia</i> L.	Euphorbiaceae	<i>Botuje, lapalapa pupa</i>	Cultivated	IFE17890	Shrub	Leaf	1. Leaf is macerated in water to treat gonorrhoea 2. Leaf is macerated in water and drunk to prevent difficult labor	NA	56
<i>Jatropha multifida</i> L.	Euphorbiaceae	<i>Ogege</i>	Cultivated wild	IFE17891	Shrub	Leaf stalk	Leaf stalk is used to wash tongue in cases of coated tongue	NA	13
<i>Abrus precatorius</i> L.	Fabaceae	<i>Omisinmisin</i>	Wild	IFE17887	Climber	Leaf	The leaves are chewed to treat cough	NA	33
<i>Mucuna pruriens</i> (L.) DC.	Fabaceae	<i>Yerepe</i>	Wild	IFE17873	Climber	Leaf	1. Leaf maceration is used as a blood supplement 2. Leaf maceration is used to treat measles	NA	66

<i>Senna alata</i> (L.) Roxb.	Fabaceae	<i>Asunran, ajaawa</i>	Cultivated wild	IFE17836	Shrub	Leaf, flower	1. Young leaves are macerated in water, mixed with salt, and used for skin diseases 2. Leaves are powdered, mixed with Sulphur, alum, and any cream to treat skin diseases 3. Leaves are macerated in water, potash is added and drunk for pile 4. Inflorescence is dried and powdered with potash to treat female infertility	LC	62
<i>Senna hirsuta</i> (L.) Irwin & Barneby	Fabaceae	<i>Rere</i>	Wild	IFE17889	Herb	Leaf	Leaf is pounded and added to the fruit juice of <i>Citrus aurantifolia</i> to treat typhoid	NA	24
<i>Senna siamea</i> Lam.	Fabaceae	<i>Kasia</i>	Cultivated wild	IFE17911	Tree	Leaf, stem bark	Decoction of leaf and bark is used for malaria	LC	41
<i>Tetrapleura tetraptera</i> (Schum & Thonn (Taub.)	Fabaceae	<i>Aidan</i>	Cultivated wild	IFE17841	Tree	Leaf, seed	1. Leaf is macerated and alum is added to treat cough 2. Dried seeds are powdered and mixed with cold pap to treat stroke	LC	37
<i>Anthocleista djalonensis</i> A. Chev.	Gentianaceae	<i>Sapo</i>	Wild	IFE17885	Tree	Stem bark, root	1. Decoction of the stem bark is used to treat malaria 2. Decoction of the root with the leaves of <i>Phyllanthus amarus</i> is used to treat pile	LC	61
<i>Heliotropium indicum</i> L.	Heliotropiaceae	<i>Ogbe-ori-akuko</i>	Wild	IFE17835	Herb	Leaf	Decoction of the leaf is taken to treat skin diseases	NA	26
<i>Irvingia gabonensis</i> (Aubry-Lecomte ex O'Rorke) Baill.	Irvingiaceae	<i>Ooro</i>	Cultivated wild	IFE17888	Tree	Leaf	Leaf is macerated with leaf of <i>Hibiscus</i> spp to treat gonorrhoea	VU	26
<i>Ocimum gratissimum</i> L.	Lamiaceae	<i>Foromoba</i>	Cultivated	IFE17840	Herb	Leaf	1. Leaf juice is applied to a fresh wound 2. Leaves are macerated in water and drunk to treat malaria	NA	89
<i>Persea americana</i> Mill.	Lauraceae	<i>Pia-nla</i>	Cultivated wild	IFE17877	Tree	Leaf	1. Decoction of the leaf is taken to treat stroke 2. Decoction of the leaf is used to treat high blood pressure	LC	49
<i>Allium sativum</i> L.	Liliaceae	<i>Ayuu</i>	Cultivated wild	IFE17853	Herb	Bulb	1. Infusion of the bulb in alcohol is used to treat pile 2. The bulbs are eaten to treat stomach ulcer 3. Infusion of the bulbs in fruit juice of <i>Cirus aurantifolia</i> is used to treat hypertension	NA	79
<i>Corchorus olitorus</i> L.	Malvaceae	<i>Ewedu</i>	Cultivated	IFE17905	Herb	Leaf	1. Leaves are cooked without salt to treat measles 2. Leaves are macerated in cold water and drunk during difficult labor	NA	49
<i>Gossypium hirsutum</i> L.	Malvaceae	<i>Owu</i>	Cultivated wild	IFE17844	Shrub	Leaf	1. Decoction of leaf is used for malaria 2. Decoction of the leaf and leaf of <i>Citrus aurantifolia</i> is used as a blood tonic	VU	79

