



## Traditional medicinal plants and practices of an Indigenous community in Katipunan Village, Bayugan City, Agusan del Sur, Philippines

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### Abstract

Medicinal plants represent an alternative treatment for various diseases and their use is becoming increasingly prevalent worldwide. This study aimed to present preliminary data on the ethnomedicinal plants used by the Indigenous people of Barangay Katipunan, Bayugan City, Agusan Del Sur. Data were obtained through semi-structured, face-to-face interviews. The benefits, importance, and coverage of ethnomedicine were expressed using several quantitative indices including the Informant Consensus Factor (ICF) and relative frequency of citations (RFC). Most respondents were male (68.18% of 44 respondents). Eighty ethnomedicinal plant species have been documented and are distributed across 38 families. For every species, the leaves (42%) were the most utilized for preparing ethnomedicines, whereas decoctions (37%) were the most popular plant preparation method. Trees constituted the largest proportion, comprising of 34 plant species (42%). The three most used ethnomedicinal plant species in the study area are *Anodendron borneense* (0.65), *Blumea balsamifera* (0.6), and *Artemisia vulgaris* (0.57). Cultivated plant species were the most common sources of medicinal plants, constituting 56.3% of the species found in their localities. Medicinal plants were preferred by 41 (93%) respondents, indicating that they used traditional medicine for their primary health treatment.

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## Introduction

Traditional plant knowledge, as a health remedy, is rooted in history and has been transferred from one generation to the next (Islam *et al.*, 2014). As civilization progressed to modernization, some groups retained and preserved traditional ways. Knowledge of medicinal plants as a source of ailment alleviation has extended back to early civilizations in China, India, and the Near East (Aziz *et al.* 2018). According to the World Health Organization (WHO), 60% of the world's population and approximately 80% of the population of developing countries depend on traditional medicine, primarily herbal remedies, for primary healthcare (Taddei-Bringas *et al.*, 1999; Woo *et al.*, 2012; Ahmad Khan & Ahmad, 2019). Medicinal plants are gaining recognition in areas with high medical costs, particularly in Asia and Africa.

The Philippines is one of the world's most important biodiversity hotspots (Gaither & Rocha, 2013) with approximately 13,000 plant species, 39% of which are endemic (Banag-Moran *et al.*, 2022). Various plant species are widely used in traditional alternative medicines for the treatment of various diseases (Maldonado-Miranda, 2021). In addition to its highly diverse biodiversity, the Philippines is also considered culturally diverse in terms of ethnicity and is classified differently based on identity, language, socio-political systems, and practices. This country is culturally rich in archipelagic ethnic language groups, such as the different Indigenous People (IP) that occupy the island of Mindanao in the southern part of the country. Some of these IPs are cultural communities of the *Higaonon Manobo* that are scattered across the Caraga region. The total population of the *Higaonon* group is approximately 30,000 and occupy core areas in the main provinces of the Mindanao Region. The tribe was also recognized as one of the largest and most Indigenous groups of 'Lumads' (Valdeavilla, 2018).

Medicines are substances with nutritive, curative, or preventive properties, whereas "herbal" medicines are botanical or plant-based preparations (Sharma *et al.*, 2021; Kapurkar *et al.*, 2022). Hence, "herbal

medicine" is used as a plant-based substance with nutritive, curative, and preventive properties (Wachtel-Galor & Benzie, 2011). Ethnobotany has studied how indigenous communities in specific locations use plants for food, clothing, housing, and medicine (Aiyelaja & Bello, 2006). Harshberger (1986) used the term "ethnobotany" to describe the usage of plants by aboriginal people and defined it as the study of the relationship between people and plants, and most commonly refers to the study of the indigenous uses of plants. In other words, it is the marriage between cultural anthropology and botany that investigates the role of plants in medicine, nourishment, natural resources, and gods (Kumar, 2011).

