INFORMATICS JOURNALS

Review Article

Journal of Natural Remedies
DOI: 10.18311/jnr/2026/49055

eISSN: 2320-3358 | Vol 26(1), 2026 | pp. 01-18

Ethno-medicinal Plants Used by Ethnic People for the Treatment of Different Ailments from Gangtok and Namchi Districts of Sikkim

Samten Doma Sherpa[1], Sonam Bhutia[1*], Tiewlasubon Uriah[2], Bhumika Chettri[3], Pynshailang Dkhar[2] and Sanswrang Basumatary[4]

[1]Department of Pharmacognosy, Government Pharmacy College Sajong, Government of Sikkim (GoS), Sikkim University, Sajong – 737135, Sikkim, India; sonamkzbhutia@gmail.com

[2]Institute of Pharmacy, Assam Don Bosco University, Tapesia, Sonapur – 782402, Assam, India

[3]Department of Pharmacognosy, Krupanidhi College of Pharmacy, Rajiv Gandhi University of Health Science, Bangalore – 560035, Karnataka, India

[4]School of Pharmaceutical Sciences, Girijananda Chowdhury University, Guwahati – 781017, Assam, India

Abstract

Background: Traditional healing practices rooted in centuries-old practices in different communities throughout the globe have potential health benefits for millions of people. **Aim:** In the present study, we aimed to document the medicinal plants used by the traditional healers and tribal people to treat various ailments of the indigenous communities residing within the study area. **Methods:** The present ethnobotanical study has been conducted in two districts-Gangtok and Namchi districts of Sikkim, and interacted with 5 traditional healers and 93 local informants (total-98). The methodology followed during the survey was a cross-sectional study, a field survey, face-to-face interviews, and pre-prepared semi-structured questionnaires. The data were examined using quantitative ethnobotanical indices such as Relative Frequency of Citation (RFC) and Fidelity level(FL%), in order to assess the dependability and richness of herbal knowledge. **Results:** A total of 72 medicinal plant species belonging to 61 families, 69 genera. The category of most frequent medical ailments was Cough (26%), likewise wound healing (24%), Diarrhoea (24%), Skin allergy (22%), Diabetes (18%), Fever (18%), Respiratory problems, Jaundice and Bone fracture (12%). The study revealed that roots/rhizomes are highly used, followed by fruit and aerial parts, and the commonly used preparation was powder and extract forms. *Combretaceae* was the most used family among other families. The RFC was 0.4 for *Emblica officinalis*, and FL was (26%) for Cough disease, followed by wound healing and diarrhoea (24%). **Conclusion:** It was concluded that the traditional groups in the two districts have long-standing knowledge of the therapeutic uses of medicinal plants. Additional investigation, separation and detailing of the active phytoconstituents of these plants having more RFC and FL%, may lead to the identification of novel therapeutic candidates in the future.

Major Findings: A total of 72 medicinal plant species belonging to 61 families, 69 genera and the highest Relative Frequency of Citation (RFC) was 0.4 for *Emblica officinalis*, and the highest Fidelity level (FL%) was 26% for Cough disease, followed by wound healing and diarrhoea (24%) were reported in this article.

Keywords: Field Survey, Indigenous People, Sikkim Himalaya, Traditional Medicines, Traditional Use

(Article Chronicle: Article Received on: 18.03.2025; Revised on: 11.12.2025; Accepted on: 23.12.2025)

Abbreviation: RFC - Relative Frequency of Citation; FL - Fidelity level; WHO - World Health Organisation; GPC - Government Pharmacy College; GERD - Gastroesophageal Reflux Disease; UTI - Urinary Tract Infection; N - Nepali Name.

*Author for correspondence

1. Introduction

According to the World Health Organization (WHO), "Traditional medicine is defined as the total of the knowledge, skill, and practices based on the theories, beliefs, and experiences indigenous to different cultures, whether explicable or not, used in the maintenance of health as well as in the prevention, diagnosis, improvement or treatment of physical and mental illness". Herbal medicines include herbs, herbal materials, herbal preparations and finished herbal products that contain an active ingredient, parts of plants, or other plant materials, or combinations (WHO). This type of healing has been used for ages in the Sikkim Himalaya, and this document describes some of its traditional practices, particularly with reference to the preparation and processing of botanical ingredients and the system's underlying elements of trust and belief. The knowledge regarding the use of medicinal plants has been passed from generation to generation, and only a specific group knows about the details of it[1-4]. Documentation and prioritisation of traditional medicines used by the local community is essential for: (a) Conservation, (b) Management of species in the particular region, and (c) increasing knowledge regarding locally available plants and their usability. The state of Sikkim possesses a vast richness of plants[5-9]. The majority of tribal and rural groups that use organic farming methods rely on traditional medical systems to address their illnesses. The goal of the current study is to comprehend how the rural people of Sikkim employ common plants as remedies and the local health customs associated with them. To comprehend local medical customs and how the rural people of Sikkim (South and East) employ traditional medicines for treatment, and to produce field-based, reliable documentation. This survey research is a part of an initiative to document data for future phytochemical and pharmacological studies, which can serve as a starting point for future drug discovery for various ailments, in addition to contributing to the discussion and preservation of traditional knowledge and medicinal plants. Since the traditional knowledge of indigenous people has been passed down orally by elders for many centuries, documenting medicinal plant species may also help to preserve it for future generations. Sikkim is the Himalayan landlocked state of India. It is bound on the north by China (the Tibet plateau), on the east by the Chumbi valley of Tibet and Bhutan, on the west by Nepal and on the south by the Darjeeling district of West Bengal[10,11].

2. Materials and Methods

2.1 Study Area

The study area covered two districts in the state of Sikkim, i.e., south and east Sikkim; in total, 6 villages/towns were covered under the survey. South district: Perbing, Namchi, Jorthang and Lingee and East District: Gangtok and Singtam (Figure 1). Geographically, Sikkim lies between 27°05'- 28°07' N latitude and 88°31'- 56°E longitude, which is the smallest but biologically most diverse Himalayan state in India. During the monsoon season, the region experiences heavy rains and a tropical environment. The region has mostly clay loam soil texture[12]. We obtained the institutional approval letter for conducting this mini-pilot survey study: Memo No. 96/GPC/2024, dated 24th April, 2024. It was part of a Bachelor of Pharmacy, 8th Semester, 6 months from March 2024 to August 2024.

