



Ethnobotanical assessment of medicinal plants used by indigenous tribes in Mainpat Hills, Chhattisgarh: Quantitative indices and therapeutic potential

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Research

Abstract

Background: This study explores traditional medicinal knowledge among indigenous tribes of Mainpat hills, Chhattisgarh, documenting their reliance on ethnomedicinal plants for treating common ailments. Using indices like UV, RFC, and FL, it identifies species with therapeutic potential, stressing the need to conserve both indigenous knowledge and biodiversity. The aim is to document and analyse traditional plant use and highlight species of high medicinal value.

Methods: An ethnobotanical survey was conducted across tribal villages in Mainpat hills using door-to-door interviews with local inhabitants and healers. A total of 17 informants participated in the study, who are practicing healers. Data on plant names, parts used, preparation, treated ailments, and administration routes were collected via structured questionnaires. Quantitative indices (UV, ICF, RFC, FL, ROP) were applied for analysis.

Results: A total of 46 medicinal plant species belonging to 33 families were documented for the treatment of 36 ailments distributed across 11 disease categories. Leaves were the most frequently used plant part (39%), predominantly prepared as oral decoctions. The results indicate a strong dependence of local communities on herbal medicine for primary healthcare. *Vitex altissima* L.f. showed the highest use value, indicating broad therapeutic application, while *Vernonia amygdalina* Delile showed the lowest. Respiratory ailments exhibited the highest consensus among informants. Species such as *Punica granatum* L., *Citrus limon* (L.) Osbeck, and *Tinospora cordifolia* (Willd.) Hook.f. & Thomson showed the highest therapeutic specificity and cultural importance within the community.

Conclusion: The indigenous communities of Mainpat hills exhibit rich ethnomedicinal knowledge and dependence on plant-based remedies for healthcare. Key plants with high UV and FL indicate strong therapeutic and cultural value. The findings highlight the need for pharmacological validation and conservation of both traditional knowledge and biodiversity.

Keywords: Ethnomedicine, medicinal plants, traditional medicinal system, tribal communities, Surguja

Background

Plants have been central to human survival since prehistoric times, providing food, medicine, and other essential resources (Singh *et al.* 2017). In India, the medicinal use of plants has a long and well-documented history, with references in ancient Vedic and Ayurvedic texts and archaeological evidence from early civilizations, reflecting the deep integration of plant-based remedies into traditional healthcare systems (Fabricant & Farnsworth 2001; Balkrishna *et al.* 2019). Indigenous communities have played a key role in preserving and transmitting this knowledge across generations (Ayyanar & Ignacimuthu 2005; Ayyanar & Ignacimuthu 2011). The World Health Organization estimates that 65-80% of the global population, particularly in rural regions, continues to rely on traditional medicine for primary healthcare. In countries such as India, limited access to modern medical facilities in tribal and remote areas further strengthens dependence on traditional healing practices, with nearly 6,000 plant species reportedly used in indigenous medicine (Ayyanar & Ignacimuthu 2010; Ralte & Singh 2024).

In recent years, ethnobotanical research across South Asia has increasingly combined traditional knowledge documentation with quantitative analysis, reflecting efforts to better quantify cultural importance and inform conservation strategies. For example, comprehensive quantitative surveys of medicinal plants with use-value, informant consensus, and related indices have been reported from Mizoram in northeast India (128 plant species documented across 17 villages) (Ralte & Singh 2024) and similar methodologies have been applied in Pakistan's Gokand Valley to profile over 100 medicinal species and assess their conservation status (Sulaiman *et al.* 2020). Studies in Bangladesh have recorded ethnomedicinal uses of large species sets among indigenous communities using both qualitative and quantitative approaches (Faruque *et al.* 2019), and systematic reviews highlight a growing body of ethnomedicinal documentation, evaluation, and conservation research across India, Pakistan, Bangladesh, and Nepal, with India leading in the number of published studies on medicinal plant knowledge and its conservation (Duche-Pérez *et al.* 2025). Despite this growing body of work, systematic quantitative ethnobotanical research remains limited for tribal regions of Chhattisgarh, underscoring the need for focused studies in such underrepresented areas.

Chhattisgarh, a biodiversity-rich state in north-central India, has a high tribal population, particularly in the Surguja region (Ahirwar 2015, Bhoi *et al.* 2025a). According to Census 2011 data, the tribal numbers of Chhattisgarh comprise about 30% of state's total population, which is equivalent to 7.5% of all tribes in India (<http://www.census2011.co.in/census/state/chhattisgarh.html>). Despite this richness, quantitative ethnobotanical studies from Chhattisgarh, especially from understudied districts such as Surguja, remain scarce, and much traditional knowledge is rapidly declining. Mainpat, a plateau region in Surguja district, is inhabited by several tribal communities, including the Pahadi Korwa, Manjhi, Oraon, Kanwar, and Gond, who traditionally depend on local flora for medicinal purposes (Jain *et al.* 1997; Ekka 2011; Bhoi *et al.* 2025b).

The present study aims to systematically document and quantitatively analyze the ethnomedicinal knowledge of tribal communities in Mainpat, Surguja district, thereby addressing a significant regional research gap and contributing to the conservation of indigenous medicinal knowledge.

Materials and Methods

Area of Study/Survey

The ethnobotanical survey was conducted in the Mainpat region, a hill station located in the Surguja district of Chhattisgarh, India. Mainpat is geographically bounded by Sitapur block to the east, Lakhanpur block to the northwest, Ambikapur block to the north, and the Raigarh district to the south (Shrivastava & Kanungo 2013). The region lies between latitudes 22°30'-22°40' N and longitudes 82°30' - 82°45' E (Figure 1). These boundaries and surrounding administrative units are clearly indicated in the study area map.

Mainpat forms a tabletop-like plateau with an elevation ranging from approximately 990 to 1128 m above sea level, which results in a comparatively cool and moderate climate relative to the surrounding plains. The climate is characterized by mild summers, cool winters, and moderate to high seasonal rainfall, creating favorable conditions for diverse vegetation.

The vegetation is predominantly tropical deciduous forest, with *Shorea robusta* (Dipterocarpaceae) as the dominant species, along with other deciduous tree species. Compared to other regions of the Surguja district, Mainpat exhibits high floristic richness and represents multiple ecosystem types, including forested plateaus, riverine vegetation, and grassland patches. The area is covered with dense green vegetation and intersected by perennial streams and free-flowing rivers.

