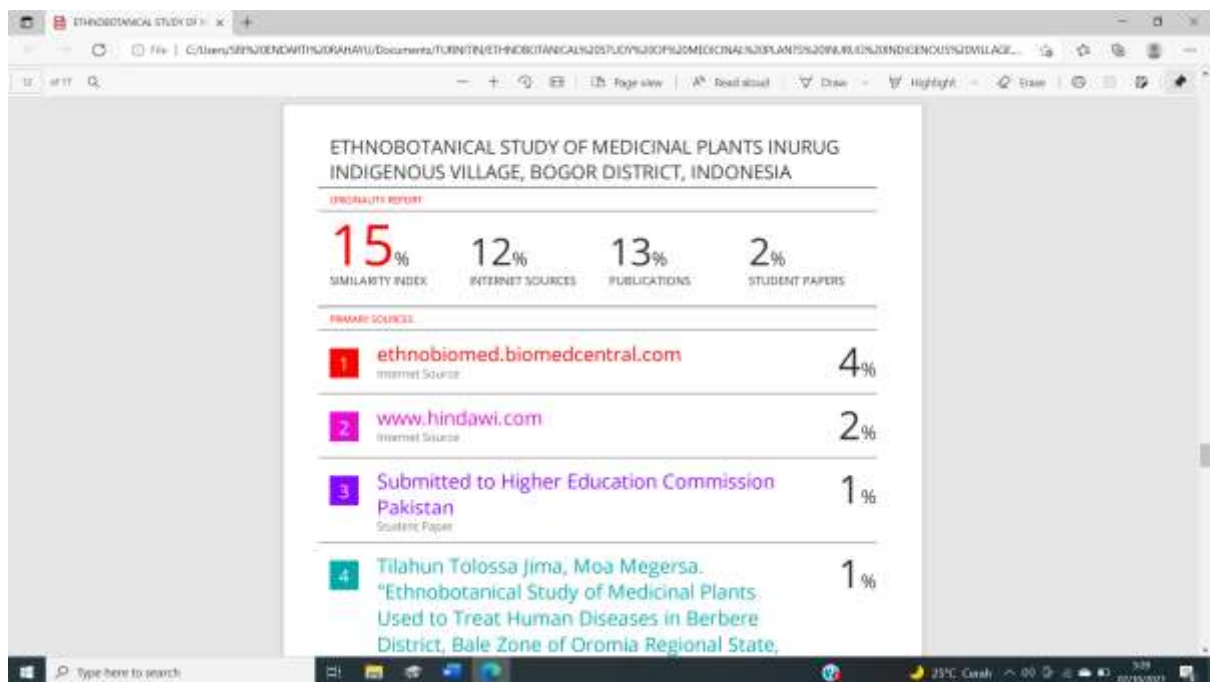


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ETHNOBOTANICAL STUDY OF MEDICINAL PLANTS IN URUG INDIGENOUS VILLAGE, BOGOR DISTRICT, INDONESIA

*Sri Endarti Rahayu, Rosalia Purba and Ikhsan Matondang

Faculty of Biology, Universitas Nasional. Jl. Sawo Manila No. 61, Pasar Minggu, Jakarta Selatan 12520, Indonesia.

*E-mail : endarti@civitas.unas.ac.id

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ABSTRACT

The ethnobotanical study in this report focuses on traditional therapeutic plants utilized by local societies in the treatment of human infections. This research was performed from January to February 2018 in Urug indigenous village, Bogor District, West Java, Indonesia. The emphasis of this study was to record curative plants used to treat different disorders in the research region. This ethnobotanical information was obtained with the aid of semi-structural interviews, guided field walks and observations with informants. The species Use value and Fidelity Level were employed in the examination of several species. Furthermore, 102 therapeutic plants, including 96 genera and 48 families were compiled and identified. However, Zingiberaceae (9.8%) family had the highest therapeutic plants used for several therapies in this region. The highest proportion of medicinal plants comprise of herbs (40.2%) while leaves (69%) were the most often used parts in the formulation of traditional drugs. Meanwhile, decoctions (47.8%) were commonly utilized as a traditional medicine preparation method. The frequently applied ethnomedicinal plant types were *Centella asiatica* (1.0) while the highest Fidelity Level value for the management of sprue was *Pterocarpus indicus*. Also, indigenes in this survey community have traditional wisdom in the treatment of human diseases using these plants. The significant risk to these herbs is the indifference by youths, therefore there is a need to raise awareness within the local societies with focus placed on sustainable utilization and management of both medicinal plants and traditional knowledge.

Keywords : Fidelity Level (FL), Indigenous Urug village, traditional medicine, Use Value (UV)

INTRODUCTION

A variety of vegetation have made substantial contributions and remained an essential part of humanity across history. Furthermore, humans have searched for an appropriate treatment among plants to cure various disorders after the satisfaction of primary needs, including food and shelter (WHO, 2002). According to the World Health Organization (WHO), about 80% of the world relies on traditional knowledge and medicine, particularly herbs for basic health care requirements (Imbo, 2010). Specifically, medicinal plants have been in existence, use, and a part of the curative customs in undeveloped societies (Jima and Megersa, 2018).