<i>Hibiscus</i> spp	Malvaceae	<i>Afaimoni-konimora</i>	Wild	IFE17855	Herb	Leaf	The leaves are macerated together with the leaves of <i>Ageratum conyzoides</i> and <i>Irvingia gabonensis</i> and taken to treat gonorrhoea	NA	7
<i>Sida acuta</i> Burm. F.	Malvaceae	<i>Osepotu</i>	Wild	IFE17868	Herb	Leaf	The leaves are macerated in local gin and drunk to treat syphilis	NA	7
<i>Sida veronicifolia</i> Lam.	Malvaceae	<i>Eesi ile</i>	Wild	IFE17928	Herb	Leaf	Leaf is macerated in water and drunk to treat pile	NA	7
<i>Theobroma cacao</i> L.	Malvaceae	<i>Kokoo</i>	Cultivated wild	IFE17826	Shrub	Leaf	Decoction of the leaf and seeds of <i>Sorghum bicolor</i> (L.) Moench is used as a blood tonic	NA	36
<i>Azadirachta indica</i> A. Juss.	Meliaceae	<i>Dogoyaro</i>	Cultivated wild	IFE17839	Tree	Leaf	Decoction of the leaf and the leaf of <i>Cymbopogon citratus</i> is taken to treat malaria	LC	70
<i>Entandrophragma angolense</i> D.C.	Meliaceae	<i>Ijebo</i>	Wild	IFE17859	Tree	Leaf	Decoction of the bark is used to treat malaria	VU	19
<i>Khaya grandifoliola</i> C. DC.	Meliaceae	<i>Oganwo</i>	Wild	IFE17852	Tree	Leaf, stem bark	1. Decoction of the leaf and stem bark is used for rheumatism 2. Decoction of the stem bark is used to treat yellow fever 3. Decoction of the stem bark is used to treat malaria 4. Infusion of the stem bark in water is taken to treat skin diseases	VU	77
<i>Sphenocentrum jollyanum</i> Pierr.	Menispermaceae	<i>Akerejupon</i>	Wild	IFE17867	Shrub	Root, stem bark	1. Dried root is powdered and mixed with pap to treat typhoid 2. Stem bark is dried, powdered, and taken with pap to treat stomachache	NA	59
<i>Triclisia subcordata</i> Oliv.	Menispermaceae	<i>Kanranjongbon</i>	Wild	IFE17830	Climber	Root	The powdered dry root is mixed with black soap and used to wash the breast in cases of breast cancer	NA	7
<i>Ficus exasperata</i> Vahl.	Moraceae	<i>Eepin</i>	Wild	IFE17837	Tree	Leaf, latex	1. Decoction of the leaf is used to treat high blood pressure 2. Leaves are macerated, and potash is added and taken for syphilis 3. Leaves are macerated with the leaves of <i>Vernonia amygdalina</i> and used as an aphrodisiac 4. The latex is mixed with palm oil and sugar to treat cough	LC	55
<i>Artocarpus altilis</i> (Parkinson) Fosberg	Moraceae	<i>Gbere, berefurutu</i>	Cultivated wild	IFE17915	Tree	Root, stem bark	Decoction of root and stem bark is used for dizziness	NA	11
<i>Ficus sur</i> Forrsk.	Moraceae	<i>Opoto</i>	Wild	IFE17831	Tree	Leaf	Leaf is macerated in water and drunk to cleanse the blood	NA	1
<i>Moringa oleifera</i> Lam.	Moringaceae	<i>Ewe igbale</i>	Cultivated wild	IFE17910	Tree	Root, stem bark	1. Decoction of the root, fruits of <i>Citrus aurantifolia</i> , and potash is used to treat syphilis 2. The dried stem bark is powdered with local chalk, mixed with local gin, and used as first aid for any ailment	NA	36