2.2 Data Collection, Documentation, Selection of Participants and Identification of Plant Species

In our survey, we aimed to document the medicinal plants used by the traditional local healers and tribes to treat various ailments of the indigenous communities residing within the study area. The key informants were mainly traditional healers (5

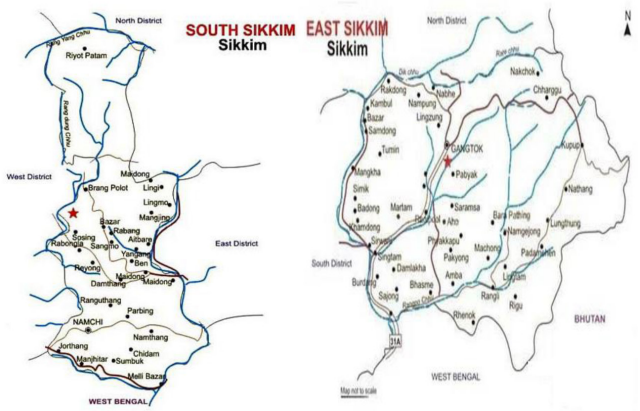


Figure 1. Study areas of survey.

traditional healers) and other participants in all, who were selected using purposive and snowball sampling method[13-17] and were interviewed. For each informant, we recorded personal information on location, level of education, gender, age, how they acquired knowledge about medicinal plants and marital status. Each traditional healer gave their free, verbal, prior informed consent before the interview began. The traditional healers and local informants were promised that the collected botanical data would be utilised for scholarly purposes only. Interviews were conducted in the Nepali language because the majority (70%) are Nepali-speaking population residing in Sikkim. No informants were below the age of 16. The international and national plant name indexing[18-21] were used to validate plant scientific names and families. Moreover, during the whole process of the survey, we have strictly followed the ethical guidelines of the International Society of Ethnobiology[22] For the first time, ethnobotanical surveys have been conducted in Sikkim's south and east districts. The methodology followed during the survey cross-sectional study, a field survey, open-ended, and semi-structured questionnaires. The data were examined using quantitative ethnobotanical indices such as Relative Frequency of Citation (RFC), and Fidelity level (FL), in order to assess the dependability and richness of herbal knowledge[23]. During the field study, information was acquired about the parts of plants, how they were prepared and administered, and how they were utilised to cure various illnesses. Each medicinal plant's specimens were closely monitored, examined closely, and identified using accepted literature[24-27]. The concern was taken to publish the traditional healer's details for scientific communication in the future.

3. Quantitative Analysis of Ethnobotanical Data

Frequencies and percentages were utilised to summarise the ethnobotanical data that were entered into an Excel sheet. The data were examined using quantitative ethnobotanical indices such as Relative Frequency of Citation (RFC) and Fidelity %, in order to assess the dependability and richness of herbal knowledge[28].

3.1 Relative Frequency of Citation (RFC)

It presents the local importance of each species in a study area[29]. To calculate RFC, the number of respondents citing a useful species (RFC) is divided by the total number of respondents in the field survey (N), as explained in previous work[30], where "FC" is the number of informants who mentioned the species, while *[N]* indicates the total number of informants who participated in the survey. The formula is given below:

$$RFC = \frac{FC}{N} (0 < RFC < 1)$$

3.2 Fidelity Level (FL%)

The percentage of informants who stated using specific plant species to treat a specific condition in the study area is known as the fidelity level or FL. This formula is used to determine the FL index: NP/N X 100 = FL (%)[31,32], where N is the total number of informants who mentioned the plant for any major sickness, and Np is the number of informants who separately indicated the use of a species for the same major ailment. The formula is given below:

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

4. Statistics

The scientific ethnobotanical data from the field survey, face-to-face interviews among the traditional healers and the indigenous people from the study area were analysed and presented in tabular and graphical presentations within the manuscript by using the software Microsoft Excel 2013. The Relative Frequency of Citation (RFC) and highest Fidelity level (FL%) values were analysed for the different diseases, and the graphs for the collected data are presented within the manuscript.

5. Results and Discussion

All the work that an herbalist or traditional healer performs in his practice is mostly done by himself, with as little help as possible coming in from family members. If there is any herbal medication available in their local area, they gather it all from different places or purchase it sometimes, and even collection can be done

Table1. List of medicinal plants used by traditional healers and indigenous people

Sl. No.	Scientific name and Family	Family	Local name	Habitat	Part used	Treatment of disease	Preparation of a dosage form	Mode of Administration	RFC	FL %
1	*Termanalia chebula* Retz.	*Combretaceae*	*Harra* (N)	Temperate region	Fruit	Use as a tonic, to cure eye disease, heart and bladder diseases, and indigestion	Dried fruit powder can be taken with water (1glass) in the morning and evening	Oral	0.15	10
2	*Terminalia ballerica* Gaertn.	*Combretaceae*	*Barra* (N)	Lower Hill Forest	Fruit, bark	Dealing with bronchitis, asthma, respiratory trouble, anaemia, leucoderma	Dried fruit powder can be taken with water (1glass) in the morning and evening	Oral	0.23	12
3	*Emblica officinalis* Gaertn.	*Phyllanthaceae*	*Amala* (N)	Tropical or subtropical Lower hill	Fruit	Rheumatic pains, asthma, jaundice, nausea, constipation, diarrhoea, eye disease, diabetes mellitus	As raw fruit, powdered drug with water (1glass), mainly taken in the morning	Oral	0.40	22
4	*Acorus calamus* L.	*Acoraceae*	*Bojho* (N)	Middle hill	Root, rhizome	Fever, antispasmodics, insect repellent	Crush or triturate to make a paste	Topical	0.17	18
5	*Astilbe rivularis* Buch.-Ham. ex D.Don	*Saxifragaceae*	*Buro-Okhati* (N)	Temperate region	Whole body, leaf, roots, rhizome	Bone fracture, blood purifier, tonic for uterine and menstrual disorders	Juice is obtained and applied to swelling and fractures. Paste is taken with honey.	Topical	0.17	12
6	*Ferula narthex* Boiss.	*Apiaceae*	*Hing* (N)	Rocky locations	Gum, powder	Asthma, cough, epilepsy, toothache	A pinch of hing is taken with water. A small piece of hing is placed in the tooth cavity	Oral	0.24	26
7	*Viscum articulatum Burm*. f.	*Loranthaceae*	*Harchur* (N)	Lower and upper hill	Whole plant	Ulcer, epilepsy, muscular pain, bone fracture	Crushed to form powder, half a tablespoon is taken with water or milk	Oral	0.16	12
8	*Quercus infectoria subsp. veneris (A. Kern.) Meikle*	*Fagaceae*	*Majuphal, Oak Galls, Gall Nut*	Not known	Outgrowth of the twigs	Heals tonsillitis, cough, and cold, diarrhoea, treats piles	Extract of twigs	Oral	0.06	24

Table1. Continued...