Furthermore, Indonesia contains numerous natural resources, where 9,000 out of 30,000 plant species are medicinal (Decree of Minister of Health of the Republic of Indonesia, 2007). This country is occupied by different ethnic groups from western Sabang to eastern Merauke because of the abundant natural resources and culture. Also, each of these communities has a personal knowledge on the therapeutic uses of these plants (Kandari *et al.*, 2012). The traditional drug in this society is a piece of the nation's culture and commonly utilized by the people. Moreover, in 2013 information from Basic Medical Research (Riskesdas) demonstrated 35.2% Indonesian communities have and utilize orthodox drugs for treatment (Shanti *et al.*, 2014).

The indigenes of outlying regions mainly depend on local sources to cure several diseases (Abbasi *et al.*, 2013). Therefore folk medicine has been frequently utilized in Urug indigenous village, Bogor district due to the isolated location of this region and socio-economic condition of the people. This region has a piece of civilizational though the traditional values have been preserved. The village was resolute about the conservation of culture through a letter from the Ministry of Education and Culture number 440/1-02.5-24/J. 1988. This indicates Urug is a traditional village with historical and traditional value/relic (Setiawan, 2014). Furthermore, several points of life in this community are arranged in detail by custom because the Sundanese Kingdom heritage has been maintained. The method of preserving and obtaining rice is a piece of the numerous customary rules of the indigenes. These requirements also apply to the process of farming, gardening, raising livestock, constructing buildings, and human interactions. Also, everything is attached to the hereditary regulations created by the ancestors. These people assume every rule inherited maintains the message of life obtained from predecessors. The people also think these standards were cautiously established in regard to the life experiences of the ancestors. These requirements have been in the lives of people within Tatar Pasundan since the Sunda Kingdom and are written similarly to today's laws. The book by Ekadjati (Ekadjati, 1984), Sundanese Culture: Zaman

Padjadjaran established this notion and described several laws created by this Kingdom to govern the citizens.

Furthermore, studies in this community have been performed by several scholars, including ethnobotany of the Sharia tradition (Izzuddin and Azrianingsih, 2014) and inventory of medicinal plants Izzuddin and Azrianingsih (2015) but there are 16 investigations on quantitative ethnobotany. Therefore, there is a need to conduct a study to record the medicinal plants associated indigenous knowledge in Urug village. The reason for this research was to provide and protect the predecessors' knowledge connected to therapeutic plant use within the community. Also, results 29 in this study are expected to show the significance of local medicinal plants and knowledge documentation in the production of ethnomedicinal remedies for the treatment of primary human diseases.

MATERIALS AND METHODS

Research region

The Urug village is located between 6°25' and 6°45' South Latitude and 107°30' and 107°40' west Longitude approximately 108 km from Jakarta. This town is positioned amongst hillsides with dense forest, next to mount Pongkor, 100-150 m above sea level. The weather has two tropical seasons, including the rainy and dry climates between October to March and April to September respectively. This rainy period continues with an elevated average rainfall for about six months and consequently, fertile soils are observed in this region (Dewantara, 2013). The yearly average precipitation and temperature vary between 2000 and 2500 mm and 22°C to 25°C respectively. Furthermore, agriculture is the main economic source for this town where most people are farmers. Figure 1 depicts the low education level in this community.

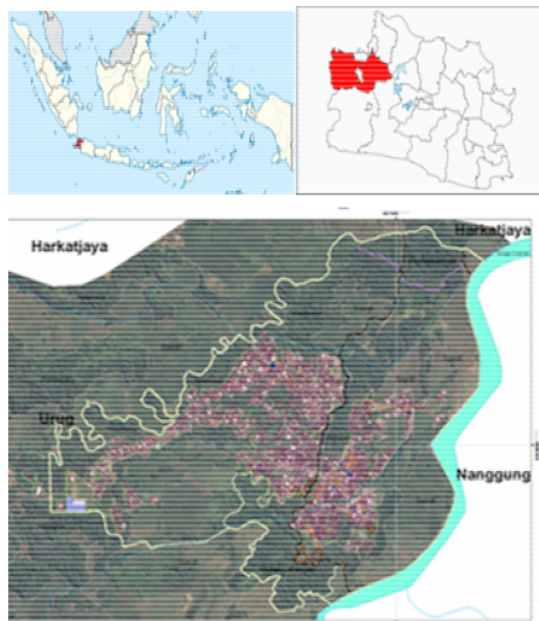


Fig. 1 : Research location in Urug Village, Bogor District, West Java, Indonesia.

Method

The research was conducted from January to February 2018 and the traditional physicians were cross-examined with the aid of a survey and open-ended discussion. Furthermore, 87 informants were utilized in this analysis, including 13 females and 4 males selected randomly between 19–100 years. The age of these sources is crucial and impacts the degree of understanding about medicinal plant use (Hong *et al.*, 2015). Also, conversations with the informants were designed to acknowledge the physicians' extent of knowledge on several matters, including herbal plants, parts used, illnesses cured, and the methods of usage and administration. Moreover, samples were obtained and detected immediately in the field based on the ethnobotanical information available. Meanwhile unknown plants were recorded and noted by identification books (Packer, 1968; Min *et al.*, 2006; Van Steenis, 1972). The Plant List (www.theplantlist.org) and International Plant Names Index (www.ipni.org) are used to identify vegetation species and taxonomy. However, samples were not obtained to protect the existence of these herbs.

Quantitative analysis

The ethnobotanical data 30 was examined with various quantitative indices including Use Value (UV) and Fidelity Level (FL). This first parameter assesses 19 relative significance per medicinal plant according to the relative use among informants (Phillips *et al.*, 1994). Furthermore, UV was calculated with the below formula:

$$UV = \frac{(\sum U_i)}{N}$$

Where U_i is the amount of use reports mentioned 24 by informants while i and N are the total figure questioned for a particular plant species. Also, a high UV value shows numerous use reports and vice versa for the plant.

