



Ethnobotanical Study and Conservation Status of Medicinal Plants Used by the Local Community in Desa Namo Bintang, North Sumatra

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ABSTRACT

The indigenous communities in North Sumatra exhibit unique languages, rituals, traditional dwellings, and profound cultural heritages, encompassing indigenous knowledge of medicinal botany. Modernization, apathy and lifestyle changes among younger generations have put this traditional knowledge in risk of extinction due to its oral transmission throughout generations. Therefore, this study aims to capture the traditional knowledge by ethnobotanical surveys in Desa Namo Bintang for the preservation of potentially vital details. The number of respondents in this study was determined using the Slovin formula with a 10% margin of error. Data collection was conducted by interviewing 97 respondents selected using purposive sampling. The ethnobotanical data recorded were the scientific and vernacular names of medicinal plants, growth form, family, plant part used, preparation methods, medicinal benefits/types of diseases that can be treated, number of plant individuals, conservation status and documentation. The conservation status was obtained from the website of IUCN Red List. This study identified 85 species of medicinal plants in Desa Namo Bintang, classified into 37 families. The predominant medicinal herb utilized by respondents was *Zingiber officinale*, *Cymbopogon citratus*, *Curcuma longa*, *Kaempferia galanga*, and *Curcuma xanthorrhiza*. The family Zingiberaceae represented the greatest number of species. Leaves were the most commonly employed ingredient, and the main preparation method was decoction. The evaluated medicinal plants were mostly categorized as Least Concern (LC), while one species, *Swietenia mahagoni*, was classified as Near Threatened (NT). The necessity for local conservation depends on both the intensity of community use and the sustainability of harvesting practices. The current study proposes community-based conservation by developing cultivation plots and implementing sustainable harvesting.

Keyword: Conservation Status, Curative Plants, Decoction, Ethnobotanical Knowledge, Leaves, Near Threatened

1. Introduction

Traditional medicine encompasses the comprehensive knowledge, skills, and practices rooted in the theories, beliefs, and experiences of various cultures, which are employed to preserve health and to prevent, diagnose, and treat bodily and mental ailments. It is frequently comprehensive, depending on medicines derived from herbal, animal, or mineral sources. Numerous countries recognize traditional medicine as a significant component of healthcare and have initiated efforts to incorporate practices, commodities, and practitioners into their national frameworks. Traditional medicine has evolved as a global trend, with demand steadily increasing [1]. Although the risks and benefits are discussed, people consider herbal treatments to be generally safe because they are natural and less likely to cause side effects [2].

Ethnobotany is a branch of life science investigating particularly the connection between humans and flora, as well as the observations and identifications of botanical diversity to prevent and treat both human and animal

diseases [3]. Ethnobotanical studies greatly contribute to documenting local wisdom and its interactions with the plants in the local environment. Indigenous knowledge refers to the values, abilities, customs, rituals, and practices that a specific group of people has established and passed down through the generations [4]. Different indigenous tribes in Indonesia have widely used a variety of traditional medicinal plants to treat various human health problems. For instance, people of Kalimantan have utilized at least 204 plant species as traditional medicine [5].

North Sumatra is a culturally varied province predominantly populated by the indigenous Batak people (comprising the Toba, Karo, Simalungun, Pakpak, Angkola, and Mandailing groups), the Nias people (on Nias Island), and the coastal Malays. These communities exhibit unique languages, rituals, traditional dwellings, and profound cultural heritages, encompassing indigenous knowledge of medicinal botany. Ethnobotanical knowledge plays an important role in the conservation of biodiversity [6], as the bioactive source, and in further development of plant utilization studies (discovery of modern pharmaceutical products or managing emerging illnesses). According to Desa Namo Bintang Regulation No. 1 of 2020, Desa Namo Bintang of Pancur Batu District, Deli Serdang Regency, covers an area of 833.4 hectares and consists of 1,005 community families. The Karo ethnic group is the majority of the population, renowned for their traditional natural medicine. The study area is near one of North Sumatra's principal medicinal plant markets, Pasar Pancur Batu. Modernization, apathy, and lifestyle changes among younger generations have put this traditional knowledge at risk of extinction due to its oral transmission throughout generations [7]. Therefore, this study aims to capture the traditional knowledge by ethnobotanical surveys in Desa Namo Bintang for the preservation of potentially vital details.