Sl. No.	Scientific name and Family	Family	Local name	Habitat	Part used	Treatment of disease	Preparation of a dosage form	Mode of Administration	RFC	FL %
9	*Lepidium sativum* L.	*Brassicaceae*	*Chamsur* (N)	Temperate region	Seed, leaf	diarrhoea, hepatoprotective, swelling, diuretic	Fried, crushed to powder, drink with tea milk Have leaf soup 2 times for a day.	Oral	0.03	22
10	*Fraxinus floribunda* Wall.	*Oleaceae*	*Lakuri (N)*	Tropical and temperate regions	Bark, leaf	Bone fracture, joint dislocation, sprains, gout and osteoarthritis, purgative	Stem bark is crushed to make a paste, and bandaged affected area for a few days. Freshly collected stem bark is heated and placed on the affected area	Topical, oral	0.02	12
11	*Swertia chiraita* Buch.-Ham. ex Wall.	*Gentianaceae*	*Chirawto, Chiraita* (N)	Upper hill/ temperate	Whole plant	Skin allergy, chronic fever	2-3 ml of decoction can be taken in the morning	Oral	0.35	18
12	*Bergenia ciliate* (Haw) Sternb.	*Saxifragaceae*	*Pakhambeth* (N)	On moist rocks and under forest shade	Whole plant	Diarrhoea, cut wounds, piles, a dissolving bladder and a kidney stone	Powder or triturate, boil with water	Oral	0.23	22
13	*Aconitum ferox* Wall. ex. Ser.	*Ranunculaceae*	*Bigma* (N)	Temperate sub-Alpine	Root	Used during food poisoning-induced vomiting (emesis)	Cut a small part, mix with water	Oral	0.31	2
14	*Bixa orellana* L.	*Bixaceae*	*Kachosimrik* (N)	Tropical climate	Fruit, seeds	Joint crack treatment (bone fracture)	A small quantity of powder with water or raw milk, or raw egg	Oral	0.07	12
15	*Magnolia doltsopa* (Buch.-Ham. ex DC.)	*Magnoliaceae*	*Chap* (N)	Himalayan region	Flower	Epilepsy	Dry bark, powder it liquefies with water	Oral	0.06	2
16	*Adatoda vasica* L.	*Acanthaceae*	*Asuro* (N)	Native to the Oriental floristic region	Leaf	Bronchitis, pneumonia, cough, asthma	Fresh leaves were triturated to a fine paste and squeezed by hand to take out the juice	Oral	0.20	26

Table1. Continued...

Sl. No.	Scientific name and Family	Family	Local name	Habitat	Part used	Treatment of disease	Preparation of a dosage form	Mode of Administration	RFC	FL %
17	*Epipactis palustris* (L.) Crantz	*Orchidaceae*	*Barla* (N)	Humid woodland and grassland	Fruit	Used to cure cough, swelling and skin infection, including boils	Fruit can be taken as it is or in powder form	Oral	0.04	24
18	*Lyonia ovalifolia* (Wall.) Drude	*Ericaceae*	*Angeri* (N)	Native to the Himalaya-Altitude: 6500 ft	Young leaf/ Flower bud	Treat dermatitis and other skin irritations	Young leaves are crushed, and the paste can be applied to the skin	Topical	0.09	22
19	*Azadirachta indica* A. Juss.	*Meliaceae*	*Neem Pati* (N)	Semi-arid and wet tropical regions, from sea level to about 700	Aerial part	Skin allergy and diabetes	Decoction can be applied topically for skin disorders and Leave extract can be taken for diabetes.	Oral/Topical	0.26	18
20	*Kaempferia rotunda* L.	*Zingiberaceae*	*Bhuichampa* (N)	Monsoon forests and open grassland-Altitude: 1700ft	Underground Fruit	Treating indigestion, fever and accelerating wound healing, bone fracture	Extraction for indigestion, fever, and wounds. Paste of tuber root can be used for a bone fracture	Oral/Topical	0.21	24
21	*Bombax ceiba* L.	*Malvaceae*	*Simal* (N)	Wet tropical regions- altitude-1500 m	Bark	Urinary infection, abdominal pain, Diabetes	Decoction of the bark. Bark juice is given to reduce stomachaches and urinary infections	Oral	0.13	18
22	*Abies wabbiana* Lindl.	*Pinaceae*	*Gobresalla* (N)	The Himalayas, with altitudes of 1,600–4,000 m	Leaf	Mouth ulcer, stomachache, anti-fertility	Dried powder is given twice a day for the treatment of ulcers and stomach pain	Oral	0.25	10
23	*Artemisia vulgaris* L.	*Asteraceae*	*Titaypati* (N)	Tropical region, 350 m above sea level	Leaf	Insomnia and stress, skin disorders, blood coagulant, and for kidney stones	The extract of leaves mixed with ethanol can be used for the treatment of insomnia and stress, and for kidney stones. Fresh leaves can be applied to the nose to prevent blood from the nose	Oral/Topical	0.34	2

Table1. Continued...

Sl. No.	Scientific name and Family	Family	Local name	Habitat	Part used	Treatment of disease	Preparation of a dosage form	Mode of Admini stration	RFC	FL %
24	*Aconogonum molle* (D.Don) H.Hara.	*Polygonaceae*	*Thotne* (N)	Native to the Indian Himalayas elevation ranging from 1800 to 5480 m above mean sea level	Young shoot	Pickle and vegetables in hills, Diabetes, skin disorder, diarrhoea, gastrointestinal disorders	Whole plant juice extract is taken twice per day orally to treat diarrhoea.	Oral	0.23	22
25	*Bauhinia variegate L.*	*Fabaceae*	*Koirala*(N)	Mixed deciduous forest at altitudes from 500–800 m	Whole plant	Skin diseases, tonic, ulcers, wound healing, as a digestant	Bark and flower buds are used for pickling. Dried flowers are used for diarrhoea and piles.	Topical, Oral	0.17	24
26	*Buddleja asiatica Lour.*	*Scrophulariaceae*	*Bhinsenpati* (N)	Tropical or subtropical areas 2000 m in altitude	Aerial part	Fever, diarrhoea, rheumatic, skin diseases, anti-fertility	The aerial part of the plant extract can be used as an abortifacient. The flower juice from the plant is applied as a wash to treat skin disease	Oral, Topical	0.15	22
27	*Costus speciosus* (J. Koenig) Sm.	*Costaceae*	*Beth Laure* (N)	Lowland deciduous forests-altitude: up to 1,400 m	Stem and Root	Constipation, skin disease, pneumonia, urinary diseases, and body cooling	Leaf extract is used for high fever. Rhizome juice with sugar is used for leprosy and headaches	Oral	0.25	18
28	*Drymaria cordata L.*	*Caryophyllaceae*	*Abhijalo* (N)	The Himalayas region, altitudes of 200-2400 m	Whole plant	Sinuses, leprosy, tumours, bronchitis, cold, headache, ulcers	The raw, whole plant is mashed under a piece of cotton cloth and is used as an inhaler for sinusitis. Plant paste can be applied directly to the head for a headache.	Inhaler/ topical	0.28	2
29.	*Eucalyptus globosa* Labill.	*Myrtaceae*	*Tarpin* (N)	Western Ghats, altitudes between 900-1500 m	Leaf	Wound infections, vegetable and pickle	Leaf oil can be used on wounds and fungal infections, and massaging oil can relieve joint pain and arthritis	Topical	0.12	24

Table1. Continued...