During the pandemic, IPs suffered from heightened risks and unequal health implications. Despite having access to essential amenities, such as healthcare, they are discriminated against and harmed by their origins and identities. However, owing to circumstances such as a lack of transportation and scarcity of money, these people find it convenient to use medicinal plants. IP communities prefer to use the old methods, especially in their healthcare and methods of using traditional herbal medicines for healing.

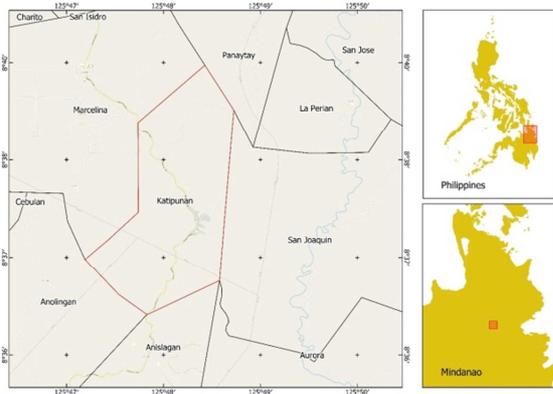
This study aimed to identify the medicinal plants used by the IPs of Katipunan Village, including their uses and natural curative properties. The specific objectives were as follows: a) to determine the demographic profile of the respondents who were using medicinal plants to treat common illnesses; b) to identify and classify key plant species, growth habits, and manner of application; c) to identify ailments or diseases treated and the plant parts used; d) to determine the sources of medicinal plants and respondents' preferences for pharmaceutical or medicinal plants; and e) to determine the Informant Consensus Factor (ICF) and Relative Frequency of Citations (RFC) for each medicinal plant.

## Materials and methods

### *Location of the Study*

This study was conducted in Barangay Katipunan, Bayugan City, Agusan del Sur. It is situated at

approximately 8.6432°N and 125.7979°E on Mindanao Island. The highest elevation at this coordinate was estimated at 85.1 meters above the mean sea level. Katipunán Village is a barangay in Bayugan City, Agusan del Sur Province (Fig. 1).



**Fig. 1.** The location of Barangay Katipunán in Bayugan City, Agusan del Sur, Philippines.

#### *Sampling of informants*

This study was conducted from January 2022 to March 2022, following standard protocols for the collection of ethnobotanical data (Alexiades & Sheldon, 1996; Marti, 2010). Permission to perform an ethnomedicinal survey in Katipunán Village was granted by the Barangay Captain and the community Tribal Leader as the local authorities of the village. Information was collected from local traditional health practitioners and indigenous and tribal people with practical knowledge of medicinal plant use for various remedies. The fieldwork comprised interviews with 44 people belonging to the *Higaonon* tribal community.

#### *Data collection*

This study employed a descriptive survey research design through face-to-face interviews to assess preferences for using medicinal plants with pharmaceutical drugs. Informal interviews, semi-structured questionnaires, and group discussions were used to gather data for in-depth analysis of medicinal plants, including their uses, curative properties, and taxonomies. During fieldwork, the local names, parts of the plants used, the illness or disease cured, and details of preparation and application were documented. In addition, the

medicinal plant species mentioned by the informants were taxonomically identified using the available published literature, both printed and online.

Primary data were collected using a semi-structured survey questionnaire with open-ended questions (see Appendix for the questionnaire). The research questionnaire was adopted from Nuñez *et al.* (2021) and slightly modified for this study. Prior to fieldwork, the researchers requested permission from the office of the College of Forestry and Environmental Sciences through Dean to conduct the study, in addition to the approval of the Barangay Captain and the Indigenous People's Mandatory Representative (IPMR) of Katipunán.

#### *Statistical Treatment of Data*

The researchers calculated the Informant Consensus Factor (ICF) and Relative Citation Frequency (RFC). The ICF was measured to study the total usage of plant species according to culture applicability. This was calculated using the following formula:  $FIC = NUR - NT / NUR - 1$ , where FIC is the informant consensus factor, NUR is the number of use citations, and NT is the number of species used.