2. Research Method

The research was conducted in Desa Namo Bintang. It is part of Pancur Batu, Deli Serdang Regency, North Sumatra Province. Geographically, Namo Bintang Village is located between 3°27' North Latitude and 3°30' North Latitude and 98°36' East Longitude and 98°37' East Longitude. The distance from the center of Medan City is 16.3 km, and from the center of Deli Serdang Regency is 36.4 km. Namo Bintang Village has a tropical climate with two seasons: rainy and dry (Desa Namo Bintang Regulation No. 1 of 2020).

The number of respondents in this study was determined using the Slovin formula with a 10% margin of error. Purposive sampling was applied to select 97 respondents for interviews. Respondents were the village community who had lived in Namo Bintang village for at least four years, were well-communicated men and women over the age of 17, and had used medicinal plants [27]. The characteristics of the respondents collected were: gender, age, place of birth, residency status, language, ethnicity, religion, education, and occupation. The scientific and vernacular names of medicinal plants, growth form, family, plant part used, preparation methods, medicinal benefits/types of diseases treated, number of plant individuals, and conservation status were carefully recorded as ethnobotanical data. Medicinal plants' conservation status obtained from the website of the International Union for Conservation of Nature (IUCN) Red List.

3. Result and Discussion

The results of the data analysis in Table 1 show that the majority of medicinal plant users were women (71%), aged 37-56 years (42%), and were native residents of Desa Namo Bintang (92%). In general, the local community's knowledge of medicinal plants utilization is higher, enabling them to provide information to newcomers, for example, in the form of counseling [8]. Respondents were predominantly of Karo ethnicity (79%) and worked as farmers (51%). This is consistent with prior studies, which stated that both the Karo and the Simalungun intensely utilize traditional medical herbs. This circumstance has led to a robust trade in medicinal plants and traditional herbal treatments in North Sumatra [28]. The Karo ethnic community provides medicinal plants used in traditional medicines and remedies. The creation of these herbal treatments is a tradition handed down through generations, with advances in packaging and usage [29]. In general, the Karo tribe utilizes medicinal plants in their daily lives, both for health maintenance and for treatment [9]. Forty-one percent of respondents were high school graduates, and 14% were university graduates. One factor that influences the level of knowledge among the community is education; the higher the level of education, the higher the knowledge and innovation in the use of medicinal plants [10].

Table 1. Socio-demographic of respondents

Variables	Total	Percentage
Gender		
Men	28	29%
Women	69	71%
Age		
17-36	17	17%
37-56	40	42%
57-76	37	38%
> 77	3	3%
Residency status		
Native	89	92%
Migrants	8	8%
Ethnicity		
Karo	77	79%
Toba	8	8%
Jawa	9	9%
Others	3	3%
Occupation		
Farmer	49	51%
Housewife	18	19%
Trader/dealer	10	10%
Businessman	7	7%
Others	7	7%
Employee	3	3%
Teacher	3	3%
Education		
No education	6	6%
Elementary school	15	15%
Junior High School	22	23%
Senior High School	40	41%
University	14	14%

Based on interviews conducted, the people of Desa Namo Bintang explained that the majority of them have been using medicinal plants since childhood. This wisdom was verbally passed down from generation to generation by the parents. Respondents acquired knowledge regarding the processing and advantages of medicinal plants from their parents (76%), neighbours (11%), and social media (13%). Knowledge about the use of medicinal plants is a cultural heritage of the nation, passed down from generation to generation to the present day. This heritage has given rise to various medicinal plant concoctions that are characteristic of traditional Indonesian medicine [11], [12]. However, several respondents stated that they began consuming medicinal plants regularly since the COVID-19 pandemic. The pandemic has made people more cautious and concerned about their immune systems. According to a previous study, many people choose traditional medicinal plants for their immunomodulatory benefits and supportive therapy for infected patients [13].

Respondents tend to use medicinal plants regularly, at least once a day. These results support research by [14], which explains that the frequency of consuming medicinal plants varies among respondents. Most respondents consume them regularly every day, while others only consume them when they are experiencing health problems or illness. The majority of respondents (40%) chose medicinal plants because they felt they were safer to use with fewer side effects compared to modern medicines. In addition, they tend to be simple to process and easy to obtain, either by purchasing them (50%), cultivating them in home gardens or farms (47%), or finding them growing wild in the neighbourhood (3%). Previous research stated that people choose herbal

medicine as an alternative treatment because it is relatively affordable [15], especially for treating minor illnesses based on local cultural beliefs and experiences [16]. Respondents indicate that the cultivation of medicinal plants is challenging due to the several stages required post-planting. In addition, Desa Namo Bintang is not far from one of North Sumatra's principal markets for natural medicine, Pasar Pancur Batu [27]. Therefore, they dominantly prefer acquiring medicinal plants from diverse sources for convenience and cost-effectiveness.