<i>Musa paradisiaca</i> L.	Musaceae	<i>Ogede agbagba</i>	Cultivated wild	IFE17892	Herb	Fruit, stem	1. Unripe fruit is cooked and eaten for diabetes 2. Decoction of the stem and leaves of <i>Ficus exasperata</i> is used to treat hypertension	NA	41
<i>Pycnanthus angolensis</i> (Welw.) War.	Myristicaceae	<i>Akomu</i>	Wild	IFE17906	Tree	Leaf, stem bark	1. Latex from the stem is used to treat cough 2. Decoction of the leaf and stem bark is used to treat insomnia and hypertension	NA	37
<i>Argemone mexicana</i> L.	Papaveraceae	<i>Egele</i>	Cultivated wild	IFE17925	Herb	Leaf	1. Leaves are macerated in water and used to bath and drunk for measles 2. Decoction of the leaf in fermented maize water is used to treat yellow fever	NA	9
<i>Parquetina nigrescens</i> (Afzel.) Bullock	Periplocaceae	<i>Ogbo</i>	Wild	IFE17824	Climber	Leaf	Maceration of leaf is mixed with milk to improve blood level	NA	41
<i>Bridelia ferruginea</i> Benth	Phyllanthaceae	<i>Ira</i>	Wild	IFE17828	Tree	Stem bark	The dried bark is ground and mixed with the fruit juice of <i>Citrus aurantifolia</i> to treat typhoid	NA	20
<i>Phyllanthus amarus</i> Schum. & Thonn.	Phyllanthaceae	<i>eyin-olobe</i>	Wild	IFE17822	Herb	Whole plant	1. Decoction of the whole plant is used for fever 2. The whole plant is infused in the fruit juice of <i>Citrus aurantifolia</i> and used as an aphrodisiac and to treat backache	NA	50
<i>Peperomia pellucida</i> (L.) H.B & K.	Piperaceae	<i>Rinrin, irinrin</i>	Wild	IFE17865	Herb	Leaf	Leaf juice is applied to boil	NA	37
<i>Plumbago zeylannica</i> L.	Plumbaginaceae	<i>Inabiri</i>	Wild	IFE17843	Herb	Root	The root is powdered with <i>Mondia whitei</i> (Hook. F.) Skeels and mixed with food and used as an aphrodisiac	NA	13
<i>Bambusa vulgaris</i> Schrad. ex J.C. Wendl.	Poaceae	<i>Oparun</i>	Wild	IFE17869	Shrub	Leaf	1. Decoction of the leaf is used for hypertension 2. Decoction of the leaf and fruits of <i>Citrus aurantifolia</i> is used to treat malaria	NA	69
<i>Cymbopogon citratus</i> (D.C) Stapf.	Poaceae	<i>Koko oba, ewe tii</i>	Cultivated	IFE17847	Herb	Leaf	Decoction of the leaf and fruits and the leaves of <i>Citrus aurantifolia</i> is used to treat malaria and yellow fever	NA	43
<i>Saccharum officinarum</i> L.	Poaceae	<i>Ireke</i>	Cultivated	IFE17884	Herb	Leaf, stem	Decoction of the leaf and stem is used to treat malaria	NA	11
<i>Zea mays</i> L.	Poaceae	<i>Agbado</i>	Cultivated	IFE17848	Herb	Flower	Decoction of the inflorescence is used for measles	LC	16
<i>Securidaca longipedunculata</i> Fresen.	Polygalaceae	<i>Ipeta</i>	Wild	IFE17857	Tree	Root	The dried root is powdered with seeds of <i>Aframomum melegueta</i> K. Schum. and swallowed for diabetes	NA	17
<i>Morinda lucida</i> Benth	Rubiaceae	<i>Oruwo</i>	Cultivated wild	IFE17860	Tree	Leaf, stem	1. The leaf is macerated in water to treat diabetes 2. Decoction of the leaf and stem bark is used for malaria	NA	60
<i>Nauclea latifolia</i> Sm.	Rubiaceae	<i>Egbesi</i>	Wild	IFE17875	Tree	Leaf, stem bark, root	1. Decoction of the stem bark is drunk to treat malaria 2. Decoction of the leaf, root, and stem bark is used to treat insanity 3. Decoction of the leaf is used to treat pile	NA	44