On the other hand, RFC identifies the local importance of each medicinal plant species and is calculated using the following formula:  $RFC = FC / N$ , where FC is the number of informants who mentioned the plant species and N is the total number of informants (Kayani *et al.*, 2014; Napagoda *et al.*, 2018; Tardio & Pardo-Santayana, 2008). Therefore, this study uses a combination of qualitative and quantitative research approaches, as it draws out information and numerical data from respondents through survey questionnaires.

## **Results and discussions**

#### *Demographic profile of the respondents*

A total of 44 participants were interviewed, comprising 30 males (68.18%) and 14 females (31.82%). All respondents were members of the *Higaonon* tribal community and represented by the IPMR. The majorities were farmers, with 29 (65.91%),

and the rest engaged in various activities, such as chainsaw operators, construction workers, rubber tappers, barangay health workers, garbage collectors, and others (34.09%). The largest number of responses were from respondents aged 50–65 years. Four respondents were over 65 years old, seventeen respondents were in the 35-49 bracket, and only two were 18-34 years old.

**Table 1.** Sociodemographic profile of respondents from Katipunan.

Category	Parameters	No. of informants	Percentages (%)
Gender	Male	30	68.18
	Female	14	31.82
Social Position	IP member	42	95.45
	Tribal IPMR	1	2.27
	Barangay Health Worker	1	2.27
	Farmer	29	65.91
Occupation	Chainsaw Operator	2	4.55
	Construction	2	4.55
	BHW	1	2.27
	Garbage Collector	1	2.27
	Rubber Tapping	2	4.55
	Others	7	15.91
	Age	18 - 34 years old	2
	35 - 49 years old	17	38.64
	50 - 65 years old	21	47.73
	More than 65 years	4	9.09

Although residents engaged in various activities to derive income, most were farmers residing in mountainous areas, which is consistent with the results of Balangcod and Balangcod (2011) and Gruyal *et al.* (2014).

*Diversity of medicinal plants*

All Indigenous societies worldwide maintain and develop knowledge about the use of plants in traditional medicine. This knowledge has been passed down through generations in the Philippines via oral

transmission. In this study, 80 medicinal plants used to treat various diseases were identified as herbal medicines. Descriptions and information on the identified plants are shown in Supplement 1. Ethnobotanical data, scientific names, families, local names, parts used, preparation methods, Relative Frequency Citation (RFC), and therapeutic applications were represented for each plant species. The medicinal species belonged to 38 families, with Asteraceae (eight species) being the most abundant, followed by Lamiaceae (seven species), Fabaceae (six species), Moraceae (five species), and other families represented by one–three species (Table 3).

This indicates that the study area contains a wide range of plant species. Furthermore, because the area is remote from the city and access to modern healthcare is limited, the majority of Indigenous People continue to rely on traditional medicine.

Medicinal plant preparations and applications differ depending on the type of illness that is being treated. Table 2 summarizes the different illnesses and diseases that could be treated based on their responses. The most common preparation technique is the decoction. With decoction, the plant parts, usually the leaves, were boiled, filtered, and orally provided as a juice drink, such as the leaves of *Vitex negundo* and *Coleus scutellarioides*, to treat the common cold and cough. Plants are also infused by infusions, where leaves or stem scrapes are juiced and applied directly to cuts and wounds. For example, the bark of *Musa textilis* has been used to treat wounds. Some are directly consumed, such as *Paspalum conjugatum* leaves, to treat stomachaches.

**Table 2.** Summary of illnesses and diseases that can be treated using medicinal plants.

Diseases Treated	Species
Anemia	Mayana
Anti-diabetes	Banaba, Manzanitas
Anti-Inflammatory	Payaw, Hagimit
Antimicrobial	Madre de Cacao
Antioxidant	Talong-talongan
Arthritis	Busikad, Sinaw-sinaw
Constipation	Sangig
Cough	Avocado, Bayabas, Gabon, Ganda, Hilbas, Kalabo, Kisol, Lagundi, Lanzones, Mangga, Mayana, Rabana, Sibujin, Sili, Tanglad, Kabihid, Tawa-tawa, Tubog
Diarrhea	Avocado, Bayabas, Bayabas (Tapol), Busikad, Caimito, Himag, Kanding-kanding,