The ethnobotanical survey in the study site identified 85 species of medicinal plants, classified into 37 families (Table 2). The predominant medicinal herbs utilized by respondents were *Zingiber officinale*, *Cymbopogon citratus*, *Curcuma longa*, *Kaempferia galanga*, and *Curcuma xanthorrhiza*. Table 2 presents detailed information regarding family, scientific name, vernacular name, growth form, plant parts used, mode of preparation, disease, and conservation status.

The predominant medicinal plant consumed by the respondents belongs to the Zingiberaceae family, comprising 15 species (Figure 1). The other high families were Cucurbitaceae, Piperaceae, and Poaceae (five species each). Four species were identified from each of the following families: Acanthaceae, Amaryllidaceae, Arecaceae, Lamiaceae, and Myrtaceae, while three species were classified from Solanaceae. The remaining species were categorized within the families: Apiaceae, Asteraceae, Euphorbiaceae, Lauraceae, Rutaceae, Acoraceae, Annonaceae, Basellaceae, Brassicaceae, Campanulaceae, Caricaceae, Convolvulaceae, Phyllanthaceae, Iridaceae, Loranthaceae, Malvaceae, Melastomataceae, Meliaceae, Moraceae, Moringaceae, Musaceae, Myristicaceae, Pandanaceae, Primulaceae, Rubiaceae, and Verbenaceae, with one or two species represented in each family.

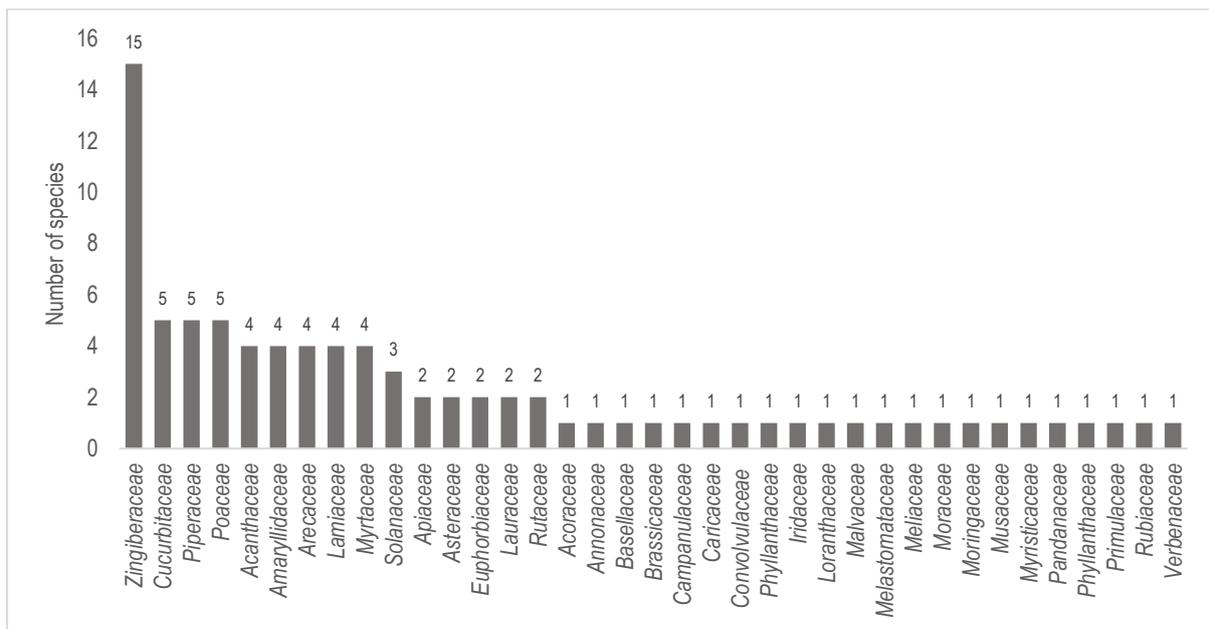


Figure 1. Family of medicinal plants used by community in Desa Namo Bintang

Table 2. Medicinal plants utilization in Desa Namo Bintang and their conservation status