The present investigation was carried out in 19 villages of the Mainpat Hills, representing a broad range of ecological and cultural settings.

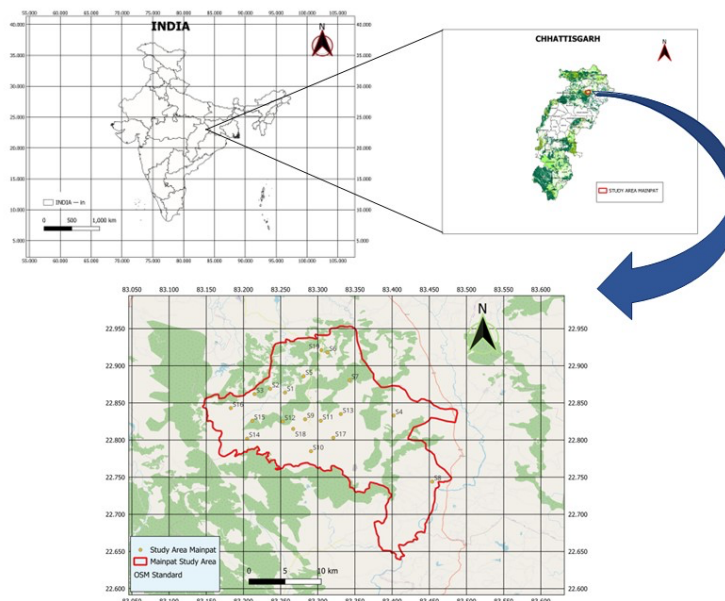


Figure 1. Map showing Mainpat in Surguja district

Selection of Informants and Sample Size

Ethnobotanical data were collected through interviews with local inhabitants and tribal communities across the selected villages. Informants were selected using purposive and snowball sampling methods.

Only individuals who willingly agreed to participate were included in the study. Prior informed consent was obtained verbally.

Questionnaire

To gather accurate information on the human-plant relationship, face-to-face questionnaires were conducted using a structured format with predetermined questions. Participants were from various age groups and communities. Questionnaire durations ranged from 15-40 minutes, depending on the respondent. Local guides were occasionally involved to enhance communication. Questions focused on plant parts used (e.g., leaves, roots, bark), preparation methods (raw, cooked, dried), diseases treated, administration modes, and dosage preparation methods.

Plant Collection and Identification

Medicinal plants reported by informants were collected during field visits with the assistance of knowledgeable local guides and healers. Plant specimens were collected in flowering or fruiting stages whenever possible.

Identification was carried out using regional floras and taxonomic keys and voucher specimens were deposited at Bio-resource Product Research Laboratory Herbarium, Department of Botany, GGV, Bilaspur, C.G., for future reference and assigned herbarium voucher numbers BPRL0021 - BPRL0066 for permanent record and verification.

Data Analysis

The collected data were analysed using qualitative and quantitative approaches. Quantitative indices were calculated using MS Excel software.

The following indices were calculated:

Use Value (UV):

$$UV = \frac{\sum U}{N}$$

where U is the number of use reports per species and N is the total number of informants ($N = [\text{INSERT NUMBER}]$).

Informant Consensus Factor (ICF):

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

where $N_{(ur)}$ is the number of use reports in each ailment category and $N_{(t)}$ is the number of species used.

Additionally, Relative Frequency of Citation (RFC), Fidelity Level (FL), Relative Popularity Level (RPL), and Rank Order Priority (ROP) were calculated following standard methodologies (Friedman *et al.* 1986; Heinrich *et al.* 1998; Tardío *et al.* 2008; Trotter & Logan 2019).

Results**Documentation of traditional medicinal knowledge from the area**

A total of 17 informants were interviewed during the study period. The response rate of participation was 80%. Consideration was given to gender, age, and occupation to capture diverse perspectives. The sample included 14 males and 3 females, representing different age groups ranging from 41-80 years. Occupations included herbal practitioners.

The sociodemographic analysis shows that most traditional healers belonged to the Oraon tribal group (41.2%), followed by Manjhi (29.4%), Kanwar (17.6%), and Gond (11.8%). The dominant age group was 61-70 years (58.8%), while the lowest representation was observed in the 41-50 years group (11.8%), indicating limited involvement of younger generations in traditional medical practice. Most healers were farmers (70.6%), reflecting the close association between agriculture and traditional healthcare systems. Traditional healing was predominantly male-dominated (82.4%), with limited participation of female practitioners (17.6%).

The sociodemographic profile of traditional medicinal practitioners recorded during the survey is summarized in Table 1. The data reveal clear patterns in tribal affiliation, age distribution, occupation and gender participation, reflecting the structure and transmission of traditional medicinal knowledge in the Mainpat region.

Table 1. Sociodemographic Profile of Traditional Medicinal Practitioners

Category	Subgroup	Number (n)	Percentage (%)
Tribal affiliation	Oraon	7	41.2
	Manjhi	5	29.4
	Kanwar	3	17.6
	Gond	2	11.8
Age group (years)	41-50	1	5.9
	51-60	2	11.8
	61-70	10	58.8
	71-80	4	23.5
Occupation	Farmer	12	70.6
	Religious practitioner	2	11.8
	Guard	1	5.9
	Housewife	1	5.9
	Mason	1	5.9
Gender	Male	14	82.4
	Female	3	17.6

According to the current investigation, most of the traditional healers of tribal groups in mainpat frequently utilized 46 plant species from 33 families to cure various types of illnesses (Table 2). We documented the botanical name, family, local name of plant, its life form, value, components used, diseases treated, preparation method, route of administration, and relative for each species that was reported. The highest use value 2.5 was observed for *Vitex altissima* L.F. and the lowest value 0.16 was noted for *Vernonia amygdalina* Delile.