Fidelity Level (FL) is the percentage of informants referring to the use of certain species in the treatment of 31 specific disease in the research region. This parameter is calculated with the below formula as earlier reported (Alexiades and Sheldon, 1996).

$$FL(\%) = \frac{NP}{N} \times 100$$

Where NP is the amount of informants referring to the use of particular plant species for a specific disease 10, and N is the total figure mentioning the variants for any condition. The maximum FL shows the prevalent use of these plants in the treatment of certain diseases by the indigenes of this research region.

RESULTS AND DISCUSSION

Through collection of plants and interviews with 17 informants, an ethnobotanical study was conducted in order to determine the knowledge 5 and use of plant species among Urug Village community. The aim of this study was to record all useful plant and their uses.

Medicinal plants reported

17 The results indicate the use of about 102 medicinal plants belonging to 96 genera and 48 families for treatment of 46 human ailments in Urug village, as shown in Table 1. Furthermore, Zingiberaceae is number one in the aspect of

herbal medication, along side about ten species (9.8%). This is probably due to high herb variety and composition of secondary metabolites, especially flavonoids, including quercetin, rutin, kaemferol, catechin, luteolin and myricetin. 20 4 phenolic compound alkaloids, terpenoids, including gallic acid, caffeic acid, ferulic acid were determined in *Zingiber zerumbet* (Ghasemzadeh *et al.*, 2016). Meanwhile, a reasonable number of respondents pointed out Zingiberaceae as the most commonly used medicine plants; this is because they are easily cultivated and also serves as food spicy. However, various studies in Indonesia have attested to the dominance of this plant, Jadid *et al.* (2020) identified about 13.3% dominance in Tengger Tribe, Ngadisari village, Indonesia while Malini *et al.* (2007) documented 7.9% in Karangwangi, Cianjur District, West Java.

Furthermore, among all the useful plants inventories, about 21 (20.6%) were from home garden and 81 (79.4%) from wild. However, Boadu and Asase (2017) documented 44% from harvested from the wild and 36% harvested from

degraded areas and few (13%) of them harvested from home garden, while Ramirez *et al.* (2017) identified 95.1% wild and 7.3% cultivated from Maupen Media, Columbia. This observation however serves as a good indicator proving local communities and indigenes do not cultivate most of the plant species used as remedies.

Life forms, plant parts used, method of collection and administration

Meanwhile, result from life growth analysis of medicinal plants identified herbaceous plants as the main constituent of species represented by 41 (40.2%), while 28 (27.4%) are tree, 20 (19.6%) shrub, 12 (11.8%) lianas and 1 (0.9%) epiphyte species as shown in Figure 2. This finding however indicates herbs and trees as the most represented life forms of medicinal plants. Meanwhile, similar research conducted by Tugume and Nyakoojo (2019) identified 36.7% herbs and 22% trees from Buhungaparish, Rukungin district, Uganda, while Umair *et al.* (2017) documented 56.5% herbs and 17% trees from Hafizabad district Pakistan.

Families	Plant Species	Local Names	Habit	Part Used	UV	FL	Preparation and use
Acanthaceae	<i>Andrographis paniculata</i> (Burm.f) Wall ex Nees	Sambiloto	Herb	Leaf	0.06	6	Boiled with water and drink the liquid for treating diabetes.
	<i>Clinacanthus nutans</i> (Burm.f) Lindau	Kitajam	Shrub	Leaf	0.18	18	Pound fresh part applied mix with shrimp paste and salt, taken orally for diarrhea, dysentery
	<i>Stachytarpheta mutabilis</i> (Jacq.) Vahl	Jarong	Shrub	Leaf	0.06	6	Boiled with water and drink the liquid treating for irregular menstruation.
	<i>Strobilanthes crispus</i> (L.) Bremek	Kibeling	Shrub	Leaf	1.12	18	Boiled with water and drink the liquid treating for urinary stone.
Agavaceae	<i>Cordyline fruticosa</i> (L.) A. Chev	Andong	Shrub	Leaf	0.06	6	Crushing; taken orally for hemoptysis.
Amaranthaceae	<i>Aerva sanguinolenta</i> (L.) Blume	Kisabrang	Herb	Leaf	0.06	6	Boiled with water and drink the liquid for treating muscle aches.
	<i>Amaranthus spinosus</i> L.	Senggang	Herb	Leaf	0.06	6	Boiled with water and drink the liquid for promoting blood circulation.
	<i>Celosia cristata</i> (L.) Kuntze	Jawer kotok	Herb	Leaf	0.41	41	Pound fresh part applied on the forehead for provide cooling and soothing effect treating for fever; postpartum; fried fresh part applied on the affected area treating for pruritus.
Anacardiaceae	<i>Spondias dulcis</i> Parkinson	Kadongdong	Tree	Shoot	0.06	6	Steamed, taken orally for scent the urine.
Annonaceae	<i>Fissitigma latifolium</i> (Dunal) Merr.	Kihadangeun	Liana	Leaf	0.12	6	Grinding, decoction; taken orally for headache.
Apiaceae	<i>Centella asiatica</i> (L.) Urb.	Antanan	Herb	Leaf	1.0	41	Boiled with water and drink the liquid treating for heart disease; bronchitis; cancer; vaginal discharges; prevent hypertension; gastricism; typhus; uric acid; headache; ringworm.
Araliaceae	<i>Nothopanax scutellarium</i> Merr.	Mamangkokan	Shrub	Leaf	0.06	6	Boiled with water and drink the liquid treating for urinary stone
	<i>Panax ginseng</i> C.A. Mey	Ginseng	Herb	Flower	0.06	6	Directly consumed for appetizer.
Arecaceae	<i>Arenga pinnata</i> (Wurmb) Merr.	Aren	Tree	Leaf	0.06	6	Pound fresh part applied on the affected areas, treating for smallpox.