Diseases Treated	Species
Earache	Labana, Lagundi, Lanzones, Makopa, Miligoy, Santol, Toog, Tuba-tuba
Fever	Bajang
Flatulence	Buyo, Gabon, Gmelina, Labana, Lagundi, Mangosteen, Nangka, Panyawan, Santol, Sili, Tanglad, Tawa-tawa, Tubog
Gas Pains	Buyo, Duwaw, Gabon, Gmelina, Himag, Kisol, Kokobanog, Rabana, Sibukaw, Tiger orchid, Tabako, Tuba-tuba
Headache	Gapas
Hemorrhage	Adgaw, Agutay, Alom, Balite, Hanlilika, Manzanitas
High blood	Panyawan
Inflamed Eye	Alingatong, Gapas
Kidney Infection	Tubo
Lactation	Sinaw-sinaw
Lump	Kamunggay
Malaria	Sawan-sawan
Muscle Spasm	Anangilan, Busikad
Over Fatigue	Sampinit
Relapse	Blue Ternate
Skin Infections	Alingatong, Himag, Mangosteen
Snake Bite	Mangosteen
Stomachache	Kamagong, Kipi-kipi/Makahiya
Swelling	Avocado, Bayabas, Bila-bila, Hanlilika, Hilbas, Kanding-kanding, Kisol, Kokobanog, Lagundi, Likway, Serpentina, Miligoy, Panyawan, Rabana, Santol
Toothache	Mayana
Ulcerative colitis	Bajang, Hagonoy, Iba, Kalachuchi, Panyawan, Tabako, Toothache Plant, Tuba-tuba, Tubo
Urinary tract infection	Blue Ternate, Iba, Tubo
Vomiting	Bila-bila, Iba, Pandan, Rabana
Wounds	Kanding-kanding, Sangig
	Abaca, Agutay, Alugbati, Balete, Bayabas, Cacao, Caimito, Falcata, Hagonoy, Himag, Kamunggay, Kisol, Lagnob, Lubi, Miligoy, Muti-muti, Saging, Toog, Tuba-tuba

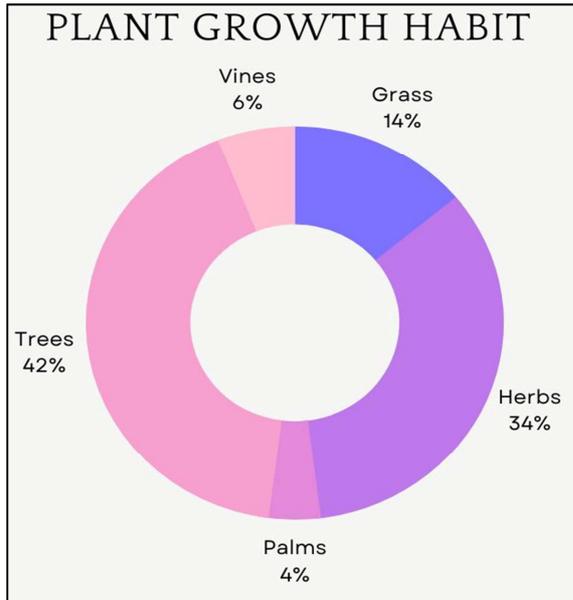
Few studies have been conducted on underground plant components, such as *Curcuma longa* roots and *Mimosa pudica*. Coming from most respondents, the leaves were the most widely used plant portion in herbal medicines (Fig. 4). It was found that *Higaonon* usage of leaves ensured the survival and permanence of valuable medicinal plants in the village, thus ensuring the sustainability of medicinal plants for future use. Other documented plants were used as follows: *Anodendron borneense* bark and stems can help flatulence and relapse; the roots of *Eleusine indica* and *Mimosa quadrivalvis* soothe and prevent muscle cramps or overfatigue, known locally as "bughat" in women, particularly after childbirth; and the leaves of *Moringa oleifera* increased milk production in breastfeeding mothers (Supplement 1).