Family	Species	Vernacular name	Growth form	Plant part used	Preparation method	Disease	Conservation status
Acanthaceae	<i>Strobilanthes crispera</i>	Keji beling	Shrub	Bark	Decoction	Musculoskeletal pain, cancer prevention, diabetes, detoxifying	Not Evaluated
	<i>Justicia gendarussa</i>	Gandarusa (Besi-besi)	Shrub	Leaf	Decoction	Lung disease, headaches, gout	Least Concern
	<i>Andrographis paniculata</i>	Sambiloto	Shrub	Leaf	Decoction	Hypertension, fever, intestinal worms	Not Evaluated
Acoraceae	<i>Acorus calamus</i>	Jerangau	Herb	Leaf	Decoction, Infusion	Cataracts, itching, colds	Not Evaluated
Amaryllidaceae	<i>Allium sativum</i>	Bawang Putih	Herb	Bulb	Infusion, Paste	Wounds, itching, hypercholesterolemia, hypertension	Not Evaluated
	<i>Allium cepa</i>	Bawang Merah	Herb	Bulb	Infusion, Sliced	Colds, coughs, reducing fever in babies	Not Evaluated
	<i>Crinum asiaticum</i>	Daun Bakung	Herb	Leaf	Roasted	Treat sprains.	Not Evaluated
	<i>Allium tuberosum</i>	Kuca	Herb	Seed	Infusion, Paste	Minor wounds, boils, itching.	Not Evaluated
Annonaceae	<i>Annona muricata</i>	Sirsak	Tree	Leaf	Decoction	Preventing breast cancer, diabetes, hypertension, gout	Least Concern
Apiaceae	<i>Coriandrum sativum</i>	Ketumbar	Herb	Seed	Decoction	Hypertension, reduce weight	Not Evaluated
	<i>Apium graveolens</i>	Seledri	Herb	Leaf	Decoction	Hypercholesterolemia	Least Concern
Areaceae	<i>Areca catechu</i>	Pinang	Palm	Fruit	Raw consumption	Physical stamina, treating sprains, itching, diarrhea	Least Concern
	<i>Cocos nucifera</i>	Kelapa	Palm	Fruit	Decoction, Raw consumption	Diarrhea, thrush, dengue fever, toothache, colds, detoxification	Not Evaluated
	<i>Arenga pinnata</i>	Aren	Palm	Palm sap	Raw consumption	Improve blood circulation	Least Concern
	<i>Cocos nucifera var. eburnea</i>	Kelapa kuning	Palm	Fruit	Decoction, Raw consumption	Detoxification, thrush, immune enhancement	Not Evaluated
Acanthaceae	<i>Graptophyllum pictum</i>	Selantam	Shrub	Leaf	Decoction	Lung disease, fever, and boils	Not Evaluated
Asteraceae	<i>Chromolaena odorata</i>	Daun kapal-kapal	Herb	Leaf	Decoction	Asthma, cold	Not Evaluated
	<i>Gynura procumbens</i>	Sambung nyawa	Herb	Leaf	Decoction	Preventing or treating cancer, hypertension, diabetes	Not Evaluated
Basellaceae	<i>Anredera cordifolia</i>	Binahong	Climber	Leaf	Decoction	Musculoskeletal pain, gout	Not Evaluated
Brassicaceae	<i>Raphanus sativus</i>	Lobak	Herb	Root	Decoction	Malaria	Not Evaluated
Campanulaceae	<i>Isotoma longiflora</i>	Katarak	Herb	Leaf	Decoction	Cataract	Not Evaluated
Caricaceae	<i>Carica papaya</i>	Pepaya	Shrub	Fruit	Raw consumption	Physical stamina, sprains, itching, diarrhea	Data Deficient