Table 2. Enumeration of plants used for medicines

Botanical name	Local name	Family	Habit	Part used	Disease treated	Preparation method/MoA	Dosage	UV
<i>Andrographis paniculata</i> (Burm.f.) Wall. ex Nees	Bhui neem	Acanthaceae	H	L	Malaria	Boil leaf & make churan, eat it with jaggery/directly consume boiled leaf	Once in morning	1
<i>Acorus calamus</i> subsp. <i>vulgaris</i> (L.) Ehrh.	Baach	Acoraceae	H	R	Anxiety, Typhoid	Crush leaves + water & make it juice& drink, Mix <i>Cassia occidentalis</i> L. Rose root + sugar + <i>Acorus calamus</i> subsp. <i>vulgaris</i> (L.) Ehrh. roots + water). Boil & filter in the vessel.	Once/2-3 times a day (½ cup for children and one cup for adult)	1
<i>Achyranthes aspera</i> var. <i>sicula</i> L.	Chirchita	Amaranthaceae	H	R	Snake bite	Crushed root + water + jaggery	Drink once	1
<i>Alternanthera sessilis</i> (L.) DC.	Gundri saag	Amaranthaceae	H	R	Mensuration problems	Prepare a juice adding rock candy and fennel seeds to the roots	Drink 3 days ES	0.5
<i>Mangifera indica</i> L.	Aam	Anacardiaceae	T	Fr	Heat stroke	Secret fruit juice + Salt/ sugar + water	1-2 times	1
<i>Centella asiatica</i> (L.) Urb.	Beng saag	Apiaceae	H	L & R	Dysuria	Mix L & R with sugar and water & make juice	Drink for 1-2 days	1
<i>Calotropis gigantea</i> (L.) Dryand.	Ankh phuta	Apocynaceae	S	Fr/R	Dog bite	Make powder using F/R and jaggery.	Eat once	1
<i>Catharanthus roseus</i> (L.) G.Don	Sadabahr	Apocynaceae	S	L ,F	Hairfall, Bp (white flowers)	Boil & Crush leaves add water, Chew leaves directly	Daily (apply on Scalp), daily	1
<i>Gymnema sylvestre</i> (Retz.) R.Br. ex Sm.	Gurmaar	Apocynaceae	C	L	Diabetes	Dry the leaf crush & make powder, 1 spoon powder + water	2 times morning & evening	1
<i>Asparagus racemosus</i> Willd.	Shatavari	Asparagaceae	SS	R	Milk secretion	Crush and make powder mix in milk	Once daily	1
<i>Aloe vera</i> (L.) Burm.f.	Gwar patha	Asphodelaceae	H	L	Skin problems, Hairfall	Directly apply on skin, directly apply gel on scalp	Daily	0.28
<i>Enhydra fluctuans</i> Lour.	Muchri saag	Asteraceae	H	L	Digestive, Blood circulation	Shallow fry the leaves	As needed	0.22

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<i>Vernonia amygdalina</i> Delile	Sugar plant	Asteraceae	ST	L	Diabetes	Boil & Crush leaf+H ₂ O	Drink Twice ES	0.16
<i>Brassica juncea</i> (L.) Czern.	Sarso	Brassicaceae	S	Se	Muscle/ Body pain	Oil extract is applied and massaged	Daily	1
<i>Carica papaya</i> L.	Papaya	Caricaceae	T	L	Lactation problems	Crushed leaves juice	Drink Daily	1
<i>Terminalia bellerica</i> (Gaertn.) Roxb.	Bahera	Combretaceae	T	Se & Fr	Diarrhea	Eat fruit directly or crush seed and mix in water	1-2 times	1
<i>Terminalia chebula</i> Retz.	Harra	Combretaceae	T	Se	Helps to Digest	Crush seed into powder & add with water	Drink one time a day	1
<i>Chamaecostus cuspidatus</i> (Nees & Mart.) C.D.Specht & D.W.Stev.	Insulin plant	Costaceae	H	L	Diabetes	Chew directly	Daily morning	1
<i>Bryophyllum pinnatum</i> (Lam.) Oken	Pathar-chata	Crassulaceae	H	L	Gastric problems	Chew the leaves with black salt	Daily ES	0.33
<i>Momordica dioica</i> Roxb. ex Willd.	Khexa	Cucurbitaceae	C	R	Poisoned	Root crushed and mix local Mahua alcohol.	2-3 times	1
<i>Cyperus rotundus</i> L.	Motha ghas	Cyperaceae	H	B	Headache (Half side)	Crush the Bulb + salt keep between toes & face and expose to sunlight	3-5 times	1
<i>Shorea robusta</i> C.F. Gaertn.	Sarai	Dipterocarpaceae	T	L	Dysentery	Boil leaves and drink the extract	Once a day	1
<i>Diospyros melanoxylon</i> Roxb.	Tendu	Ebenaceae	T	Fr & BS	Stomache fever	Boil bark and drink juice / eat fruit directly.	Once	1
<i>Euphorbia tithymaloides</i> L.	Naagdon	Euphorbiaceae	S	L	Irregular/ heavy bleeding	Crush Leaves+ water + black pepper	Drink in ES	1
<i>Cassia occidentalis</i> (L.) Rose	Bada Chakunda	Fabaceae	S	R	Typhoid	Mix roots of <i>Cassia occidentalis</i> L. Rose & <i>Acorus calamus</i> subsp. <i>vulgaris</i> (L.) Ehrh. + <i>Murraya koenigii</i> (L.) Spreng. with sugar and water. Boil & filter them in vessel.	2-3 times a day ½ cup for children and one cup for adult	1
<i>Cassia tora</i> L.	Chakunda	Fabaceae	H	R & Se	Typhiod, prevents blood pressure and sugar	Crushed root is boiled and filtered and mix sugar, Seed dried & made into powder	Drink half bowl 3 alternate days, Add in tea daily	0.5