In addition, *Falcataria falcata* (L.) Greuter and R. Rankin bark has been reported as a treatment option for wounds. This is a valuable finding because *F. falcata* has been planted for timber purposes and its medicinal properties have never been documented in the Philippines. In the West Java community forest,

*F. falcata* was evaluated for phytochemical content, characterization of secondary metabolites through GC/MS analysis, and antioxidant activity using the DPPH method. The results revealed the presence of phenolic compounds, flavonoids, steroids, terpenoids, saponins, and tannins (Ramidatul *et al.*, 2021).

#### Plants Growth Habits

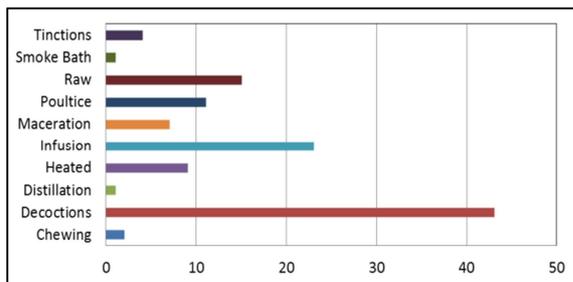
On plant growth habit, out of the 80 species, trees constituted the largest proportion with 34 species covering 42%, followed by herbs with 27 species (34%), grass with 11 species (14%), vines with 5 species (6%), and palm with 3 species (4%) as shown in Fig. 2. Katipunan is a remote village with lush secondary forest. The *Higaonon* tribe is historically rich in ethnomedicinal practices and is known to use local names like "lunas" (meaning "cure") for most medicinal plants. The knowledge and practices of the tribe on medicinal plants warrant the conservation of medicinal plant species, particularly those found in upland ancestral lands, where ethnomedicinal practices are still abound (Balinado & Chan, 2017; Dapar *et al.*, 2020; Manting & Dapar, 2020).



**Fig. 2.** Percentage of plant growth habits.

*Manner of Medication*

The preparations were divided into 10 categories: chewing, decoction, distillation, heating, infusion, maceration, poultice, raw, smoke bath, and tincture. The decoction was the most common preparation (37%), followed by infusion (20%), raw (13%), poultice (9%), heated (8%), maceration (6%), tinctures (3%), chewing (2%), smoke bath (1%), and distillation (1%) (Fig. 3).



**Fig. 3.** Manner of application of medicinal plants for various illnesses.

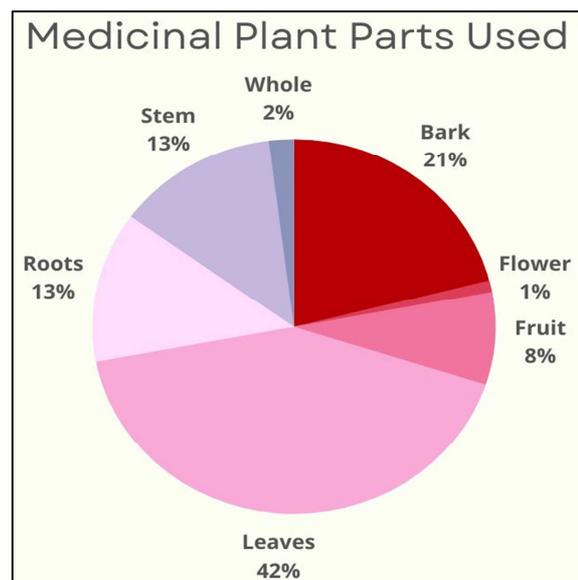
The method of administration differs depending on the type of disease or condition being treated. Furthermore, the most commonly described method of preparation (typically for leaves) was the decoction (Fig. 3). This supports the findings of Balangcod and Balangcod (2011), who found that decoction, is one of the most prevalent techniques. This method extracts leaves, sap, and other substances from plants, thereby

increasing its effectiveness. This is consistent with the findings of Balinado and Chan (2017) and Nankaya *et al.* (2019), who reported that decoction is the most commonly used method for preparing medicinal plants. However, the preparations and use of decoctions at the household level has several limitations since any change in the recommended method can alter plants efficacy and toxicity profile (Daswani *et al.*, 2011).