Sl. No.	Scientific name and Family	Family	Local name	Habitat	Part used	Treatment of disease	Preparation of a dosage form	Mode of Administration	RFC	FL %
30	*Nyctaanthus arbortistis* L.	*Oleaceae*	*Parijat* (N)	Lower Hill Forest	Fruit/Flower	Swelling, laxative, sedative effect, anti-fertility agent	Dried fruits can be administered orally to get relief from cough, decoction of dried flowers with jaggery used as an anti-fertility agent in females; leaf juice is applied externally skin diseases	Orally/ Topical	0.29	10
31	*Ocimum tenuiflorum* L.	*Lamiaceae*	*Tulasi* (N)	Native to tropical and subtropical regions- altitude of 6000 feet	Aerial Part	Cough, asthma, diarrhoea, fever, dysentery, eye diseases, gastric ailments, osteoarthritis, indigestion	Dried leaves can be used as an herbal tea in cold/gastric	Orally/ Topical	0.35	26
32	*Aloe barbadensis* (L.) Burm. f.	*Asphodelaceae*	*Ghewkumari* (N)	Widely distributed-1300 to 2600 m in dry, rocky and/ or exposed places	Leaf	Treat skin injuries (cuts, burns, insect bites, eczemas) and digestive problems, wound healing properties, and internal use as a laxative	For laxative effect, the lower leaf is open, and juice is taken as it is or with half full of water. For burns, the gel is applied directly to the burnt area.	Oral/Topical	0.38	24
33	*Evodia fraxinifolia* (Hook.) Benth.	*Rutaceae*	*Khanakpa* (N)	Evergreen forests, between 900-2500 m altitudes	Fruit	Diarrhoea, dysentery, vomiting, nausea, indigestion, gastroesophageal reflux disease (GERD), stomach ulcers	Root powder (1 teaspoonful) with 50ml water is taken orally 2-3 times daily to treat dysentery	Oral	0.19	22
34	*Tupistra nutans* Wall. ex Lindl. *e*	*Asparagacea*	*Nakima*(N)	The Eastern region of the Himalayas, altitude-1700 m to 2750m	Flower	Fever, high blood pressure, and pain relief	Root decoction is used to treat body pain and weakness. Flowers can be taken as a regular vegetable to treat diabetes	Oral	0.31	18

Table1. Continued...

Sl. No.	Scientific name and Family	Family	Local name	Habitat	Part used	Treatment of disease	Preparation of a dosage form	Mode of Administration	RFC	FL %
35	*Acacia catechu* (L.f.) Willd	*Fabaceae*	*Kachokhair* (N)	Deciduous forest, lower mountains/ hills, altitude between 900-1200m	Bark/Fruit	Low blood pressure	Mix the powder with milk or water (5g)	Oral	0.06	2
36	*Aesandra butyraceae* (Roxb.) H.J. Lam	*Sapotaceae*	*Chewri*(N)	Native to Southeast Asia, the Himalayas from 300 to 1500 meters	Fruit	Indigestion, headache	Juice of the bark is used to treat indigestion, and as an anthelmintic; seed fat is applied for headaches	Oral/Topical	0.10	22
37	*Oroxylum indicum* (L.) Kurz.	*Bignoniaceae*	*Totala* (N)	Tropical areas altitude of 1200 m	Flower, seed	Arthritis and jaundice, rheumatic, gastric ulcers, tumours, respiratory diseases, diabetes, diarrhoea and dysentery	Root bark extract is used for anti-diarrhoeal, diuretic, and anodyne, and is used to cure dropsy. Paste made from ground seeds with fire soot is applied to the neck to treat tonsillitis, inflammations, skin diseases, sprains, and rheumatism	Oral/Topical	0.29	22
38	*Terminalia arjuna* (Roxb). ex. DC.	*Combretaceae*	*Arjun Sal* (N)	semi-arid and sub-humid tropical up to 1500 m altitude	Bark	Asthma	Crushed to powder, take with water 3 times a day. Avoid meat, fish, and eggs	Oral	0.33	
39	*Mesua ferrea L.*	*Calophyllaceae*	*Nagayswari, Nagphal* (N)	Common in Peninsular and Northeastern India, altitude of up to 1500 m	Seed	Skin allergy	Rub it with water to make a paste and apply it to the infected areas	Topical application	0.09	24
40	*Sapindus mukorossi Gaertn.*	*Sapindaceae*	*Rittha* (N)	lower foothills and midhills of the Himalayas, altitudes of up to 1,200 metres	Fruit	Antidandruff	Fruit extract can be used for wash wounds. scal	Topical application	0.06	24

Table1. Continued...

Sl. No.	Scientific name and Family	Family	Local name	Habitat	Part used	Treatment of disease	Preparation of a dosage form	Mode of Administration	RFC	FL %
41	*Allium sikkimense* Baker.	*Alliaceae*	*Jangli Lasun* (N)	High altitude regions of the Himalaya between 4000-5000 m	Oil	Cold and cough, breathing problem, bodyache	Paste is used to cure body pain and to keep the body warm in severe cold, and the seed can be used as it is to treat breathing issues. Paste/paste water can be used to kill mouth odour	Oral/Topical	0.36	24
42	*Glycyrrhiza glabra L.*	Amaryllidaceae	*Zethimadhu* (N)	Subtropical climates below 600 meters	Root/ Rhizome	Fever, ulcers, skin diseases, jaundice, diabetes, lower blood pressure	A teaspoonful of liquorice powder consumed with 1 cup of milk thrice a day to get relief from pain and inflammation associated with a stomach ulcer. Its gel is applied 3 times daily for 2 weeks to reduce redness, swelling, and itching from eczema	Oral/Topical	0.25	18
43	*Myristica fragrans* Houtt.	*Myristicaceae*	*Jai Phal* (N)	Terrestrial (Primary Rainforest, Tropical) altitudes up to 4,500 metres	Fruit	Headaches, diarrhoea, vomiting, bad breath	For daily use, for adults, just 250 – 500 mg (one – two small pinches) along with honey or ghee can be taken in the morning, after food. Fruit can be taken to cure a sore throat	Oral/ powder	0.32	22
44	*Tinospora cordifolia* (Willd.) Hook.f. and Thomson	*Menispermaceae*	*Gurjo* (N)	Deciduous forest altitude up to 1400 m	Stem	Skin infection, UTI, diabetes, high blood pressure	Soak a small piece in water and drink	Oral	0.35	18

Table1. Continued...

Sl. No.	Scientific name and Family	Family	Local name	Habitat	Part used	Treatment of disease	Preparation of a dosage form	Mode of Admini stration	RFC	FL %
45	*Cressa cretica* L.	*Convolvulaceae*	*Indrajal* (N)	Subtropical biome, altitude range 0–175 m	Leaves/Root	Cough, cold, jaundice	The plant paste is used for treating sores, fever, and jaundice	Oral/Topical	0.12	26
46	*Picrorhiza kurroa* Royle ex. Benth.	*Plantaginaceae*	*Kutki* (N)	alpine Himalayas between 3000 m and 4500 m altitudes	Root	Jaundice, diabetes, cough	For fatty liver, take Kutki root powder (2 to 3gms) with warm water two times every day, at least for three months. Take 4-8 pinches of Kutaki powder, mix with water or honey and have it once or twice a day to cure the symptoms of vitiligo	Oral	0.16	18
47	*Andrographis paniculata* (Burm.f.) Wall. ex. Nees	*Acanthaceae*	*Kalmek*(N)	Native of tropical South-East Asia level up to 1600 m altitude	Root, whole plant	Jaundice, anaemia, fever	Drink with water (infusion)	Oral	0.18	18
48	*Cautleya spicata* (Sm.) Baker.	*Zingiberaceae*	*Panisaro* (N)	tropical and temperate areas Altitude: 1,800 m	Rhizome	Toothache, bodyache	Take a piece, chew for a toothache, take powder with water for a bodyache	Oral	0.04	2
49	*Nardostachys jatamansi* Clarke	*Caprifoliaceae*	*Jattamasi* (N)	Alpine Himalayan ranges 3,000-5,000 m above sea level	Root/ Rhizome	Hair fall, dandruff, bodyache	Keep the root in coconut oil for some time and apply it to get relief from pain or dandruff	Topical	0.21	2
50	*Acacia concinna* (Willd.) DC.	*Mimosaceae*	*Shikakai* (N)	South asian tropical areas altitude 50-1050 metres	Fruit	Cuts and Wounds, purgative	Decoction can be taken to give a purgative effect	Oral/Topical	0.06	24

Table1. Continued...