Family	Species	Vernacular name	Growth form	Plant part used	Preparation method	Disease	Conservation status
Convolvulaceae	<i>Ipomoea aquatica</i>	Kangkung	Herb	Leaf	Infusion, Paste	Boils	Least Concern
Cucurbitaceae	<i>Benincasa hispida</i>	Gundur/Buah Kundur	Climber	Leaf	Decoction	Heartburn, burn wound/injury	Not Evaluated
	<i>Cucurbita moschata</i>	Labu kuning	Climber	Fruit	Decoction	Hypertension	Not Evaluated
	<i>Secchium edule</i>	Labu siam	Climber	Fruit	Decoction	Colds, coughs, intestinal disorders, burns	Not Evaluated
	<i>Momordica charantia</i>	Pare	Climber	Leaf	Infusion	Anorexia, reduces fever, treats intestinal worms	Not Evaluated
	<i>Cucumis sativus</i>	Timun	Climber	Fruit	Infusion	Gout, hypercholesterolemia	Not Evaluated
Euphorbiaceae	<i>Ricinus communis</i>	Jarak	Shrub	Leaf	Steamed	Reduces swelling and rheumatic pain	Least Concern
	<i>Acalypha indica</i>	Kucing-kucingan	Herb	Leaf	Decoction	Musculoskeletal pain, hypertension, kidneys	Not Evaluated
Phyllanthaceae	<i>Bischofia javanica</i>	Singkam	Tree	Leaf	Grated	Heartburn	Least Concern
Iridaceae	<i>Eleutherine palmifolia</i>	Bawang Dayak	Herb	Bulb	Infusion	Cancer, hypertension, hypercholesterolemia	Not Evaluated
Lamiaceae	<i>Coleus amboinicus</i>	Bangun-bangun	Herb	Leaf	Decoction	Wounds, sprains, heartburn	Not Evaluated
	<i>Orthosiphon aristatus</i>	Kumis kucing	Herb	Leaf	Decoction	Regulates menstruation, cleanses the blood in the body, relieves stomachaches	Not Evaluated
	<i>Ocimum sanctum</i>	Kemangi	Herb	Leaf	Decoction	Musculoskeletal pain, immune system.	Not Evaluated
	<i>Ocimum tenuiflorum</i>	Ruku-ruku	Herb	Leaf	Raw consumption, Decoction	Musculoskeletal pain, flu	Not Evaluated
Lauraceae	<i>Persea americana</i>	Alpukat	Tree	Leaf	Decoction	Hypertension, hypercholesterolemia, heartburn	Least Concern
	<i>Cinnamomum burmanni</i>	Kayu manis	Tree	Leaf	Infusion	Blood circulation	Not Evaluated
Loranthaceae	<i>Dendrophthoe pentandra</i>	Surindan / Benalu duku	Shrub	Leaf	Decoction	Treating chickenpox	Not Evaluated
Malvaceae	<i>Hibiscus rosa-sinensis</i>	Kembang sepatu	Shrub	Leaf	Decoction	Fever, cough	Not Evaluated
Melastomataceae	<i>Melastoma malabathricum</i>	Senduduk	Shrub	Leaf	Decoction	Treating bloody diarrhea	Not Evaluated
Meliaceae	<i>Swietenia mahagoni</i>	Mahoni	Tree	Seed	Raw consumption	Newly cut umbilical cord scar on a baby, diabetes	Near Threatened
Moraceae	<i>Artocarpus heterophyllus</i>	Nangka	Tree	Leaf	Decoction	Stomach ache, toothache, reduces inflammation of the skin	Not Evaluated
Moringaceae	<i>Moringa oleifera</i>	Kelor	Shrub	Fruit	Raw consumption	Improves breast milk production, prevents cancer, hypertension	Least Concern