Families	Plant Species	Local Names	Habit	Part Used	UV	FL	Preparation and use
	<i>Cocos nucifera</i> L.	Kelapa hijau	Tree	Endosperm	0.06	12	Coconut water, taken orally for diabetes.
	<i>Zalacca edulis</i> Reinw.	Salak	Tree	Leaf	0.12	6	Boiled with water and drink the liquid treating for smallpox; Pound and drink.
Asphodelaceae	<i>Aloe vera</i> (L.) Burm.f	Ilait	Herb	Leaf	0.12	12	Fresh leaves shoots consumed daily for treating cough.
Asteraceae	<i>Ageratum conyzoides</i> L.	Babadotan	Herb	Leaf	0.41	6	1 Pound fresh part mixing with soil applied on the affected area treating for wound.
	<i>Artemisia vulgaris</i> L.	Baru cina	Herb	Leaf	0.06	6	Boiled with water and drink the liquid and drink the liquid for treating dysmenorrhea..
	<i>Blumea balsamifera</i> (L.) DC	Sembung	Shrub	Leaf	0.35	12	Boiled with water and drink the liquid, treating for postpartum; lung diseases;colds.
	<i>Emilila sonchifolia</i> (L.) DC	Jonge	Herb	Shoot	0.06	6	Directly consumed for appetizer.
	<i>Gynura procumbens</i> (Lour.) Merr.	Kelingsir	Shrub	Leaf	0.06	6	Boiled with water and drink the liquid treating for urinary stone or directly consumed for indigestion.
	<i>Sonchus arvensis</i> L.	Tampuyung	Herb	Stem	0.18	18	Boiled with water and drink the liquid treating for urinary stone.
	<i>Spilanthes paniculata</i> Wall. ex DC	Jotang	Herb	Shoot	0.06	6	Directly consumed for appetizer.
Balsaminaceae	<i>Impatiens balsamina</i> L.	Pacar air	Herb	Seed	0.06	6	Boiled with water and drink the liquid treating for cancer.
Begoniaceae	<i>Begonia robusta</i> Blume	Hariang	Herb	Leaf	0.12	6	1 Pound fresh part applied on the affected area treating for snake bite.
Blechnaceae	<i>Stenochlaena palustris</i> (Burm. f.) Bedd	Pakuudang	Liana	Leaf	0.06	6	Boiled with water and drink the liquid treating for typhus.
Campanulaceae	<i>Hippobroma longiflora</i> (L.) G. Don	Korejat	Herb	Flower	0.29	18	Cut, drop the liquid to the eyes treating for headache.
Cannaceae	<i>Canna indica</i> L.	Ganyong	Herb	Tuber	0.06	6	Boiled with water and drink the liquid treating to fever.
Caprifoliaceae	<i>Sambucus javanica</i> Blume	Sangitan	Herb	Root	0.06	6	Boiled stem with water and drink the liquid treating for muscle swelling.
Caricaceae	<i>Carica papaya</i> L.	Gedanggandul	Tree	Root	0.06	6	Boiled with water and drink the liquid for health tonic.
Chloranthaceae	<i>Chloranthus erectus</i> (Buchanan-Hamilton) Verdcourt	Keras tulang	Shrub	Leaf	0.35	24	Boiled with water and drink the liquid treating for stroke.
Clusiaceae	<i>Garcinia mangostana</i>	Manggis	Tree	Fruit	0.06	6	Boiled with water and drink the liquid treating for cholesterol lowering.
Combretaceae	<i>Quisqualis indica</i> L.	Ceguk	Liana	Seed	0.06	6	Grinding, decoction; taken orally for depriving ascarid.
Convolvulaceae	<i>Ipomoea batatas</i> (L.) Lam.	Ubi jalar	Liana	Flower	0.06	6	1 Fried fresh part applied on the affected area treating for furuncle.
	<i>Lepistemon binectariferum</i> (Wall.) Kuntze	Parumpung	Liana	Sap	0.06	6	Boiled with water and drink the liquid treating for diarrhea.
Crassulaceae	<i>Kalanchoe pinnata</i> (Lam.) Pers.	Buntiris	Herb	Leaf	0.06	6	1 Pound fresh part applied on the forehead for provide cooling and soothing effect treating for fever.
Dilleniaceae	<i>Dillenia indica</i> L.	Sempur	Tree	Leaf	0.12	6	Powder and tied for postpartum.
Elaeocarpaceae	<i>Muntingia calabura</i> L.	Kersen	Tree	Leaf	0.12	6	Boiled with water and drink the liquid treating for cholesterol lowering and diabetes.