Infusion is the external treatment of medicinal plants through direct application on the affected area by wrapping it with a piece of fabric (*'hampol'*). The sap of roasted or mashed plant parts combined with liniment oil was squeezed or rubbed onto the body (skin) using the poultice or cataplasm technique. For bleeding cuts or wounds, the leaves or bark were crushed, and the juice was collected and used as a poultice or infusion. Chewing of leaves or fruits and direct application to wounds have also been practiced in the village.

*Plant Parts Used*

Various plant parts with medicinal properties have been used to treat various diseases. The most used parts were the leaves (42%) and bark (21%), followed by the roots and stems (13%), fruits (8%), whole plants, and roots (2%) (Fig. 4).



**Fig. 4.** Distribution of medicinal plant parts used for the treatment of various illnesses.

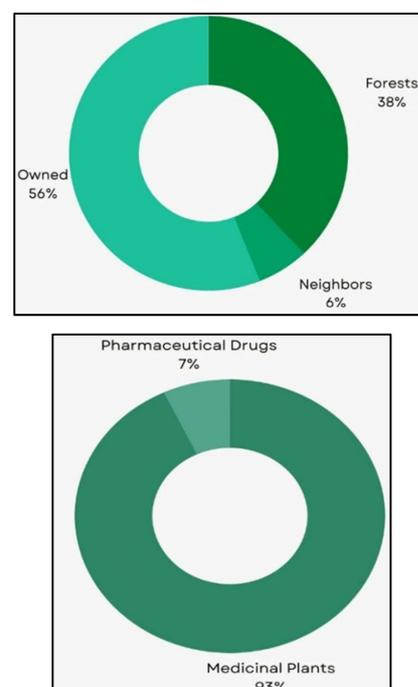
The proportions of plant components used for medicinal purposes are shown in Fig. 4. Leaves are widely used for medical purposes. The use of stems and bark in therapy was also mentioned by respondents. For example, fruits and complete plants have rarely been described. Roots have been used as herbal remedies in numerous ways. The roots of medicinal plants are mostly used to treat diarrhea (*Psidium guajava*, *Syzygium samarangense*), stomachache (*Rhinacanthus nasutus*, *Sandoricum koetjape*), ulcer (*Averrhoa bilimbi*), severe flatulence (*Pseudelephantopus spicatus*, *Kaempferia galanga*), vomiting (*Cyanthillium cinereum*), relieves pain (*Mimosa pudica*, *Gmelina arborea*) and applied directly (*'hampol'*) to the chest and back to relieve muscle pains or excessive tiredness in women, especially in those who have given birth. In comparison to medicines that require the use of roots or complete plants, which require the plant to be uprooted, the use of leaves conserves the plant. The results of this study were similar to those reported by Pizon *et al.* (2016), Tindowen *et al.* (2017) and Morilla and Demayo (2019). Furthermore, the use of diverse leaf extracts guarantees that active components for treatment are produced more effectively (Focho *et al.*, 2009).

#### *Plant source and respondents' preference on medicinal plants*

Medicinal plants collected in their homes (owned) had the highest percentage (56.3%), followed by forests (37.5%), and medicinal plants (6.3%). Most of the medicinal plants in this study were cultivated and collected from their own home gardens, whereas a few species were in dense forest areas. *Chrysophyllum caimito* (Caimito), *Coleus amboinicus* (Kalabo), *Plumeria rubra* (Kalachuchi), *Citrus macrocarpa* (Kalamansi), *Curcuma longa* (Duwaw), and *F. falcata* (Falcata) are some of the species that are planted with a few IPs as cash crops. Of the 44 respondents, 41 (93%) preferred medicinal plants, whereas only three (7%) preferred pharmaceutical drugs. This indicates that the respondents relied exclusively on traditional medicine for their primary health care (Fig. 5). Medicinal plants are used as resources in all cultures (Jamshidi-Kia *et al.*, 2018). The utilization of traditional herbal

medicines by many locals is attributed to their efficacy, availability, affordability, and sustainability as alternatives to synthetic drugs and pharmaceuticals (Dilshad *et al.*, 2010; Demie *et al.*, 2018).