Family	Species	Vernacular name	Growth form	Plant part used	Preparation method	Disease	Conservation status
Musaceae	<i>Musa sp.</i>	Tunas pisang	Herb	Sap/Latex	Raw consumption	Bleeding from an external (open) wound	Least Concern
Myristicaceae	<i>Myristica fragrans</i>	Pala	Tree	Fruit	Infusion	Anorexia, headache, stomachache	Data Deficient
Myrtaceae	<i>Syzygium polyanthum</i>	Salam	Tree	Leaf	Decoction	Hypercholesterolemia, hypertension, gout	Not Evaluated
	<i>Psidium guajava</i>	Jambu biji	Tree	Leaf	Raw consumption	Diarrhea	Least Concern
	<i>Syzygium aromaticum</i>	Cengkeh	Tree	Flower	Decoction	Cough, cold, anorexia, blood circulation	Not Evaluated
	<i>Syzygium aqueum</i>	Jambu air	Tree	Leaf	Decoction	Diarrhea	Least Concern
Pandanaceae	<i>Pandanus amaryllifolius</i>	Pandan	Shrub	Leaf	Decoction	Cancer, diabetes	Data Deficient
Phyllanthaceae	<i>Phyllanthus niruri</i>	Daun meniran	Herb	Leaf	Decoction	Immune system, flu	Not Evaluated
Piperaceae	<i>Piper nigrum</i>	Lada hitam	Climber	Seed	Decoction	Cold	Not Evaluated
	<i>Piper betle</i>	Sirih	Climber	Leaf	Decoction, Pounded	Natural antiseptic, treats external wounds, eye pain, body odor	Not Evaluated
	<i>Peperomia pellucida</i>	Sirih cina	Herb	Leaf	Pounded	Boils, musculoskeletal pain	Not Evaluated
	<i>Piper crocatum</i>	Sirih merah	Climber	Leaf	Decoction	hypertension	Not Evaluated
	<i>Piper aduncum</i>	Sirih hutan	Shrub	Leaf	Decoction	Overcoming physical fatigue	Least Concern
Poaceae	<i>Cymbopogon citratus</i>	Serai	Herb	Stem	Decoction, Pounded	Sprains, coughs, asthma, fever, anorexia, gout, blood circulation, musculoskeletal pain	Not Evaluated
	<i>Imperata cylindrica</i>	Alang-alang	Herb	Root	Decoction, Steamed	Fever, nosebleeds, cough	Not Evaluated
	<i>Bambusa</i>	Rebung / tunas bambu	Herb	Stem	Raw consumption, Decoction	Hypercholesterolemia, rheumatic pain, aids digestion	Least Concern
	<i>Cymbopogon nardus</i>	Serai wangi	Herb	Stem	Decoction	Muscle pain	Not Evaluated
	<i>Saccharum officinarum</i>	Tebu merah	Herb	Stem	Decoction	Thrush, cough, kidney	Not Evaluated
Primulaceae	<i>Labisia pumila</i>	Rumput Fatimah	Herb	Leaf	Decoction	Heartburn	Not Evaluated
Rubiaceae	<i>Uncaria gambir</i>	Gambir	Tree	Leaf	Infusion, Pounded	Heartburn, burn wound/injury	Not Evaluated
Rutaceae	<i>Citrus microcarpa</i>	Jeruk kasturi	Shrub	Leaf	Squeezed	Sore throat, cough	Not Evaluated
	<i>Citrus hystrix</i>	Jeruk purut	Shrub	Fruit	Decoction	Fever, cough, body odor	Least Concern

Family	Species	Vernacular name	Growth form	Plant part used	Preparation method	Disease	Conservation status
Solanaceae	<i>Solanum verbascifolium</i>	Lancing	Shrub	Leaf	Decoction	Colds, stomach aches, sprains, muscle aches, anorexia	Not Evaluated
	<i>Physalis peruviana</i>	Depuk-depuk / Ciplukan	Herb	Leaf	Decoction	Asthma, chickenpox, fever	Least Concern
	<i>Solanum torvum</i>	Rimbang	Shrub	Fruit	Decoction	Strengthens the uterus, maintains eye health	Not Evaluated
Verbenaceae	<i>Stachytarpheta jamaicensis</i>	Sipenggel kuda	Herb	Leaf	Decoction, Pounded	Fever, immune enhancement, sprains	Least Concern
Zingiberaceae	<i>Zingiber officinale</i>	Jahe	Herb	Rhizome	Raw consumption, Decoction, Pounded	Colds, coughs, asthma, heartburn, blood circulation, external wounds	Not Evaluated
	<i>Curcuma longa</i>	Kunyit	Herb	Rhizome	Decoction	Musculoskeletal pain, colds, cancer prevention	Data Deficient
	<i>Kaempferia galanga</i>	Kencur	Herb	Leaf	Decoction	Colds, coughs, heartburn, anorexia, sprains, immune enhancement, external wounds	Data Deficient
	<i>Curcuma xanthorrhiza</i>	Temulawak	Herb	Rhizome	Decoction, Pounded	Prevents liver cancer, anorexia, blood circulation, immune enhancement, colds, fever.	Not Evaluated
	<i>Alpinia galanga</i>	Lengkuas	Herb	Rhizome	Pounded	Kidney, hypercholesterolemia, prevention cancer, thrush	Not Evaluated
	<i>Zingiber zerumbet</i>	Lempuyang	Herb	Rhizome	Pounded	Tinea versicolor, heartburn, fatigue, itching, anorexia	Data Deficient
	<i>Zingiber officinale</i> var. <i>rubrum</i>	Jahe Merah	Herb	Rhizome	Raw consumption, Decoction, Pounded	Cough, cold, anorexia	Not Evaluated
	<i>Curcuma heyneana</i>	Kuning gajah	Herb	Rhizome	Decoction	Colds, itching, coughs, stomach aches, heartburn, blood circulation, anorexia, burns	Data Deficient
	<i>Boesenbergia pandurata</i>	Temu kunci	Herb	Rhizome	Decoction	Colds, anorexia	Not Evaluated
	<i>Zingiber purpureum</i>	Bangle/Burlei	Herb	Rhizome	Decoction	Boils, intestinal worms, coughs, fever	Data Deficient
	<i>Zingiber officinale</i> var. <i>amarum</i>	Jahe Kampung	Herb	Rhizome	Raw consumption, Decoction, Pounded	Colds, musculoskeletal pain, fatigue, blood circulation	Not Evaluated
	<i>Curcuma zedoaria</i>	Kunyit putih	Herb	Rhizome	Decoction	Anorexia, colds	Data Deficient
	<i>Etingera elatior</i>	Cekala	Herb	Stem	Roasted	Anorexia, fever	Data Deficient
	<i>Amomum compactum</i>	Kapulaga	Herb	Fruit	Raw consumption	Eases breathing	Least Concern
	<i>Hedychium coronarium</i>	Gandasuli	Herb	Rhizome	Decoction	Asthma, sprains, internal wounds, intestinal obstruction	Data Deficient