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<i>Clitoria ternatea</i> L.	Aparajitha	Fabaceae	H	F	Anxiety	Direct consumption	Once a day	1
<i>Delonix regia</i> (Bojer ex Hook.) Raf.	Gulmohar	Fabaceae	T	F	Piles	Directly chew 2-3 flowers.	Daily morning	1
<i>Mentha spicata</i> L.	Pudina	Lamiaceae	H	L	Dysentery, indigestion	Chew or boil to decoction	Once	0.4
<i>Ocimum sanctum</i> L.	Tulsi	Lamiaceae	H	L	Cough, throat soar	Chew or boil to decoction	Once	0.5
<i>Vitex altissima</i> L.F.	Charaigoda	Lamiaceae	T	BS	Blood formation BP,sugar, pain, Pneumonia	Boil bark in water make powder by crushing. Add powder in boiled water, Honey + powder+ lemon	Drink in every alternate days ES, 2-3 times\day	2.5
<i>Punica granatum</i> L.	Anaar	Lythraceae	T	Fr	Weakness/ blood formation	Secret juice	Daily	2
<i>Hibiscus rosa-sinensis</i> L.	China rose	Malvaceae	ST	F	Diabetes	Eat flowers directly	Daily	1
<i>Azadirachta indica</i> A.Juss.	Neem	Meliaceae	T	L	Fever	Boil leaves and make herbal tea	2-3 days	1
<i>Tinospora cordifolia</i> (Willd.) Hook.f. & Thomson	Giloy	Menispermaceae	CS	S	Pain	Chew a small piece of the stem	One time a day	0.33
<i>Moringa oleifera</i> Lam.	Munga	Moringaceae	T	L	Helps to maintain blood pressure	Leaves boiled in water is mixed with jaggery in earthen vessel	Two times a day	1
<i>Eucalyptus citriodora</i> Hook.	Nilgiri	Myrtaceae	T	L	Pain	Crush & apply on the paining area.	Daily	1
<i>Psidium guajava</i> L.	Amrudh	Myrtaceae	T	Fr	Stomach bloating	Remove inside of Fruit cover it, Add powders of black salt & carom seed +cook then clean.	Eat 1 or 2 pieces as needed.	1
<i>Syzygium cumini</i> (L.) Skeels	Jamun	Myrtaceae	T	i.Se & L ii.Fr	Dysentery, Sugar	Seed powder and leaf direct consumption, Fruit juice	Eat once	1
<i>Phyllanthus emblica</i> L.	Amla	Phyllanthaceae	T	L	Cholera	Crush and mix with traditional <i>Madhuca longifolia</i> (L.) J.F.Macbr. fermented beverage	Drink 3 alternative days ES	1
<i>Scoparia dulcis</i> L.	Tinko	Plantaginaceae	S	L, R	Ulcers, Haemorrhage	Boil leaves in water& gargle, Root/leaves crushed and mixed in <i>Madhuca longifolia</i> (L.) J.F.Macbr alcohol beverage.	Twice a day	0.5
<i>Pyrus communis</i> Strobl	Naspati	Rosaceae	T	Fr	Fertility/ Uterine related problem	Give Fruit juice fermented for several days	Daily	1

<i>Citrus lemon</i> (L.) Osbeck	Nimboo	Rutaceae	T	Fr	Stomach problems /indigestion	Secret fruit juice with salt & water	Once or twice as needed	2
<i>Murraya koenigii</i> (L.) Spreng.	Meetha neem	Rutaceae	T	L	Cough, Stomach ache	Chew leaves	Once a day till cured	1
<i>Madhuca longifolia</i> (L.) J.F.Macbr.	Mahua	Sapotaceae	T	Fr	Rheumatism	Fruit cooked with jaggery	Daily	1
<i>Curcuma longa</i> L.	Haldi	Zingiberaceae	H	Rz	Cuts, Cough	Boil raw Rz, crush & put in clean cloth, tie it to wound, Drink powder with milk.	2-3 times a day	0.4

Abbreviations: 1. Habit- H: herb, C: climber, CS: climber shrub, S: shrubs, SS: spinous shrub, Ss: Small shrub, T: Tree, ST: small tree. 2. Plant part used- B: bulb, L: leaf, R: root, F: flower, Fr: fruit, Rz: Rhizome, BS: bark of stem, S: Stem, Se: seed 3. MoA: Mode of administration. 4. Dosage- ES: empty stomach, UV: use val

Family wise distribution of common plants used

Among all the plant species that were studied, the Fabaceae family was known to be the most dominant family. The documented data from the survey indicates that the tribes of Mainpat primarily employed the family Fabaceae which represented 4 species, Myrtaceae, Lamiaceae and Apocynaceae which represented 3 species each, Asteraceae, Combreteaceae & Amaranthaceae which represented 2 species each, Anacardiaceae, Meliaceae, Rutaceae, Euphorbiaceae, Phyllanthaceae, Apiaceae, Menispermaceae, followed by Lythraceae, Sapotaceae, Brassicaceae, Dipterocarpaceae, Cucurbitaceae, Ebenaceae, Asparagaceae, Cyperaceae, Acanthaceae, Zingiberaceae, Acoraceae, Asphodelaceae, Crassulaceae, Amaranthaceae, Caricaceae, Moringaceae, Costaceae, Malvaceae, Plantaginaceae, Rosaceae which represented 1 species each (Fig 2).

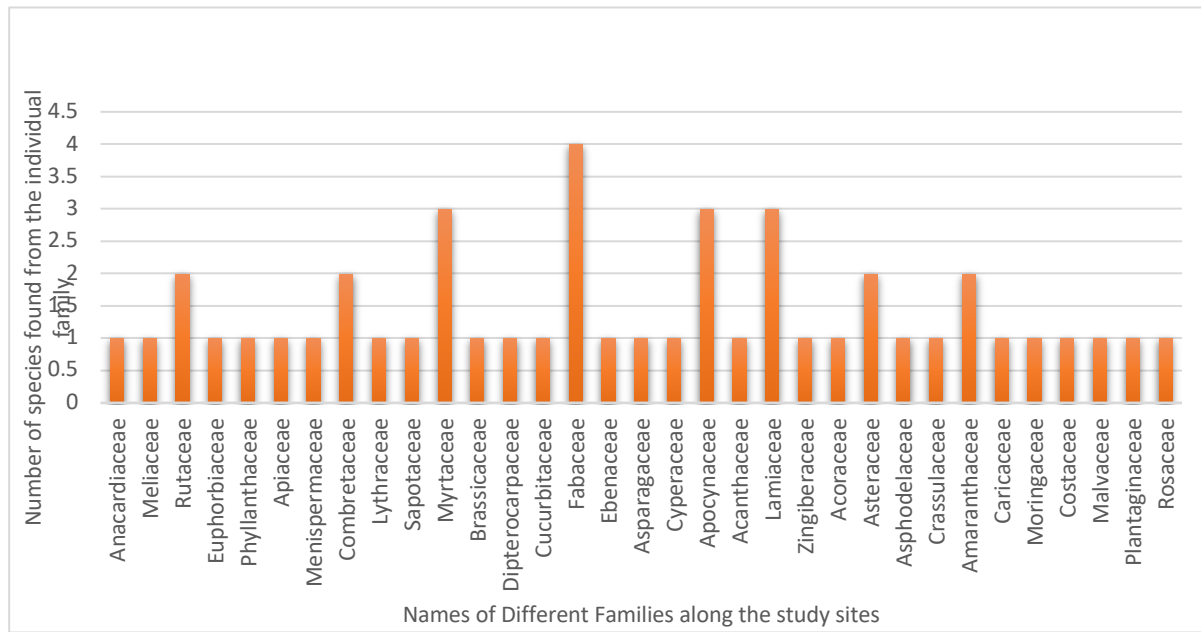


Figure 2. Family wise distribution of species

Habit wise distribution of medicinal plants

In Figure 3, the habit-wise distribution of the medicinal plants that were collected is demonstrated. As two type of plants is discussed, trees account for most curative plants (17), followed up by herbs (16), shrubs, and climbers.