Families	Plant Species	Local Names	Habit	Part Used	UV	FL	Preparation and use
Euphorbiaceae	<i>Jatropha multifida</i> L.	Pohonyodium	Shrub	Seed	0.06	6	Pound and drink with water, treating for toothache.
	<i>Phyllanthus acidus</i> (L.) Skeels	Cerme	Shrub	Leaf	0.06	6	Pound and drink with water for asthma.
	<i>Sauropus androgynus</i> (L.) Merr.	Kadu	Shrub	Leaf	0.06	6	Pound fresh part applied on affected area treating for furuncle.
	<i>Tinospora crispa</i> (L.) Hook. f. & Thomson	Brotowali	Liana	Leaf	0.12	6	Directly consumed for hypertension.
Fabaceae	<i>Abrus precatorius</i> L.	Saga	Herb	Leaf	0.06	6	Fresh leaves consumed daily for abdomen pain.
	<i>Archidendron ellipticum</i> (Blume) I. C. Nielsen	Kicaang	Tree	Stem	0.18	12	Crushed, squeezed, drops the liquid on the eyes for treating conjunctivitis.
	<i>Archidendron pauciflorum</i> (Benth.) I.C. Nielsen	Jengkol	Tree	Fruit	0.06	6	Fried and taken orally for treating tuberculosis.
	<i>Erythrina variegata</i> L.	Dadap	Tree	Leaf	0.47	12	Fried fresh part applied on the affected area treating for pruritus; boiled with water and drink the liquid for smallpox; grinding, decoction, taken orally for common colds, fever, cough, hypertension.
	<i>Leucaena leucocephala</i> (Lam.) de Wit	Petai	Tree	Leaf	0.18	6	Fried, applied on the affected area treating for smallpox.
	<i>Milletia sericea</i> (Vent.) Benth.	Kawaok	Liana	Root	0.18	12	Boiled with water and drink the liquid treating for appetizer.
	<i>Pterocarpus indicus</i> Willd.	Angsana	Tree	Sap, leaf	0.8	47	Sap applied on affected area treating for sprue, toothache; boiled leaves with water and drink the liquid treating, for common colds, indigestion.
	<i>Senna tora</i> (L.) Roxb.	Ketepeng	Herb	Leaf	0.41	35	Pound and applied on the affected area for ulcer, itching.
	<i>Spatholobus ferrugineus</i> (Zoll. & Moritz) Benth.	Carulang	Liana	Sap	0.12	6	Sap put in bamboo, boiled with water, drink the liquid treating for diarrhea.
Lythraceae	<i>Lagerstromia speciosa</i> (L.) Pers.	Bungur	Tree	Leaf, stem	0.18	6	Boiled with water and drink the liquid treating for muscle ache, urinary stone.
	<i>Coleus atropurpureus</i> Benth.	Iler	Herb	Leaf	0.12	6	Grinding, decoction; taken orally for enteritis, piles
Lamiaceae	<i>Orthosiphon aristatus</i> (Blume) Miq.	Kumis kucing	Herb	Leaf	0.12	6	Boiled with water and drink the liquid treating for muscle ache, urinary stone.
	<i>Allium cepa</i> L.	Bawang merah	Herb	Bulb	0.12	6	Pound fresh part applied on the affected area treating for abdomen pain.
Malvaceae	<i>Ceiba pentandra</i> (L.) Gaertn.	Rende	Tree	Leaf	0.29	18	Fresh leaves consumed daily treating for urinary stone.
	<i>Sidarrhombifolia</i> L.	Sanagori	Shrub	Leaf	0.06	18	Boiled with water and drink the liquid treating for uric acid.
	<i>Urena lobata</i> L.	Pangkurutan	Shrub	Leaf	0.06	6	Boiled with water and drink the liquid treating for abdomen pain.
Meliaceae	<i>Azadirachta indica</i> A. Juss	Mimba	Tree	Leaf	0.06	6	Boiled with water and drink the liquid for treating diabetes.