Communities of Desa Namo Bintang utilized several components of the plant for medical purposes. Our study indicated that leaves were the most commonly employed ingredient at 51% (Figure 2). The other common parts were rhizome (15%) and fruit (14%). Previous ethnomedicine studies have reported that leaves are commonly collected for healthcare purposes by Karonese in North Sumatra [17], Acehnese in East Aceh [18, 19], and the Tengger tribe in Probolinggo [20]. Their popularity in traditional medicine is due to the simple treatment [21]. Leaf collection within permissible boundaries is also beneficial to plant survival compared to harvesting other parts, for instance, the root, bulb, or stem. In addition, leaves contain the highest concentration of secondary metabolites among the many sections of plants [17]. Only a tiny percentage of those interviewed acknowledged using the remaining components (root, sap, bark, and flower).

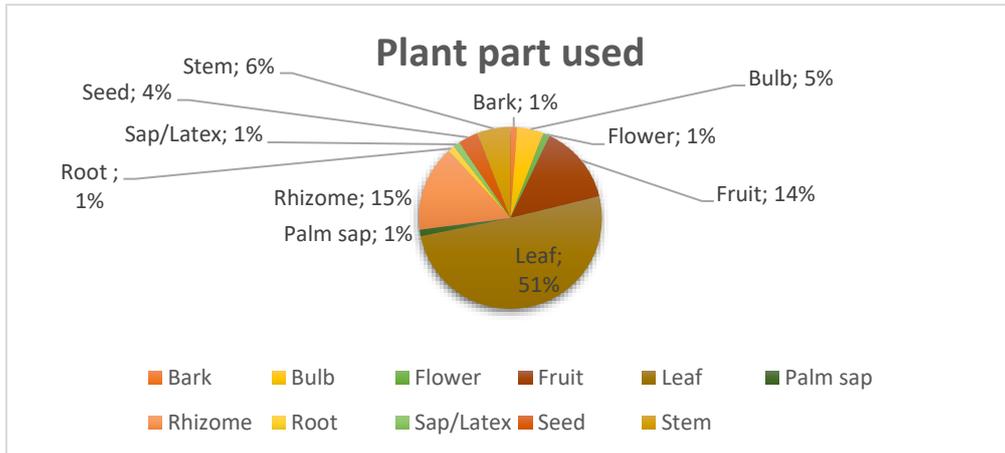


Figure 2. Plant part used by local community in the study site

There are various methods to prepare medicinal plants for the treatment of ailments. The main preparation method in the study site was decoction. The community of Desa Namo Bintang prepared at least 59 types of medicinal plants into a decoction before usage (Figure 3). The other methods were raw consumption, pounded, infusion, roasted, steamed, grated, and squeezed. Decoction is considered the most popular due to its simplicity, expenditure, and ease of continuous performance [9]. Furthermore, the beneficial nutrients present in medicinal plants can be extracted into water during boiling [22]. Therefore, it has been widely used by various communities in Indonesia and around the world, as reported by other previous studies in East Nusa Tenggara of the Bunaq Tribe [23], in North Sumatra of the Karo Tribe [9], in Western Sudan [24], and in India of the Mizo Tribe [25].