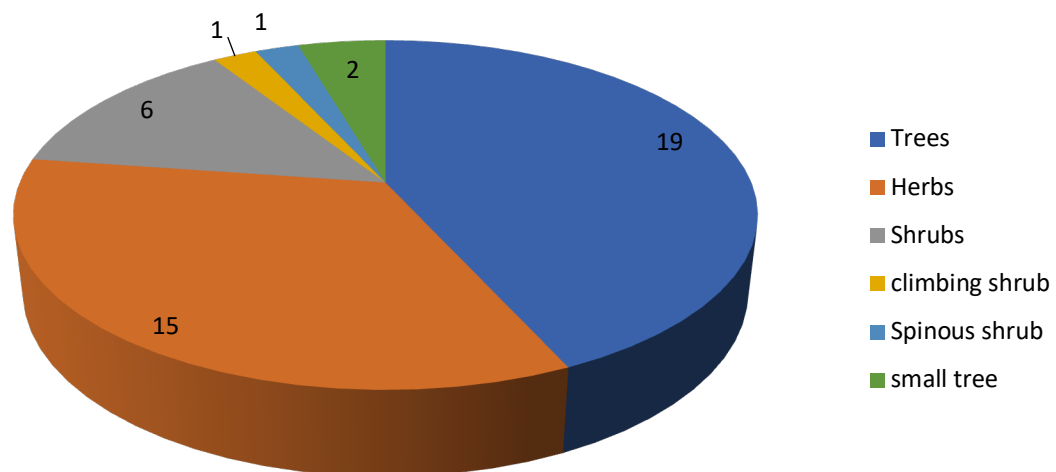


Figure 3. Distribution of Habit

Informant relative frequency of citation (RFC), fidelity level (FL), relative popularity level (RPL) and priority rank order (ROP) of some highly utilized plants

The Informant Consensus Factor (ICF) is a valuable tool in ethnobotanical studies used to measure the level of agreement among informants regarding the use of specific plant species to treat health conditions. It serves as an indicator of the cultural significance and perceived effectiveness of a plant within a community's traditional healing practices. Specifically, an ICF value of 0 indicates that informants used entirely different plant species to treat the same ailment category, reflecting low consensus and high diversity of therapeutic knowledge within the community. This pattern suggests individualized treatment practices and multiple parallel ethnomedicinal traditions rather than a shared standardized remedy system. In contrast, the non-zero ICF value observed for respiratory diseases reflects higher agreement among informants and the use of a limited number of commonly accepted plant species. The Informant consensus factor (ICF) of documented plant species for use in treating different illnesses has been depicted in Table 3.

From the reported data following findings has been noted in Table 4. The relative frequency of citation (RFC) for all the ailment categories was 0 except the ailment category of respiratory diseases which observed RFC value 0.25, greatest fidelity level (FL) 100% was shown by *Punica granatum* L., *Citrus lemon* (L.) Osbeck, *Moringa oleifera* Lam., *Vernonia amygdalina* Delile, *Syzygium cumini* (L.) Skeels, *Tinospora cordifolia* (Willd.) Hook.f & Thomson, *Vernonia amygdalina* Delile and the lowest 40 was observed by *Vitex altissima* L.F. The (RFC) relative frequency of citation was highest for *Vernonia amygdalina* Delile with value of 0.35 and was lowest for the species *Bryophyllum pinnatum* (Lam.) Oken and *Alternanthera sessilis* (L.) DC. value as 0.06. The relative popularity level observed the value less than 1 for all the species, which implies that the species were typically less recognized for treating ailments by all the tribal groups present in mainpat, chhhattisgarh. The Rank of Order (ROP) was observed to be lowest for the species *Alternanthera sessilis* (L.) DC. with value of 2.9 and was noted highest for the species *Vitex altissima* L.F. with value of 11.76.

Table 3. Informant consensus factor (ICF) of documented plant species for use in treating different illnesses

Ailment category type	Medical terminology	No. of reports on use	% of the report	No. of used species	% of the species	ICF
Dermatological related disorders	Hairfall, Skin problems, Cuts	3	5.08	3	5.17	0
Respiratory related diseases	Cough, throat soar, Pneumonia	5	8.47	4	6.90	0.25
General Fever	Heat stroke, Typhoid, Malaria	7	11.86	7	12.07	0
Gastro-intestinal related disorders	Stomach problems/indigestion, Diarrhea, Cholera, piles, Gastric problems, stomach bloating	13	22.03	13	22.41	0
Ureno-genital related problems	Dysuria, Uterine problems, Menstruation problems	6	10.16	6	10.34	0
Nervous related disorder	Anxiety, Headache (Half sided)	3	5.08	3	5.17	0
Skeletal-muscular pain and swelling	Rheumatism, Muscle/Body pain	5	8.47	5	8.62	0
Body energizers	Weakness	2	3.39	2	3.45	0
Blood/genetic related problems	Diabetes, Hemorrhage	8	13.56	8	13.79	0
Cardio-vascular related problems	Blood pressure, Blood circulation	4	6.78	4	6.90	0
Others	Poisoned, Dog bite, snake bite	3	5.08	3	5.17	0