Families	Plant Species	Local Names	Habit	Part Used	UV	FL	Preparation and use
	<i>Sandoricum koetjape</i> (Burm. f.) Merr.	Kecapi	Tree	Shoot	0.12	6	Fried, applied on the affected areatreating for smallpox.
Myristicaceae	<i>Myristica fragrans</i> Houtt.	Pala	Tree	Seed	0.06	6	Directly consumed for heart problem.
Myrtaceae	<i>Psidium guajava</i> L.	Jambu batu	Tree	Leaf	0.18	12	Boiled with water and drink the liquidtreating for diarrhea.
Moraceae	<i>Artocarpus communis</i> J.R. Forst. & G. Forst.	Sukun	Tree	Leaf	0.06	6	Boiled with water and drink the liquid for treating cancer.
	<i>Ficus hispida</i> L.f.	Bisoro	Tree	Leaf	0.06	6	Boiled with water and drink the liquid treating for muscle aches.
	<i>Ficus septica</i> Burm. f.	Kiciat	Shrub	Leaf	0.06	12	Boiled with water and drink the liquid treating for muscle aches.
	<i>Ficus variegata</i> Bl.	Kondang	Tree	Sap	0.06	6	Taken orally for diarrhea.
Oleaceae	<i>Nyctanthes arbor-tristis</i> L.	Srigading	Tree	Flower Leaf	0.06	6	Boiled with water and drink the liquidtreating for fever.
Oxalidaceae	<i>Averrhoa carambola</i> L.	Belimbing	Tree	Leaf	0.06	6	Boiled with water and drink the fluid for treating diarrhea.
	<i>Oxalis barrelieri</i> L.	Calincing	Herb	Leaf	0.18	6	Pound fresh part applied on affectedarea treating for snake bite; rubbed on hand treating for itching.
Poaceae	<i>Andropogon nardus</i> (L.) Rendle	Serai	Herb	Root	0.06	6	Pound fresh part smear on the affected area for treating rheumatism.
	<i>Bambusa vulgaris</i> Schrad. ex J.C. Wendl.	Hawur kuning	Tree	Bud	0.06	6	Boiled with water and drink the liquid for treating hepatitis.
	<i>Cymbopogon citratus</i> (DC.) Stapf	Sereuh	Herb	Stem	0.06	6	Stem paste used as an external application for conjunctivitis.
	<i>Eleusine indica</i> (L.) Gaertn	Jampang	Herb	Leaf	0.12	6	Directly consumed for leucorrhea prevention
	<i>Oryza sativa</i> L.	Beras	Herb	Leaf	0.06	6	Powder and tied for postpartum.
Polypodiaceae	<i>Drynaria quercifolia</i> (L.) J. Sm.	Daun kepala	Herb	Leaf	0.12	12	Boiled with water and drink the liquid for fever.
Rhamnaceae	<i>Ziziphus mauritiana</i> Lam.	Bidara	Tree	Leaf	0.06	18	Boiled with water and drink the liquidtreating for neurasthenia.
Rosaceae	<i>Rubus mollucanus</i> L.	Cukcukan	Liana	Stem, leaf	0.12	6	Boiled stem with water and drink the liquid treating for urinary stone; boiled leaves with water and drink the liquid treating for itching.
Rubiaceae	<i>Cinchona ledgeriana</i> Moens ex Trimen	Kina	Shrub	Bark	0.06	6	Boiled with water and drink the liquid treating for malaria.
	<i>Gardenia jasminoides</i> Ellis	Kacapiring	Shrub	Leaf	0.52	35	Boiled with water and drink the liquid treating for fever.
	<i>Paederia foetida</i> L.	Kahitutan	Liana	Leaf	0.12	6	Boiled with water and drink the liquidtreating for postpartum.
Sapindaceae	<i>Nepelium lappaceum</i> L.	Rambutan	Tree	Leaf	0.06	6	Boiled with water and drink the liquidtreating for smallpox.
Selaginellaceae	<i>Selaginella uncinata</i> (Desv. ex Poir.) Spring.	Rane	Liana	Leaf	0.06	6	Powder and tied for postpartum.
Solanaceae	<i>Capsicum frutescens</i> L.	Cengek	Shrub	Leaf	0.06	6	Pound fresh part applied on the affected area treating for wound.
	<i>Physalis angulata</i> L.	Cecenet	Herb	Leaf	0.18	6	Boiled with water and drink the liquidtreating for diabetes.
	<i>Solanum torvum</i> Sw.	Takokak	Shrub	Fruit	0.12	6	Boiled, taken orally for heart problem; fried, taken orally for toothache.
	<i>Solanum tuberosum</i> L.	Kentang	Herb	Tuber	0.06	6	Shredded fresh part applied on the affected area treating for furuncle.
Urticaceae	<i>Laportea stimulans</i> (L. f.) Miq.	Tuak pulus	Tree	Stem	0.06	6	Cut, drink the liquid treating for headache.
Verbenaceae	<i>Clerodendrum serratum</i> (L.) Moon	Senggugu	Shrub	Leaf	0.06	6	Pound fresh part applied on the affectedon the wound for pain killer.

Families	Plant Species	Local Names	Habit	Part Used	UV	FL	Preparation and use
	<i>Lantana camara</i> L.	Cente	Shrub	Leaf	0.12	6	Fried fresh part, mix with salt, applied on the affected area, treating for toothache.
Zingiberaceae	<i>Alpinia galanga</i> Willd.	Laja	Herb	Rhizome	0.18	18	Pound fresh part applied on affected area for treating hepatitis; cough.
	<i>Amomum compactum</i> Soland. ex Maton	Kapol	Herb	Whole plant	0.18	18	A decoction of the whole plant is drunk as a tonic to treat cough.
	<i>Amomum dealbatum</i> Roxb.	Hangasa	Herb	Leaf	0.06	6	Boiled with water and drink the liquid for treating diabetes.
	<i>Curcuma longa</i> L.	Kunir	Herb	Rhizome	0.23	12	Pounded; taken orally for diarrhea; indigestion.
	<i>Curcuma xanthorrhiza</i> Roxb.	Koneng gede	Herb	Rhizome	0.06	6	Shredded, squeezed, drink the liquid for depriving ascarid.
	<i>Etlingera elatior</i> (Jack) R.M.	Honje	Herb	Stem	0.52	35	Pounded, squeezed, liquid mixing with lime, taken orally for hepatitis.
	<i>Globba pendula</i> Roxb.	Jeuntir	Herb	Stem	0.18	18	Cut, drop the liquid to the eyes treating for headache.
	<i>Kaempferia galannga</i> L.	Cikur	Herb	Leaf	0.47	18	Powder and tied for postpartum.
	<i>Zingiber officinale</i> Roscoe	Jahe	Herb	Rhizome	0.29	6	Boiled with water and drink the liquid treating for cough; shredded fresh part and tied for postpartum. Grinding, decoction, taken orally for dysmenorrhea.
	<i>Zingiber zerumbet</i> (L.) Roscoe ex Sm.	Lempuyang	Herb	Rhizome	0.52	6	Boiled with water and drink the liquid for health tonic.