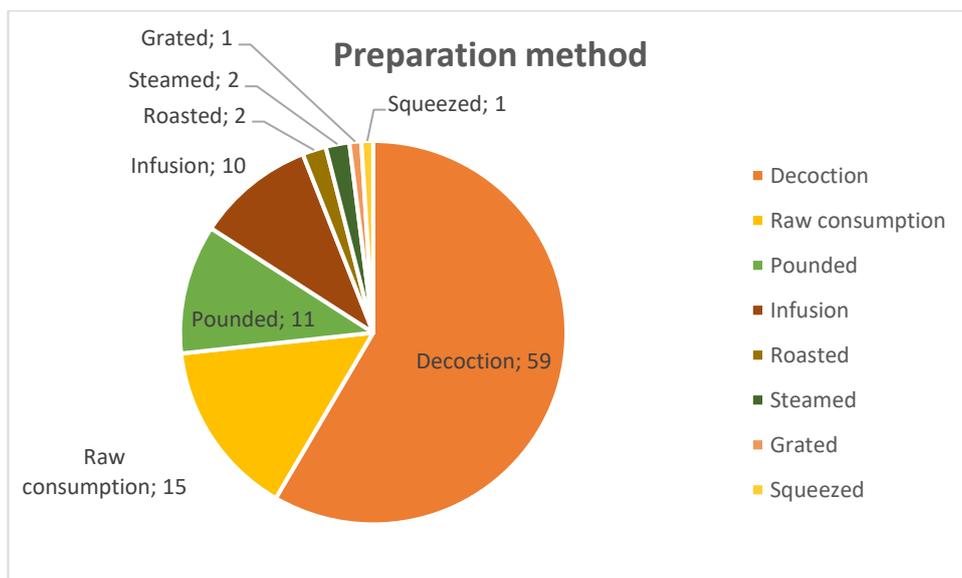


Figure 3. Methods to prepare medicinal plants for disease therapy in study site

The conservation status of more than half of the recorded species in this study has not evaluated yet by IUCN (Table 2). Medicinal plants that have been evaluated were mostly categorized as Least Concern (LC), indicating the species population is plentiful and remains stable in the wild. However, *Swietenia mahagoni* [26] was classified as Near Threatened (NT), suggesting that mature individuals are rapidly diminishing in the world's wild forests. Previous studies have shown that the seed of *Swietenia mahagoni* has been commonly utilized by various tribes in Indonesia to treat herpes, hepatitis, and diabetes mellitus [30]. The seed contains flavonoids, terpenoids, steroids, saponins, and alkaloids as antioxidants [31], [32].

Although the IUCN lists *Swietenia mahagoni* as Near Threatened on a global scale, this species is an invasive plant that is commonly grown in Indonesia. Therefore, the necessity for local conservation depends on both the intensity of community use and the sustainability of harvesting practices. Conservation approaches based on cultivation and sustainable use are more relevant than stringent protection, as is the case for vulnerable endemic species. The current study proposes community-based conservation by developing cultivation plots and implementing sustainable harvesting.

4. Conclusion

This study identified 85 species of medicinal plants in Desa Namo Bintang, classified into 37 families. The predominant medicinal herb utilized by respondents was *Zingiber officinale*, *Cymbopogon citratus*, *Curcuma longa*, *Kaempferia galanga*, and *Curcuma xanthorrhiza*. The family Zingiberaceae represented the greatest number of species. Leaves were the most commonly employed ingredient, and the main preparation method was decoction. The evaluated medicinal plants were mostly categorized as Least Concern (LC), while one species, *Swietenia mahagoni*, was classified as Near Threatened (NT). The necessity for local conservation depends on both the intensity of community use and the sustainability of harvesting practices. The current study proposes community-based conservation by developing cultivation plots and implementing sustainable harvesting.

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