Table 4. The Highly utilized plants along with their RFC, FL, RPL & ROP

Scientific name	RFC	FL	RPL	ROP
<i>Acorus calamus subsp. vulgaris</i> (L.) Ehrh	0.12	66.67	0.117	11.73
<i>Aloe vera</i> (L.) Burm.f.	0.12	57.14	0.117	6.68
<i>Alternanthera sessilis</i> (L.) DC.	0.06	50.00	0.058	2.90
<i>Bryophyllum pinnatum</i> (Lam.) Oken	0.06	66.67	0.058	3.87
<i>Cassia tora</i> L.	0.18	66.67	0.176	11.73
<i>Catharanthus roseus</i> (L.) G.Don	0.12	75.00	0.117	8.80
<i>Citrus lemon</i> (L.) Osbeck	0.12	100.00	0.117	11.70
<i>Curcuma longa</i> L.	0.12	60.00	0.117	7.02
<i>Enhydra fluctuans</i> Lour.	0.12	88.89	0.117	10.40

<i>Mentha spicata</i> L.	0.29	60.00	0.117	7.02
<i>Moringa oleifera</i> Lam.	0.23	100.00	0.058	5.80
<i>Ocimum sanctum</i> L.	0.23	50.00	0.117	5.85
<i>Punica granatum</i> L.	0.12	100.00	0.117	11.70
<i>Scoparia dulcis</i> L.	0.12	75.00	0.117	8.77
<i>Syzygium cumini</i> (L.) Skeels	0.12	100.00	0.117	11.70
<i>Tinospora cordifolia</i> (Willd) Hook.f. & Thomson	0.18	100.00	0.058	5.80
<i>Vernonia amygdalina</i> Delile	0.35	100.00	0.058	5.80
<i>Vitex altissima</i> L.F.	0.12	40.00	0.294	11.76

Frequency of the plant part used

According to the study at some instances, it was recorded that species/genus such as *Enhydra fluctuans* Lour., *Acorus calamus* subsp. vulgaris (L.) Ehrh., *Curcuma longa* L., *Vitex altissima* L.F., *Ocimum sanctum* L., *Cassia tora* L., *Syzygium cumini* (L.) Skeels, *Punica granatum* L. had been practiced in the treatment of two or more illnesses. Also, it was noticed that sometimes different plant parts were used for the treatment of the same ailment by the healers/traditional medicine practitioners. At times two different species were together used for treating ailments such as *Cassia occidentalis* (L.) Rose & *Acorus calamus* subsp. vulgaris (L.) Ehrh. is used to treat typhoid by informant named Srilinius Ekka of Oraon tribe. The plant part employed by the most of tribal people of Mainpat, Chhattisgarh for curing of various illness constitutes of following 39% were leaves which is also the most used among the tribal's followed by root and fruit which was 18% each and 9% seed, 7% flower, stem and bark of stem was reported 4% each, and bark and rhizome were considered 2% each (Figure 4). It was also seen that people used different types of methods for administration of medicine in the area such as 40% of people used powder form, 24% used in the Decoction form, 21% used direct Raw consumption as there method of medication, 12% used simple juice and about 2% people used some other methods (Figure 5). The people in the region not only benefitted from the medicinal properties of the plants they also utilized it various things such as they used them in foods example such as *Enhydra fluctuans* Lour., *Centella asiatica* (L.) Urb., *Azadirachta indica* A.Juss., *Brassica juncea* (L.) Czern., *Momordica dioica* Roxb. ex Willd., *Alternanthera sessilis* (L.) DC., *Moringa oleifera* Lam. as vegetables, utilized the fruits of *Carica papaya* L., *Diospyros melanoxylon* Roxb., *Shorea robusta* C.F. Gaertn., *Pyrus communis* Strobl, *Psidium guajava* L., *Syzygium cumini* (L.) Skeels, *Punica granatum* L., *Terminalia bellerica* (Gaertn) Roxb., *Phyllanthus emblica* L., *Citrus lemon* (L.) osbeck, *Mangifera indica* L. for eating and other uses such as *Murraya koenigii* (L.) Spreng., *Curcuma longa* L. used as additives, and *Madhuca longifolia* (L.) J.F. Macbr. was used for preparing alcoholic beverages.

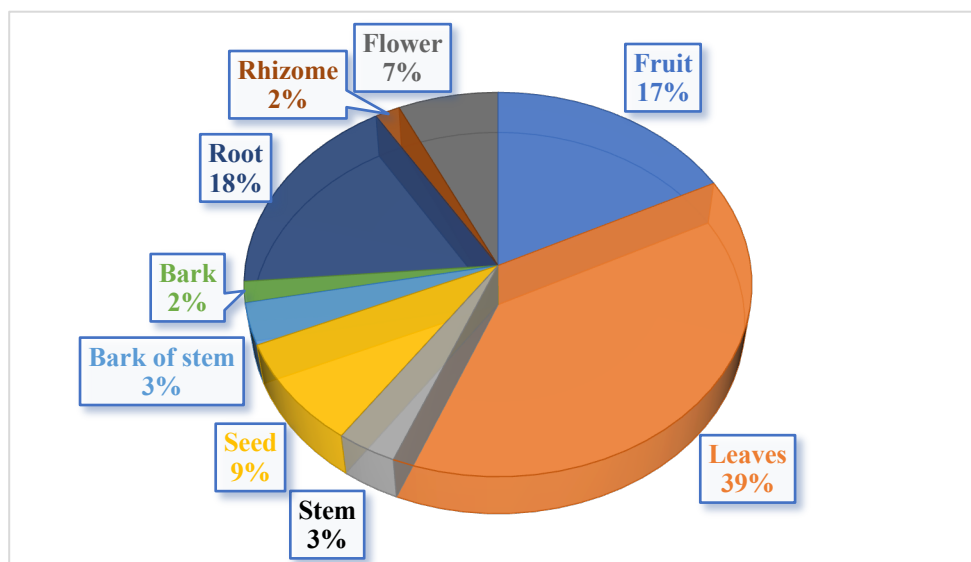


Figure 4. Percentage wise distribution of used plant parts

Details about the tribal informants

From the survey it was recorded most of the traditional medicinal practitioners in Mainpat were from the Oraon tribal group (7) followed by Manjhi (5), Kanwar (3), and few from the Gond tribal group (2) as depicted in the figure 6. The maximum age group of these traditional healers lies between 61-70 age group (10), while the lowest number lies between 41-50 age group, which directly indicates that the youths are not very much involved in the practice of the traditional system of medicine (Figure 7). This tribal people had different occupational background most of the healers were farmers (12) few were religious

person (2) followed by guard (1), housewife (1) and mason (1). The male gender dominated the field of traditional healing only few females were found to be practicing the traditional medicine in the Mainpat area (Figure 6).