<i>Plukenetia conophora</i> Mull Arg.	Rubiaceae	<i>Awusa</i>	Wild	IFE17875	Climber	Fruit	Decoction of the fruits and the cooked fruits are used to treat snakebites	NA	16
<i>Citrus aurantifolia</i> (Christm.) Swingle	Rutaceae	<i>Orombo, osan wewe</i>	Cultivated wild	IFE17823	Shrub	Fruit	1. Decoction of the fruit is taken for gonorrhoea 2. Fruits are infused in water to treat malaria 3. Juice from the fruit is used to treat indigestion, stomachache, and vomiting	NA	94
<i>Citrus sinensis</i> L.	Rutaceae	<i>Osan mimu</i>	Cultivated wild	IFE17904	Shrub	Leaf, stem bark	Decoction of the leaves and stem bark is used to treat malaria	NA	81
<i>Lecaniodiscus cupanioides</i> Planch. ex Benth.	Sapindaceae	<i>aka, akika</i>	Wild	IFE17842	Tree	Root	Decoction of the root is taken for menstrual pains	NA	11
<i>Hannoa undulata</i> Guill & Perr.	Simaroubaceae	<i>Orijin</i>	Cultivated wild	IFE17871	Tree	Leaf	The leaf juice is rubbed on the affected area to treat skin disease	NA	40
<i>Solanum dasyphyllum</i> Schum & Thonn.	Solanaceae	<i>Mafowokan omo mi, igbagun, Yewuru</i>	Cultivated wild	IFE17886	Shrub	Leaf	The leaf is powdered with the seeds of <i>Xylopi aethiopica</i> , mixed with local soap, and used to bath for measles	NA	27
<i>Solanum verbascifolium</i> L.	Solanaceae	<i>Yewuru</i>	Wild	IFE17881	Shrub	Leaf	The leaf is macerated in fruit juice of <i>Citrus aurantifolia</i> and used to treat female infertility	NA	24
<i>Laportea aestuans</i> (L.) Chew	Urticaceae	<i>Olojongbodu, lapotia</i>	Wild	IFE17866	Herb	Leaf	The leaf is powdered and mixed with shea butter and rubbed on the affected area to treat skin diseases	NA	30
<i>Aframomum melegueta</i> K. Schum.	Zingiberaceae	<i>Ataare</i>	Wild	IFE17862	Herb	Seed	The powdered seeds are mixed with palm oil to treat stomachache	DD	30