Sl. No.	Scientific name and Family	Family	Local name	Habitat	Part used	Treatment of disease	Preparation of a dosage form	Mode of Administration	RFC	FL %
51	*Eclipta prostrate* (L.) Hassk.	*Asteraceae*	*Bhengraj* (N)	Warm temperate to tropical areas Below 3,500 feet (1,066 m)	Whole plant	Diseases of the skin, liver and stomach	2 teaspoons of Bhringraj powder mixed with water can be taken during Indigestion. Same steps for diabetes also. Paste of the aerial part can be used for skin diseases	Oral/Topical	0.16	18
52	*Piper longum L.*	*Piperaceae*	*Pipla* (N)	The Himalayan foothills altitude of 900–1,500 m	Seed and Fruit	Bronchitis, cold/ cough, anti-fertility, as an antidote in snake bite and scorpion sting	Powder can be taken in a dose of 3-4 grams along with warm water for obesity. Take 2-3 pinches of Pippali powder with honey after lunch and dinner to manage the symptoms of asthma, Bronchitis	Oral	0.20	26
53	*Garuga pinnata Roxb.*	*Burseraceae*	*Raj Brisk* (N)	The moist tropics elevations from 400 - 1,200 metres	Bark/Fruit	Urinary disease, Asthma, Cardioprotective	Leaf extract can be taken for cardioprotection. Leaf juice given with honey for asthma	Oral	0.15	14
54	*Curcuma amada* Roxb.	*Zingiberaceae*	*Phacheng* (N)	Lower hill, 4500ft.	Tuberous root stock	Appetiser, skin diseases, in sprain	Tuber rhizome paste can be applied to skin diseases	Topical	0.08	
55	*Boerhavia diffusa L.*	*Nyctaginaceae*	*Punarnava* (N)	Subtropical regions below 1000 m elevation	Root	Rejuvenate cells (tonic), uterus infection	Leaf juice with milk to get relief from cataract; decoction is given orally to purify blood; the extract is used as a diuretic	Oral	0.25	2

Table1. Continued...

Sl. No.	Scientific name and Family	Family	Local name	Habitat	Part used	Treatment of disease	Preparation of a dosage form	Mode of Administration	RFC	FL %
56	*Paris polyphylla* Sm.	*Melanthiaceae*	*Satuwa (N)*	Temperate region altitude between 1300 and 1800 metres	Underground tuber	Snake bites, insect bites (Antidotes), to alleviate narcotic effects, wounds healing, fever and food poisoning (Antidotes)	Dried rhizome soaked overnight in water (extract) and taken in the morning to cure bodyache and as a rejuvenation tonic. Tuberous root paste can be applied to cuts and wounds. Powder or infusion can be used for diarrhoea and dysentery	Oral/Topical	0.13	24
57	Urtica dioica L.	*Urticaceae*	*Sishnu* (N)	The Himalayan region from 1200 to 3500 m above sea level	Roots/ Whole plant	Bone fracture and dislocation, diarrhoea, cough	The stem scale is wrapped on the bone fracture area, leaf and flowers can be taken as a vegetable to cure high blood pressure	Oral/Topical	0.21	12
58	Sinopodophyllum hexandrum (Royle) T.S.Ying	*Berberidaceae*	*Laghu patra (N)*	Mountains of the Himalayan states, altitude of 2200 to 4500 m	Roots/ rhizomes	Indigestion, Blood purifier, vermifuge, purgative, skin swelling	Rhizome extract is taken as a purgative and blood purifier	Oral	0.09	10
59	*Zanthoxyllumacanthopodium* DC.	*Rutaceae*	*Bokeytimmur* (N)	Upland open forests, at elevations from 1,400 - 3,200 m	Fruit	Appetiser, cures bad breath, tooth decay, cold and stomachache	Decoction		0.08	2
60	*Tricosanthes lepiniana* (Naudin) Cogn.	*Cucurbitaceae*	*Indreni* (N)	Endemic to North-eastern India, at 300–1500 m altitude	Fruit	Skin diseases	Oleous extract of the seed applied externally	Topical/ Oral	0.12	22
61	*Toonaciliata* M. Roem.	*Meliaceae*	*Tooni* (N)	Himalayas to tropical countries, altitudes of 25-610 m	Bark	Cure toothache, chest pain, fever and measles	Decoction	Oral	0.06	18

Table1. Continued...

Sl. No.	Scientific name and Family	Family	Local name	Habitat	Part used	Treatment of disease	Preparation of a dosage form	Mode of Administration	RFC	FL %
62	*Thysanlaenamaxima* (Roxb.) Kuntze	*Poaceae*	*Amliso* (N)	Hilly areas, streams, altitude of 2000 m	Root	Sore throat and boils	Root extract with water	Topical	0.11	2
63	*Terminalia myriocarpa* Van Heurck and Müll. Arg.	*Combretaceae*	*Panisaaj* (N)	Evergreen forests-North East India up to 700 m altitude	Bark	Cuts and wound healing	Bark extract	Oral/Topical	0.04	24
64	*Tagetes patula* L.	*Asteraceae*	*Sayapatri* (N)	Forest type, Cultivated, Altitude: 170 - 3000m	Flower	Cures sore throat, cough, and mouth ulcers	Flower extract	Oral/Topical	0.22	26
65	*Solanum khasianum* (Clarke)	*Solanaceae*	*Boksikanra* (N)	Homestead/ Roadside, altitude of 1600 m	Fruit	Tooth decay	fruit extract administered		0.06	2
66	*Schima wallichii* (DC.) Korth.	*Theaceae*	*Chilauney* (N)	Tropical-subtropical forests, altitude 600-1500 m	Bark	Deep cuts and wounds	A bark paste is applied externally to deep cuts and wounds.	Bark extract	0.15	24
67	*Rumex nepalensis* Spreng.	*Polygonaceae*	*Halhaley* (N)	Warm temperate to tropical zones, Altitude: 2150m	Root	Relieves body pain, Diabetes, cures skin disease	Root paste relieves body pain, cures skin disease, and, if applied on the scalp, reduces hair loss.	Topical	0.15	2
68	*Rubia cordifolia* L.	*Rubiaceae*	*Manjito*(N)	Hilly subtropical to sub-temperate regions, 300 m and 2000 m altitudes	Leaf and root	Stomachache and dysentery	Leaf and root juice are taken during fever, stomachache and dysentery	Oral	0.12	18
69	*Rhus semialata* Murray	*Anacardiaceae*	*Bhakimlo* (N)	Mixed forest-deciduous tree, 915 - 2745 m. altitude	Fruit	In blood dysentery	Fruit juice administered	Oral Extract/ Decoction	0.14	2
70	*Phytolacca acinosa* Roxb.	*Phytolaecaceae*	*Jaringo* (N)	Himalayas, at altitudes of 1500-3000 m	Root/ young Shoot	Cures Sinusitis, Bodyache	Young shoots are used as a vegetable to relieve body pain	Oral Raw shoot, decoction of root	0.05	
71	*Perilla fruitescens* (L.) Britton	*Labiatae*	*Silam* (N)	Hills and mountains, an altitude of 1200 m	Dried seed	Cures cough a	Dried seed, as a pickle or as it is, can be taken	Oral dried seed extract	0.07	26
72	*Oxalis corniculate* L.	*Geraniaceae*	*Chariamilo* (N)	At higher altitudes. Found up to 500m	Aerial part	Cough, diarrhoea, Dysentery, digestion	The aerial part was chewed during the disease condition	Oral Raw extract	0.03	24