The respondents used different plant parts to prepare traditional remedies especially leaves, stem, rhizome and root, therefore more species (69%) of medicinal plants were harvested for their leaves, followed by stem (7.4%), rhizome (5.4%), root (4.1%), bud (0.7%) tuber (2%) and bark, fruit in addition to flower comprised of (2.7%) each as shown in Figure 3. Furthermore, leaves are commonly used in preparing these herbal medicines because the villagers believe it contains higher medicinal properties and easy to harvest when compare with other parts. According to Boadu and Asase (2017) leaves are active in metabolite production and widely used for herb preparations.

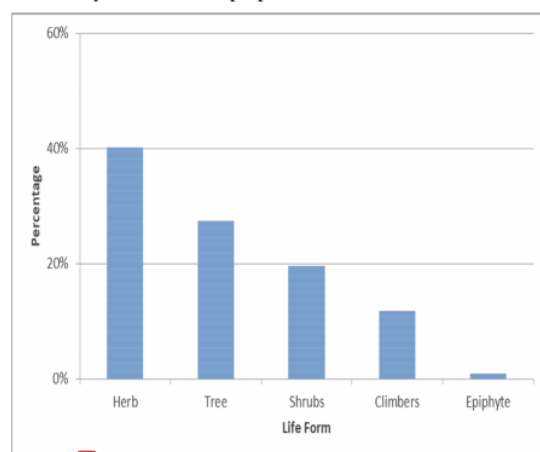


Fig. 2 : Life forms of medicinal plants in the study area

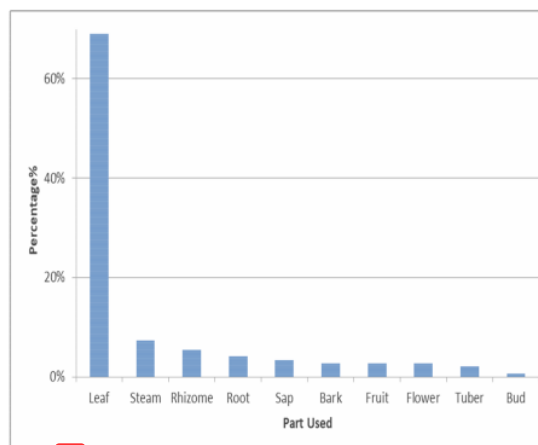


Fig. 3 : Plant parts used for the treatment of human ailments

Meanwhile, fresh plants were used based on preference, efficiency and richness. This was conducted to avoid losing volatile oils capable of decreasing after death. According to Jima and Megersa (2018) the majority of the remedies (78.6%) in the study area were prepared from fresh parts of medicinal plants followed by dried form (15.7%) and (5.7%) prepared either from dry or fresh plant part. Furthermore, the respondents reported various ways of preparation, and the information were then gathered and analyzed. The outcome of this investigation proved most remedies were prepared from a single plant, while mixture of plant parts were less encountered in the study area. However, various research

findings have reported the use of single plant species or parts for traditional remedy preparations (Eshete *et al.*, 2016).

The traditional healers usually develop these medicines for different disease types, and most formulations are administered orally except in instances of dermatological problems where external application is required. Meanwhile, water and some other additives especially salt, shrimp and lime beetle are often used during production. These were claimed to either increase nutrition, flavor or activity, although the most frequently used mode of preparation was decoction accounting for 22 preparations (47.8%) followed by pounding 15.2%, and mostly crushing 6.5% as shown in Figure 4. This outcome is in agreement with the findings of (Malini *et al.*, 2017; Tugume and Nyakoojo, 2019).

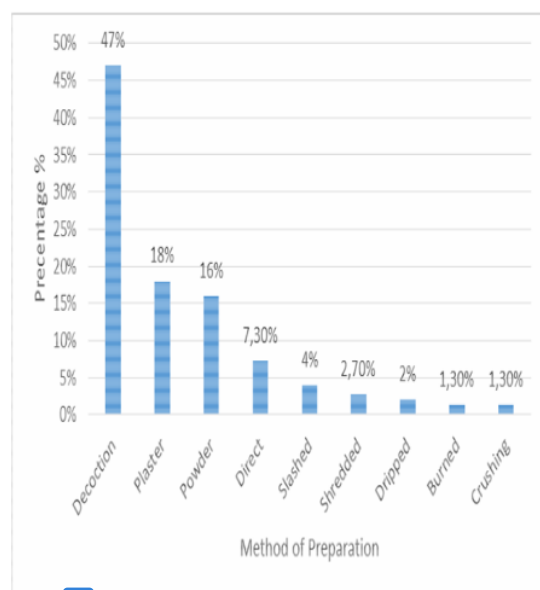


Fig. 4 : Mode of preparation of human medicinal plants in the study area

The indigenes of the study area utilize various units of measurement, including finger length (with regard to roots, barks and stems), and numbers (for foliage and fruits) to estimate the dose of medicine. Meanwhile, about 3-7 leaves are typically administered to human patients. The majority plant remedies (69%), however are taken with no fixed dosage. According to the respondents, preparation were prescribed to patients differently for different age groups, sex and other conditioned. The dosage prescription for children was mostly lower than for adults (Jima and Megersa, 2018).