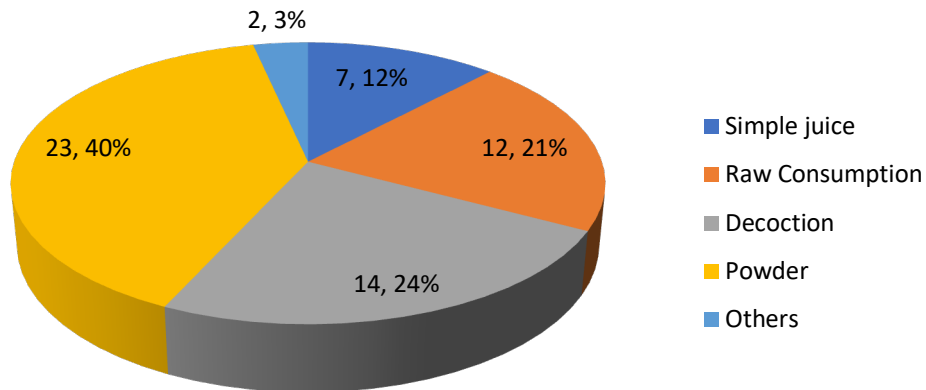


Figure 5. Category-wise data of tribals method in medication preparation

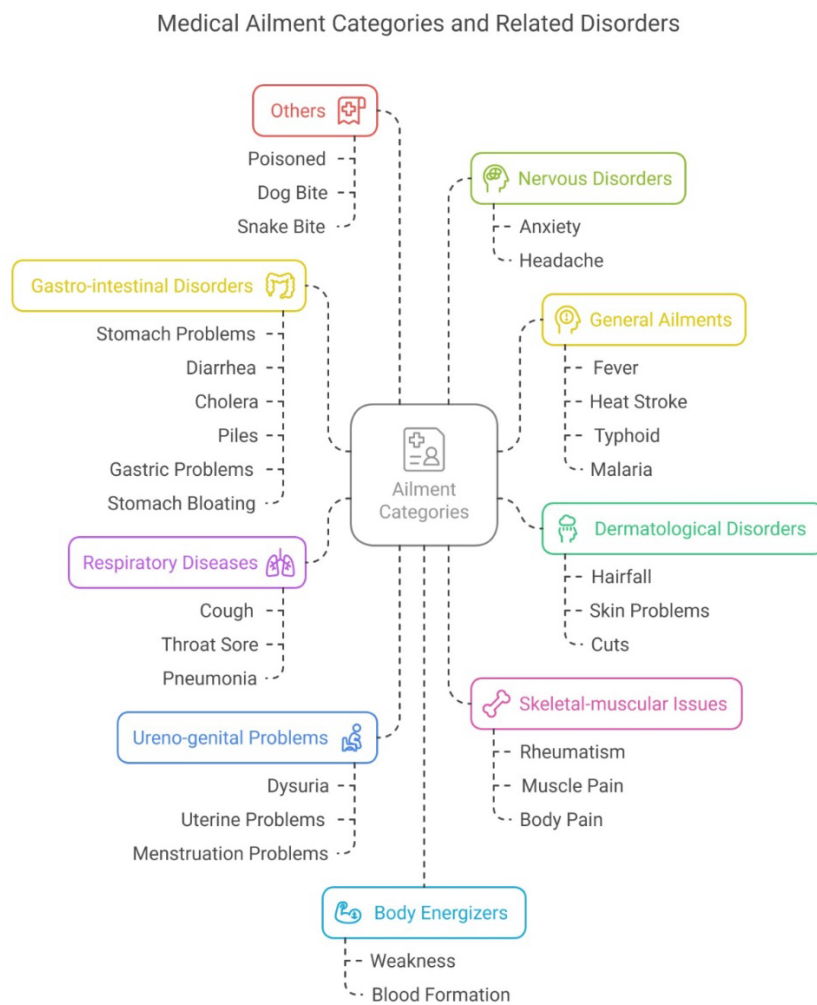


Figure 6. Variety of common ailments treated by traditional knowledge

Discussion

The present study documents the continued reliance of tribal communities in Mainpat, Chhattisgarh, on 46 medicinal plant species for primary healthcare, reaffirming the persistence of ethnomedicinal knowledge in the Central Indian Plateau. Similar ethnobotanical studies from Chhattisgarh and adjacent regions have reported comparable plant diversity and dependence on local flora; however, many remain largely descriptive. By applying quantitative indices such as Use Value (UV), Fidelity Level (FL), and Relative Popularity Level (RPL), the present study enables a more refined assessment of cultural importance and medicinal consensus.

The high UV of *Vitex altissima* reflects its broad therapeutic applicability and frequent citation, consistent with reports from forested regions of central India where multipurpose tree species are preferred due to perennial availability. In contrast, *Moringa oleifera* exhibited high UV as well as very high FL (100%). This discrepancy arises from the conceptual differences between these indices: FL measures agreement on use for a specific ailment, whereas UV reflects the diversity and frequency of reported uses. As *M. oleifera* is widely consumed as a common food and nutraceutical, it may be underreported as a medicinal plant despite strong consensus regarding its effectiveness for particular conditions. Similar patterns have been observed in other ethnobotanical studies involving food-medicine plants.

The dominance of the Fabaceae family aligns with ethnobotanical patterns reported across Chhattisgarh and the Central Indian Plateau, likely due to its phytochemical richness and ecological adaptability. Preference for trees followed by herbs mirrors findings from other tribal regions, where trees ensure year-round availability and herbs provide accessible remedies.

High FL values in species such as *Punica granatum* and *Tinospora cordifolia* indicate strong cultural trust and therapeutic specificity. Conversely, the generally low RPL (<1) suggests that ethnomedicinal knowledge is often restricted to specific healers or groups rather than being uniformly shared, a pattern widely reported in central Indian tribal communities.

Leaves (39%) were the most frequently used plant part, reflecting ecologically sustainable harvesting practices consistent with previous regional studies. Preparation methods dominated by powders (40%) and decoctions (24%) indicate traditional practices that facilitate ease of use and effective extraction of bioactive compounds. The use of multiple plant parts and polyherbal formulations highlights the holistic and synergistic approach of traditional medicine.

Socioculturally, ethnomedicinal knowledge was predominantly held by elderly male healers, indicating generational concentration. Limited participation of younger members raises concerns about knowledge erosion in the absence of systematic documentation and transmission.