*N=*Nepali name*,RFC=Relative Frequency of Citation, FL= the percentage of Fidelity level.

from Nepal also. To identify the plants through local names, different national and international websites were referred[33-36] (Table 1).

A total of 98 participants took part in the survey, 51 male and 47 female, representing 65 families (including the traditional healers). The informants' ages varied from 21 to 44 years old to 45 years and older. The main occupation of the informant was farming. The informants belonging to the age group of 21-44 (65) were undergraduates, and 45 and above (25) were high school and primary school passed, and 8 people were illiterate. Some informants were migrated with their families from Nepal in search of better employment opportunities. During the survey, it was found that people in the 21–44 age range were leaning more towards the allopathic system than traditional medicine. They started using allopathic treatments together with traditional remedies. People over 45, on the other hand, placed more trust in conventional medical practices. People in this age group were taking some of the decoctions daily. A discrepancy in the literacy level parameter was observed. Every informant contacted for the survey acknowledged that they have been taking traditional medicines primarily for skin diseases, headaches, coughs, and colds. For the purpose of boosting immunity, 66 out of 98 informants (67%) take a daily decoction consisting of plant parts. The majority of plant parts were employed, either as roots/rhizomes to create decoctions or as freshly ground material to create pastes that were applied externally. All of the informants also stated that they had benefited in some way from using traditional medicines. Other

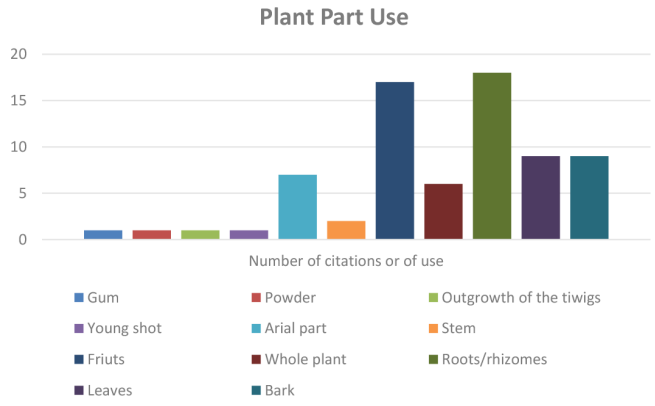


Figure 2. Part use.

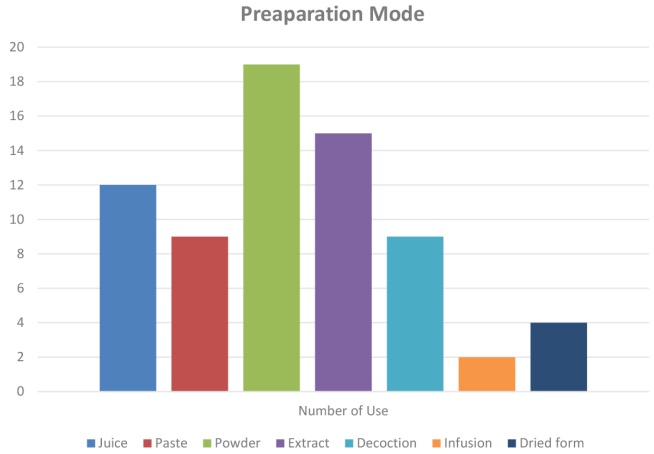


Figure 3. Different types of dosage preparation.

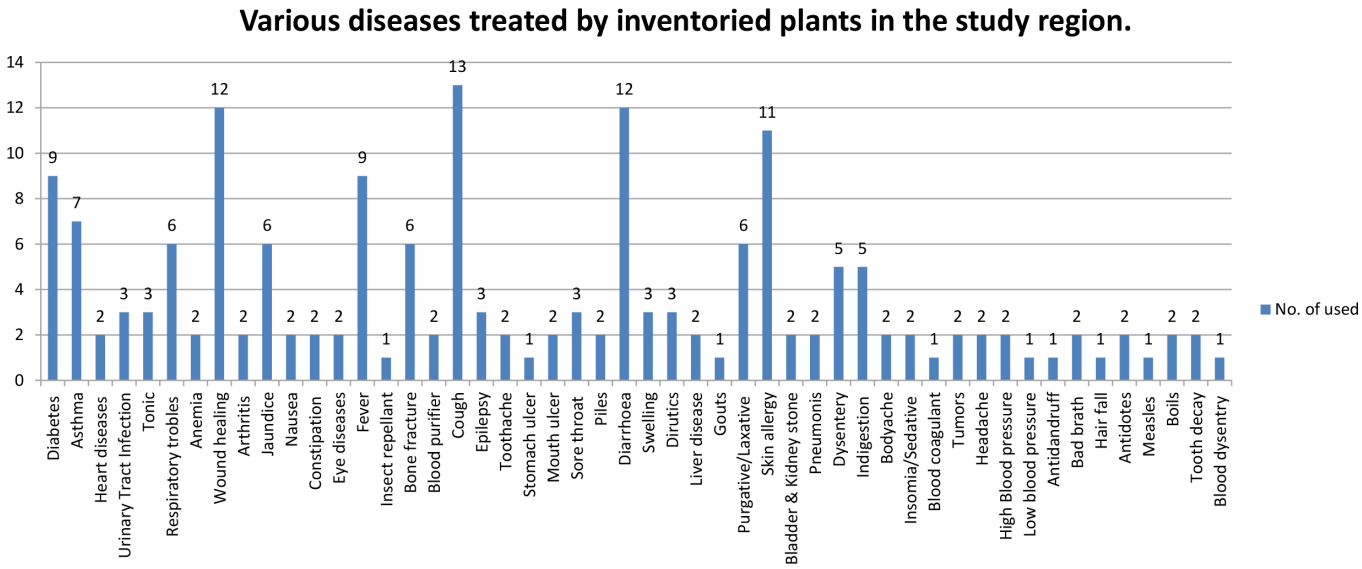


Figure 4. Different diseases treated by inventoried species in the study area.