Note: NA: Not available; LC: Least concern; DD: Deficient data; EN: Endangered

### Plant parts used

The most used plant part was the leaf. This was reportedly used in 55 remedies, way beyond the stem bark (19 remedies), root, and fruits (14 remedies each). This corresponds with the results of a previous study (Keter and Mutiso 2012), where leaves were the most used plant part, followed by the stem bark, and root. Several other studies have also reported leaves as the most used plant part (Farooq et al. 2019; Natcha et al. 2019). Other plant parts used include seeds, flowers, latex, leaf stalk, pod, tuber, bulb, and sometimes the whole plant. Even though the informants gave no particular reason for choosing a part of a plant, the use of leaves in herbal medicine is mainly due to easy accessibility (Farooq et al. 2019) and not because they are more effective than other parts of the plant (Aruwa et al. 2020). Also, the use of leaves has been said to assist conservation efforts because leaves easily regenerate compared to parts like stem bark or roots, which may kill the plant (Kayode et al. 2008).

### Method of preparation

The methods of preparation reported in this study include leaf paste, juicing, decoction, infusion, powdering, direct application, maceration, chewing, pounding, and cooking. Among these, the decoction was the most prevalent method of preparation, recommended 56 times. This was followed by maceration, recommended 37 times, and powdering 17 times. Apart from infusion (14) and juicing (11), the rest of the methods of preparation had less than 10 recommendations each (Table 2). The decoction was reported to be the overwhelmingly favored method of preparation (Keter and Mutiso 2012), even though available scientific information does not support decoction as the best method of preparation for herbal medicine (Ajao et al. 2019). The majority of the remedies (80.7%) are prepared using only a single plant or in combination with some non-plant materials, while some of the remedies include the combination of two or more plants (polyherbal) and, in some cases, with non-plant materials. Non-plant materials recorded include honey, sulfur, salt, potash, and local chalk.

### Conservation of the medicinal plants

Forty-nine of the recorded 87 medicinal plants are sourced by the informants from the wild. Informants are aware of the importance of medicinal plants but do not realize the possibility of extinction due to overexploitation and lack of conservation of these plants. The scarcity of any plant is not attributed to over-exploitation but to unfavorable seasons and the expansion of human settlement. Because of this, the IUCN online database was used to survey the conservation status of these plants. The results revealed information for only 26 of the recorded species, highlighting the lack of conservation information for most species. Of the 26 species, 17 have a conservation status of LC (Least Concern), which confirms a sufficiently stable global population for the species. Two species (*Aframomum melegueta* K.Schum. and *Mangifera indica* L.) have a DD (Deficient Data) status as there was not sufficient data to determine their conservation status, even

though the plants in this category are strongly thought to have a conservation status of vulnerable (VU) (Isichei 2010). Seven species (*Alstonia boonei* de Wild., *Carica papaya* L., *Entandrophragma angolense* (Welw.) C.DC., *Garcinia kola* Heckel, *Gossypium hirsutum* L., *Iringia gabonensis* (Aubry-Lecomte ex O'Rorke) Baill., and *Khaya grandifoliola* C.DC.) have a VU status, meaning they are likely to become endangered if steps are not taken to conserve them, and there are no species in the EN (Endangered) category. Even though these are global conservation statuses, the results are an overall combination of the individual local exploitation of the flora of the world. Studies on the conservation of vulnerable species are therefore encouraged, while it is also important to assess the conservation status of the medicinal plants that have not been assessed.

In contributing to the conservation of the cultural practices in Ile-Ife and providing background data for phytochemical and pharmacological studies, the study identifies 87 plants from 43 families used in the traditional herbal system of Ile-Ife and their corresponding uses. Euphorbiaceae is the most represented family, with eight species. Most of the remedies were monoherbal, while some were polyherbal. In addition, some non-plant materials were used in combination therapy, which included salt, sulphur, honey, and local chalk. The leaf was the most used plant part, while decoction was the preferred preparation method. The highest number of plants was used for the URD category, and the doctrine of signature was observed in some of the remedies, while other remedies have spiritual advice attached to them. However, a survey of the conservation status of medicinal plants revealed very little information as there was no conservation information for over 70% of the plants. Research into the conservation status of these plants is therefore recommended, in addition to studies to confirm the folkloric usages of the documented plants.

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