Several factors are responsible for the increased patronage of self-medication with herbal medicine, especially in rural areas, including (i) various claims regarding the efficacy or effectiveness of plant medicines; (ii) consumers' preference for natural therapies and a greater interest in alternative medicines; (iii) erroneous belief that herbal products are superior to manufactured products; (iv) dissatisfaction with the results of orthodox pharmaceuticals and the belief that herbal medicines might be effective in the treatment of certain diseases where conventional therapies and medicines have proven to be ineffective or inadequate; (v) high cost and side effects of most modern drugs; (vi) improvements in the quality, efficacy, and safety of herbal medicines with the development of science and technology; (vii) patients' belief that their physicians have not properly identified the problem; hence, the feeling that herbal remedies are another option; and (viii) a movement toward self-medication (Ahmad *et al.*, 2006; Ekor, 2014; Nissen, 2022).



**Fig. 5.** Sources of medicinal plants (left) and respondents' preferences for treating various illnesses (right).

*Relative Frequency of Citation*

The highest RFC value was recorded for *Anodendron borneense* (Himag: 0.65). However, this is a rare species in the study area; therefore, the respondents collected this species from the wild. The high RFC values of ethnomedicinal plant species indicate their widespread use among the local groups. As a result, 25 medicinal plants were found to be the most frequently used among the 80 medicinal plants studied (Table 3).

**Table 3.** Calculated relative frequency of citations (RFC).

Relative Frequency of Citation	Local Name	Number of times a particular species was mentioned
0.65	Himag	23
0.60	Gabon	21
0.57	Hilbas	20
0.51	Calabo	18
0.48	Bayabas, Falcata	17
0.45	Panyawan, Tuba-tuba	16
0.43	Mayana (Tapol), Tawa-tawa	15
0.31	Abaca, Avocado, Bila-bila	11
0.28	Mangosteen, Hanlilika, Kisol, Serpentina, Rabana	10
0.23	Caimito, Hagonoy, Lagundi, Manzanitas, Miligoy, Sili	8
0.20	Kamunggay	7
0.17	Busikad Santol	6
0.14	Buyo, Lanzones, Tubog	5
0.11	Alingatong, Anangilan, Kalamansi, Kanding-kanding, Kipi-kiپی, Toothache plant, Tubo	4
0.09	Calachuchi, Ganda, Gmelina, Hagimit, Kokobanog, Duwaw, Madre de Cacao, Payaw, Sinaw-sinaw, Tobacco, Toog	3
0.06	Cacao, Iba, Likway, Lubi, Makopa, Mangga, Nangka, Sawan-sawan, Sibujin, Tanglad, Tiger orchid	2
0.03	Adgaw, Agutay, Alom, Alugbati, Badjang, Balite, Banaba, Bayabas tapol, Blue ternate, Gapas (Bisaya), Kabihid, Kamagong, Lagnob, Pandan, Saging, Sampinit, Sangig, Sibukaw, Talong-talongan	1

An RFC of 0.20 was set as the cutoff for frequently used medicinal plants (Chao *et al.*, 2021). This implies that, below 0.20 is considered an uncommon species used by the respondents.

*Information Consensus Factor*

For ICF, a high value means that the informants have a consensus for a specific plant that may be used for a

particular category. The documented medicinal plants were used to treat 33 different ailments, which were grouped into 11 categories. The ICF values ranged from 0.00 to 0.40 with 0.40 being the highest for Kidney disorder (Urinary Tract Infection) followed by pain (0.14) and treatment of Digestive System disorders (0.09), while the lowest ICF value was 0 for chronic disease general disorder, microbial infection relapse, parasitic infection, snake bite (Table 4).