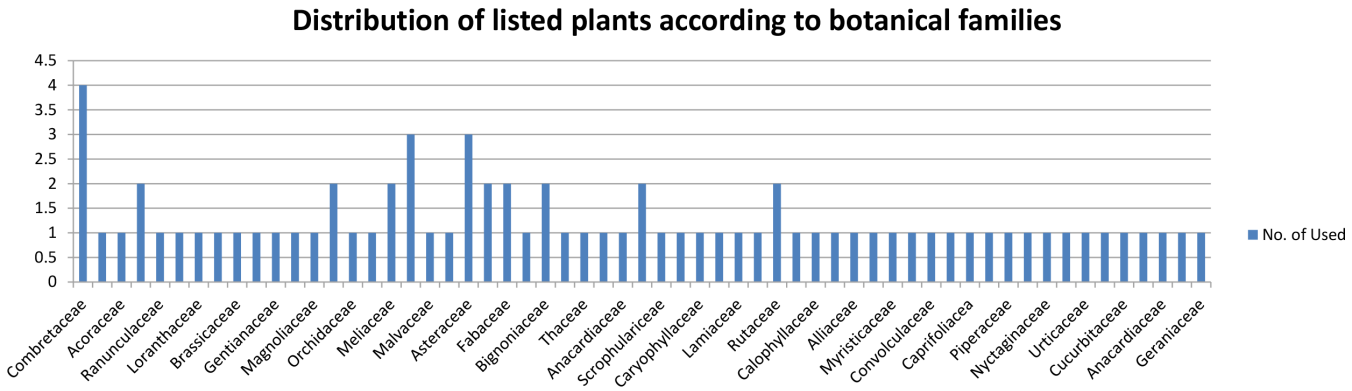


Figure 5. Distribution of plants according to the botanical families.

researchers have also documented the aforementioned species. While conducting a literature search in various Sikkim Himalaya climate zones[37-39], we also discovered that people continue to use this traditional medicinal knowledge to treat diabetes, asthma, fever, jaundice, leprosy, diarrhoea, the common cold, dysentery, bronchitis, menstruation disorders, tooth infections, and headaches.

Based on the report, a total of 72 medicinal plant species belonging to 61 families, 69 genera have been recorded in this manuscript. The category of most frequent medical ailments was Cough (26%), likewise wound healing (24%), Diarrhoea (24%), Skin allergy (22%), Diabetes (18%), Fever (18%), Respiratory problems, Jaundice and Bone fracture (12%). The study revealed that roots/rhizomes are highly used, followed by fruit and aerial part (Figure 2), and the commonly used form of preparation was powder and extract forms (Figure 3). *Combretaceae* was the most used family among other families (Figure 4). Distribution of these plants according to the botanical families is shown in Figure 5. The highest Relative Frequency of Citation (RFC) was found to be 0.4 for *Emblica officinalis,* and the highest Fidelity level (FL%) was found to be 26% for cough disease, followed by wound healing and diarrhoea (24%), and all other values were also summarised in Table 1.

6. Conclusion

As the quantitative examination of ethnobotanical practices in the research area, this work highlights the significance of traditional herbal remedies practice in the particular selected areas. The sustainability of traditional medicines and traditional healers presents encouraging opportunities for the advancement of medical treatment in human society. These traditional medicines, which have their roots in the traditional system, offer comprehensive health benefits in addition to preserving the cultural legacy. Accepting them can help close the gap between conventional wisdom and the demands of modern healthcare by resulting in more convenient, approachable, and efficient health solutions in the future.

7. Consent for Publication

We obtained the institutional approval letter for conducting this mini-pilot survey study: Memo No. 96/GPC/2024 and dated 24th April, 2024. It was part of a Bachelor of Pharmacy, 8th Semester, 6-month project conducted from March 2024 to August 2024.

8. Acknowledgements

The authors are grateful to the Health and Family Welfare Department, Government of Sikkim, Forest and Environment Department, Government of Sikkim and the host institution-Government Pharmacy College, Sajong, Government of Sikkim, other collaborating institutes and all the informants (Traditional healers as well as indigenous local people who took part in this survey).