Despite references to sustainable conservation, the findings also highlight increasing threats such as deforestation, habitat loss, land-use change, and selective overharvesting. Some recorded species face regional population decline, underscoring the need for conservation action. Community-based Forest management, cultivation of high-use species, promotion of home gardens, youth involvement, and integration of traditional healers into local conservation programs are practical strategies to safeguard both plant diversity and indigenous knowledge.

Overall, this study provides a quantitative baseline for ethnomedicinal practices in Mainpat and emphasizes the need to integrate traditional knowledge with sustainable biodiversity management in the Central Indian Plateau.

The present investigation documents 46 medicinal plant species utilized by indigenous communities of Mainpat Hills, Surguja district, highlighting the continued dependence on traditional plant-based healthcare systems. Similar levels of plant diversity and ethnomedicinal reliance have been reported from other parts of Chhattisgarh and central India, including Belgaona (Singh *et al.* 2017) and Surguja district (Jain *et al.* 1997; Bhoi *et al.* 2025a), confirming that traditional medicine remains an integral component of primary healthcare in tribal regions.

Application of quantitative ethnobotanical indices in the present study provides deeper insight into cultural importance and therapeutic consensus. *Vitex altissima* exhibited the highest Use Value (UV = 2.5), indicating its multipurpose application across ailments such as blood-related disorders, pneumonia, and pain. Comparable observations of multipurpose tree species with high UV have been reported in central Indian forests, where perennial availability enhances community reliance (Ahirwar 2015; Singh *et al.* 2017). In contrast, species such as *Punica granatum*, *Tinospora cordifolia*, *Syzygium cumini*, *Moringa oleifera*, and *Vernonia amygdalina* showed 100% Fidelity Level, reflecting strong healer agreement for specific

therapeutic uses. Similar high FL values for these species have been reported in Mizoram and Surguja, emphasizing their pharmacological relevance and cultural trust (Ralte & Singh 2024; Bhoi *et al.* 2025a).

The dominance of Fabaceae in the present inventory aligns with earlier ethnobotanical studies from Chhattisgarh and neighbouring regions (Ahirwar 2015; Bhoi *et al.* 2025b), likely attributable to the family's phytochemical richness and ecological adaptability. Habit-wise analysis revealed predominance of trees followed by herbs, a trend also observed among tribal communities of Belgahna and Surguja (Singh *et al.* 2017; Bhoi *et al.* 2025a), where trees provide year-round access while herbs serve as readily available remedies.

Leaves constituted the most frequently used plant part (39%), consistent with reports from Mizoram and Bangladesh, where leaves are preferred due to ease of collection, high metabolite content, and minimal destructive impact on plant populations (Faruque *et al.* 2019; Ralte & Singh 2024). Preparation methods were dominated by powders and decoctions, echoing traditional extraction practices widely documented in South Asian ethnomedicine (Ayyanar & Ignacimuthu 2011; Sulaiman *et al.* 2020). The use of polyherbal combinations, such as *Cassia occidentalis* with *Acorus calamus* for typhoid, reflects a holistic therapeutic approach, also reported among tribal groups in Pakistan and southern India (Ayyanar & Ignacimuthu 2005; Sulaiman *et al.* 2020).

Informant Consensus Factor (ICF) values revealed the highest agreement for respiratory ailments (ICF = 0.25), suggesting shared knowledge and perceived effectiveness of remedies for cough, throat infections, and pneumonia. Similar ailment-specific clustering has been observed in other ethnobotanical surveys, where respiratory and gastrointestinal disorders typically exhibit higher consensus due to their prevalence and immediate impact on daily life (Heinrich *et al.* 1998; Trotter & Logan 2019).

Sociodemographic analysis indicates that ethnomedicinal knowledge is predominantly held by elderly male practitioners, with limited participation from younger generations. This pattern mirrors earlier observations from Chhattisgarh and other tribal regions of India, where modernization and formal education have contributed to declining intergenerational knowledge transfer (Ekka 2011; Bhoi *et al.* 2025a).

Despite strong cultural continuity, traditional medicinal systems in Mainpat face increasing threats from deforestation, habitat degradation, land-use change, and selective harvesting. Systematic reviews emphasize that such pressures are accelerating erosion of ethnomedicinal knowledge across South Asia (Duche-Pérez *et al.* 2025). Conservation strategies including community-based forest management, cultivation of high-use species, promotion of home gardens, and engagement of traditional healers in biodiversity programs have been recommended as effective interventions (Fabricant & Farnsworth 2001; Balkrishna *et al.* 2019).

Overall, the present study provides a quantitative baseline for ethnomedicinal practices in Mainpat and reinforces the importance of integrating indigenous knowledge with conservation planning. High UV and FL species identified here represent promising candidates for future phytochemical and pharmacological validation, supporting earlier calls for bridging ethnobotany with drug discovery and sustainable healthcare development (Fabricant & Farnsworth 2001; Duche-Pérez *et al.* 2025).

Conclusion:

This study documents the continued use of medicinal plants by tribal communities of the Mainpat region and highlights their practical importance in local healthcare practices. Beyond documentation, the findings emphasize the urgent need for active measures to sustain this knowledge system in the face of increasing deforestation, urbanization, and declining intergenerational transmission.

To strengthen conservation and knowledge preservation, targeted educational programs at the community level, collaboration with traditional healers, and engagement with local forest and academic institutions are recommended. Such initiatives can facilitate systematic documentation, promote sustainable harvesting, and encourage participation of younger generations. Community-based cultivation and home gardening of frequently used medicinal species may further reduce pressure on wild populations.

The study is limited by its relatively small sample size and reliance on orally transmitted information, which may not capture the complete ethnomedicinal diversity of the region. Future research should therefore expand the sample coverage and

focus on pharmacological and phytochemical validation of key high-use and high-fidelity species to scientifically substantiate their therapeutic potential. Integrating ethnobotanical knowledge with experimental research will enhance its relevance for drug discovery, conservation planning, and sustainable healthcare development.

Declarations

Ethics approval: All participants provided oral prior informed consent,

Competing interests: Not applicable

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Author contributions: R.K. collected the data, analyzed. M.N. wrote the final version of text, participated in the theoretical background. M.P.S. monitored the data collection and analysis. S.K.S. conceptualized and supervised the research work.

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