Diseases treated in the study area

Table 4 show the medicinal plants were exploited in the treatment of 46 human ailments common to the locality. Furthermore, of these species, twelve were prescribed for post-partum related sicknesses. In addition, eleven were used to treat diarrhea as well as aches, and nine towards fever and kidney stones. Sixty-three (61.7%) were used for medical conditions affecting internal organs including hepatitis, lung and heart diseases, high blood pressure, stroke, headache as well as stomach infirmities (postnatal, ulcer, inflammation of

intestine, flatulence, plus typhus). Also twelve (11.7%) were utilized for rheumatic illnesses, nine (8.8%) for respiratory disorders, and 18 (17.6%) for skin problems.

Knowledge on Medicinal plants

Generally, ethnomedicinal information is concentrated among elderly members of the community and is difficult to teach to the young generation. Majority of youths are not interested in the benefits of traditional practices, as these are less profitable than white collar jobs. Also, the availability of modern health facilities contributes to this apathy. In addition, men work outside the village within the community setting, while the women are responsible for the family well being, as well as the children's education. Therefore, imparting this knowledge in females would be beneficial for the upbringing of these off-springs. According to informants, the ladies were deemed eager to learn about herbal medicine, and effectively inherit this important practice.

Species Use Value (UV)

Table 1 indicates these values range between 0.35 and 1.12. In addition, the five most used ethnomedicinal species, *Centella asiatica* (1.12), *Pterocarpus indicus* (1.0), *Gardenia jasminoides*, *Etlingera elatior* and *Zingiber zerumbet* (0.52 each) were used to against numerous ailments including cancer, vaginal discharge, sprue, gastritis, coughs and colds, headache, hypertension, skin diseases and parasitic worm infection. Figure 5

Table 4 : Diseases group and number of medicinal plants to cure it

Group of Ailments	Ailment	Total medicinal plants used
Digestive system diseases	13	34
Muscle and joint disease	3	13
Respiratory system diseases	4	11
Genitourinary system diseases	1	9
Eye diseases	1	5
Skin disease	4	18
Internal organ disease	6	17
Nervous system diseases	2	2
Urology diseases	1	1
Headache	1	6
Reproductive system diseases	3	15
Malaria	1	1
Other category diseases	6	15
Total	46	147

Species Use Value (UV)

Against numerous ailments including cancer, vaginal discharge, sprue, gastritis, coughs and colds, headache, hypertension, skin diseases and parasitic worm infection. Figure 5 shows the least utilized ones, *Senna tora* (0.41) and *Chloranthus erectus* (0.35), solely treated itching and stroke, respectively.

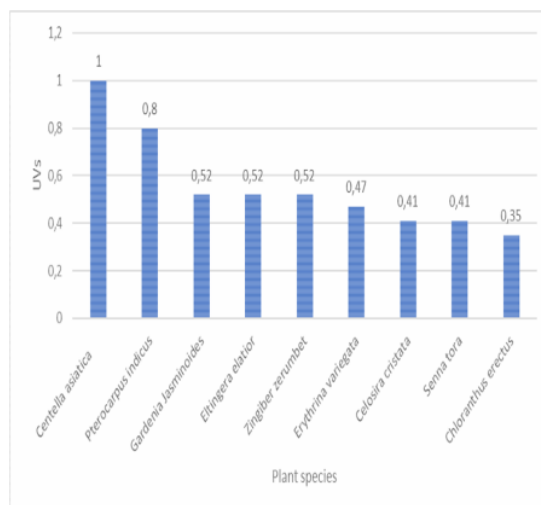


Fig. 5 : Use Value (UV) of plant Species with medicine value mentioned by informants

Fidelity Level (FL)

This evaluates the importance of every plant for each ailment. For this purpose, species with a single application were not considered. Table 1 shows *Pterocarpus indicus* (FL=47) was most effective for the treatment of sprue. In addition, *Centella asiatica* (FL=41) was most beneficial with respect to headache, and *Etlingera elatior* (FL=35), for hepatitis. Figure 6 implies the highest value for itchiness and cough with *Senna tora* (FL=35) and *Gardenia jasminoides*, respectively.

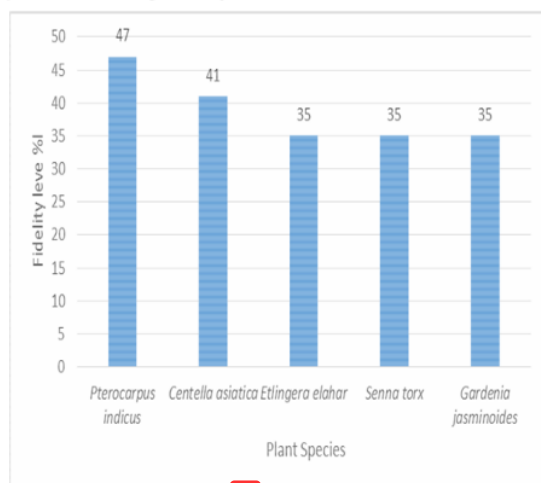


Fig. 6 : Fidelity Level of medicinal plants mentioned by informants for various diseases

CONCLUSION

This study demonstrated the prevalence of plant use in traditional medicine as well as the importance of documenting these practices. Furthermore, this is the first known quantitative ethnomedicinal analysis carried out in the study area, with respect to UV and FL indices. Also, new species and the possible therapeutic uses were identified. These herbs are possibly novel bioresources for

phytochemical and pharmacological studies, particularly *Pterocarpus indicus*, due to the anti-sprue properties exhibited. The indigenes, especially the youth ought to be educated and encouraged to embrace and preserve native medication.

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