9. References

1. Rai PC, Sherpa P, Rana DB, Sherpa MT, Rai BB, Rai LK. Traditional healers of Ribdi-Bhareng in western Sikkim:

perspectives on their methods, belief and sustenance in community health care. Pleione; 2014; 8 (2) 221-233.
2. Ghimire SK. Medicinal plants in the Nepal Himalaya: current issues, sustainable harvesting, knowledge gaps and research priorities. Medicinal Plants in Nepal: an anthology of contemporary research. 2008; 25-42.
3. Quave CL, Pieroni A. A reservoir of ethnobotanical knowledge informs resilient food security and health strategies in the Balkans. Nature Plants. 2015; 1(2):1-6. https://doi.org/10.1038/nplants.2014.21 PMid:27246758.
4. Babacan EY, Polat R, Güler O, Moyan A, Paksoy MY, Çakılcıoğlu U. An ethno-veterinary study on plants used for the treatment of livestock diseases in Genç (Bingöl-Turkey). Indian Journal of Traditional Knowledge. 2022; 21(1). https://doi.org/10.56042/ijtk.v21i1.41752
5. Singh M, Dasila K, Chettri A, Jain R, Dhyani A, Pandey A. Phytochemicals, antioxidant and antimicrobial potential of ethnomedicinal plants of Sikkim Himalaya. Indian Journal of Pharmaceutical Sciences. 2023; 85(1). https://doi.org/10.36468/pharmaceutical-sciences.1083
6. Pradhan BK, Badola HK. Ethnomedicinal plant use by Lepcha tribe of Dzongu valley, bordering Khangchendzonga Biosphere Reserve, in north Sikkim, India. Journal of Ethnobiology and Ethnomedicine. 2008; 4(1):22. https://doi.org/10.1186/1746-4269-4-22 PMid:18826658 PMCid:PMC2567294.
7. Panda S, Devi YL, Pal PK. Use and preference of medicinal plants among forest fringe indigenous communities in eastern sub-Himalayan region: a case study. InBioprospecting of Ethnomedicinal Plant Resources. Apple Academic Press; 2024; 185-195.
8. Idrisi MS, Badola HK, Singh R. Indigenous knowledge and medicinal use of plants by local communities in Rangit Valley, South Sikkim, India. NeBIO. 2010; 1(2):34-45.
9. Das T, Mishra SB, Saha D, Agarwal S. Ethnobotanical survey of medicinal plants used by ethnic and rural people in Eastern Sikkim Himalayan region. African Journal of Basic and Applied Sciences. 2012; 4(1):16-20.
10. Lama MP. Sikkim human development report. Esha Beteille, Social Science Press. 2001.
11. Rawat GS, Tambe S. Sikkim Himalaya: unique features of biogeography and ecology. Biodiversity of Sikkim. Information and Public Relations Department, Government of Sikkim. 2011; 542:1-2.
12. Rahman H, Karuppaiyan R. Agrobiodiversity of Sikkim. Climate change in Sikkim: pattern, impact and initiatives. ML Arrawatia and S Tambe(Ed.), Department of Information and Public Relations, Government of Sikkim, Gangtok. 2011; 403-428.
13. Polat R, Güner B, Babacan EY, Çakılcıoğlu U. Survey of wild food plants for human consumption in Bingöl (Turkey). Indian Journal of Traditional Knowledge. 2017; 16(3):378-384.
14. Güneş S, Savran A, Paksoy MY, Çakılcıoğlu U. Survey of wild food plants for human consumption in Karaisalı (Adana-Turkey). Indian Journal of Traditional Knowledge, 2018; 17 (2): 290-298.
15. Bharati KA, Sharma BL. Plants used as ethnoveterinary medicines in Sikkim Himalayas. Ethnobotany Research and Applications. 2012; 10:339-356. https://doi.org/10.17348/era.10.0.339-356
16. Badola HK, Pradhan BK. Plants used in healthcare practices by Limboo tribe in south-west of Khangchendzonga biosphere reserve, Sikkim, India. Indian Journal of Traditional Knowledge. 2013; 12(3):355-369.
17. Lepcha TT, Pradhan P, Gaira KS, Badola HK, Shahid M, Singh M. Ethnomedicinal use of plants by Bhutia tribe in Sikkim Himalaya. Proceedings of the 1st Himalayan Researchers Consortium. 2019; 1:71-78.
18. International Plant Names Index official website [Online], available; 2026, https://www.ipni.org/ [Accessed on 20.01.2026].
19. The Plant list official website [Online], available; 2026, http://www.theplantlist.org/tpl1.1/search [Accessed on 20.01.2026].
20. The Botanical Survey of India official website [Online], available; 2026, https://bsi.gov.in/ [Accessed on 20.01.2026].
21. International Society of ethnobiology official website [Online], available; 2026, https://www.ethnobiology.net/ [Accessed on 20.01.2026].
22. Sikkim Forest official website [Online], available; 2024, http://sikkimforest.gov.in/ [Accessed on 24.05.2024].
23. Dossou-Yovo HO, Vodouhè FG, Kaplan A, Sinsin B. Application of ethnobotanical indices in the utilization of five medicinal herbaceous plant species in Benin, West Africa. Diversity. 2022;14(8):612.
24. Kirchherr J, Charles K. Enhancing the sample diversity of snowball samples: recommendations from a research project on anti-dam movements in Southeast Asia. PloS one. 2018; 13(8):e0201710. https://doi.org/10.1371/journal.pone.0201710 PMid:30133457 PMCid: PMC6104950.
25. Tamang S, Singh A, Bussmann RW, Shukla V, Nautiyal MC. Ethno-medicinal plants of tribal people: a case study in Pakyong subdivision of East Sikkim, India. Acta Ecologica Sinica. 2023; 43(1):34-46. https://doi.org/10.1016/j.chnaes.2021.08.013
26. Bhutia KN, Basnett DK, Bhattarai A, Bhutia S. Herbal products sold in Sikkim Himalaya region–India: a mini survey. Global Journal of Medical Pharmaceutical and Biomedical Update. 2023; 18. https://doi.org/10.25259/GJMPBU_43_2022
27. Nepal A, Jana S, Bhutia S. Review on medicinal plants of Sikkim Himalayan Region with emphasis on anticancer study. Journal of Applied Pharmaceutical Science. 2024; 14(2):13-26. https://doi.org/10.7324/JAPS.2024.162372

28. Ullah N, Ullah B, Kaplan A, Dossou-Yovo HO, Wahab S, Iqbal M. Quantitative ethnobotanical study of medicinal plants used by local communities in Chamla Valley, Buner District, Pakistan. Ethnobotany Research and Applications. 2024;28:1-22.
29. Sikarwar RL. The legacy of Sir JD Hooker in Indian Plant Taxonomy. Phytotaxonomy. 2018; 18:1-6.
30. Umair M, Altaf M, Bussmann RW, Abbasi AM. Ethnomedicinal uses of the local flora in Chenab riverine area, Punjab province, Pakistan. Journal of Ethnobiology and Ethnomedicine. 2019; 15(1):7. https://doi.org/10.1186/s13002-019-0285-4 PMid:30709360.
31. Ranil RH, Pushpakumara DK, Samita S, Wijesundara DS, Dhanasekara DU. Variation of three co-occurring taxa of the genus *Cyathea* in Singharaja and Kanneliya lowland rain forests of Sri Lanka. Tropical Agricultural Research. 2010; 21(2). https://doi.org/10.4038/tar.v21i2.2595
32. Ahmad M, Sultana S, Fazl-i-Hadi S, Ben Hadda T, Rashid S, Zafar M, Khan MA, Khan MP, Yaseen G. An ethnobotanical study of medicinal plants in high mountainous region of Chail valley (District Swat-Pakistan). Journal of Ethnobiology and Ethnomedicine. 2014; 10(1):36. https://doi.org/10.1186/1746-4269-10-36 PMid:24739524.
33. Tardío J, Pardo-de-Santayana M. Cultural importance indices: a comparative analysis based on the useful wild plants of Southern Cantabria (Northern Spain). Economic botany. 2008; 62(1):24-39. https://doi.org/10.1007/s12231-007-9004-5
34. 34.Çakılcıoğlu U. An ethnobotanical field study: traditional foods production and medicinal utilisation of *Gundelia* L. species in Tunceli (Turkey). Indian Journal of Traditional Knowledge. 2020; 19(4):714-718. https://doi.org/10.56042/ijtk.v19i4.44507
35. Friedman J, Yaniv Z, Dafni A, Palewitch D. A preliminary classification of the healing potential of medicinal plants, based on a rational analysis of an ethnopharmacological field survey among Bedouins in the Negev Desert, Israel. Journal of Ethnopharmacology. 1986; 16(2-3):275-287. https://doi.org/10.1016/0378-8741(86)90094-2
36. Sreekeesoon DP, Mahomoodally MF. Ethnopharmacological analysis of medicinal plants and animals used in the treatment and management of pain in Mauritius. Journal of Ethnopharmacology. 2014; 157:181-200. https://doi.org/10.1016/j.jep.2014.09.030 PMid:25261690.
37. Sherpa MT, Mathur A, Das S. Medicinal plants and traditional medicine system of Sikkim: a review. World Journal of Pharmacy and Pharmaceutical Sciences. 2015; 4(2):161-184.
38. Mandal D, Panda AK, Rana M. Medicinal plants used in folk medicinal practice available in rich biodiversity of Sikkim. Environment and Ecology. 2013; 31(3A):1445-1449.
39. Sikkim Forest official website [Online], available; 2026, http://sikkimforest.gov.in/ [Accessed on 20.01.2026].

Author Contribution

T.U. and S.B. are responsible for the selection of the survey topic and the design of the survey protocol; S.D.S. and S.B. are involved in the major data collection by doing field visits, face-to-face interaction with traditional herbalists and other informants. S.B. and T.U. are responsible for the guidance of the survey work till the end. S.B., B.C., S.B. and S.D.S. contributed to drafting, designing, formatting and referencing of this draft article and communicating with a scientific esteemed journal having a good reputation in the scientific fields. All authors have read and agreed to the published version of the manuscript.