Zahoor *et al.* (2017) found that kidney disorder ICF values showed that urinary diseases were the most common in the study area, and most people had knowledge of its cure.

The highest number of ethnomedicinal species have been used to treat digestive system disorders, fever, and cough (32 species), followed by anti-inflammatory, inflamed eye, swelling, wounds (22), and pain (20), and only six species have been documented for the treatment of chronic diseases.

**Table 4.** Calculated Information Consensus Factor (ICF).

Categories	No. of use reports	Species	ICF
Kidney disorder ( <i>Urinary Tract Infection</i> )	6	4	0.40
Pain ( <i>Arthritis, earache, headaches, muscle spasms, stomach aches, toothache</i> )	23	20	0.14
Digestive system disorders ( <i>Diarrhea, flatulence, gas pains, ulcerative colitis</i> )	35	32	0.09
Anti-inflammatory, inflamed eye, swelling, sounds	23	22	0.05
Fever and cough	33	32	0.03
Chronic disease ( <i>Anemia, antioxidant, diabetes, high blood, over fatigue</i> )	6	6	0.00
General disorder ( <i>Hemorrhage, lactation, vomiting</i> )	5	5	
Microbial infection ( <i>Antimicrobial, kidney infection, skin infection</i> )	3	3	
Relapse	2	2	
Parasitic infection ( <i>Malaria, lumps</i> )	2	2	

## Conclusions

This study aimed to document the medicinal plants and practices of the *Higaonon* community in Barangay Katipunan, Bayugan City, Agusan del Sur. Informants' demographic profiles were obtained using a semi-structured questionnaire, and an in-depth analysis was conducted to protect and conserve endemic and vulnerable species. The results revealed a high diversity of medicinal plants, with 80 species being utilized in 11 applications. Village elders (65 years or above) have expert knowledge in terms of their experience in using and applying medicinal plants. It further revealed that there was difficulty in passing their cultural traditions on medicinal plants due to the technology and mainstreaming of the younger generations to modernity. As the researcher concluded, the leaves are the most widely used plant portion for medicinal plants, and decoctions are the most widely used in terms of application. The researcher discovered a new manner of application of certain medicinal plants, wherein they realized that even a tiny grass has value and can be used to treat various illnesses. Katipunan shows how local people valued and used medicinal plants around them, even though some are already using pharmaceutical drugs.

Because of its effectiveness and ease of use, the *Higaonon* tribe has been dependent on medicinal herbs. Despite modernization, knowledge of the historical methods of utilizing medicinal herbs has been handed down, with the older generation having a greater knowledge base than the younger generation. The tribe in Barangay Katipunan places significant importance on the plants.

The continued reliance of indigenous populations on medicinal herbs appears to have contributed to knowledge preservation. The findings of this study can serve as a reference for future systematic, biochemical, and pharmacological studies. Although the findings of this study are promising as new potential therapeutic agents for healthcare improvement, it is of utmost concern to reconsider important medicinal plant species for conservation. Priorities are part of government programs and

initiatives to preserve the national and global heritage of traditional medicinal plant knowledge used by diverse cultural communities. Plant species, particularly those that are rare and difficult to cultivate, must be managed and protected. Other sampling techniques may also be used to identify undiscovered medicinal plants in this area. A follow-up survey is suggested to further document and identify other significant plants used by the *Higaonon* community in Katipunan Village.

## Data availability

The data used to support the findings of this study have been included in this article.

**Consent** Written informed consent was obtained from all participants prior to the study.

## Conflict of interest

The authors declare that they have no conflicts of interest.

## Authors contribution

CBB, CCPE, PMDR, RTS: Conceptualization, Resources, Visualization; JAM, MTD, RTS: Methodology, Visualization; RTS: Writing -original drafts; MTD, JAM, RTS: Writing -review and editing.

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