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Ethnomedicinal study of plants used by Magar community of Sangurigadhi rural municipality of Dhankuta district, Eastern Nepal

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Abstract
This study has been carried out to document and analyze the traditional medicinal knowledge of the Magar community in Namje, Dhankuta, with emphasis on the use of medicinal plants. A total of 40 species from 32 families were recorded, with Asteraceae being the most represented. The community relies on these plants to treat ailments such as high blood pressure, diarrhea, fractured bones, jaundice, gastric problems, wounds, cough, and fever. *Bergenia ciliata* had the highest use value (0.9), highlighting its cultural and therapeutic importance. The findings underline the Magar community's strong reliance on plant-based remedies for primary healthcare and the rich ethnomedicinal heritage that faces threats from environmental change, infrastructure development, and waning interest among youth. The study stresses the need for urgent in-situ and ex-situ conservation, alongside systematic documentation and recognition of indigenous knowledge, both for cultural preservation and sustainable bioprospecting that ensures fair benefit-sharing with local communities.

Keywords: Bioprospecting, Medicinal plants, Namje, Traditional knowledge, Use value

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Introduction
Ethnomedicine is the study of traditional health practices, cultural beliefs, and the use of natural resources, particularly medicinal plants, employed by local and Indigenous communities for the diagnosis, prevention, and treatment of diseases. It reflects community-specific knowledge systems and serves as a foundation for ethnopharmacological research and modern drug discovery (Duche-Pérez et al., 2024). Traditional medicine continues to play a vital role in primary healthcare for hundreds of millions worldwide, especially in rural and indigenous communities where biomedical access is limited and cultural traditions sustain plant based healing systems.

The World Health Organization (WHO, 2019) has highlighted the global significance of traditional and complementary medicine, urging evidence based integration, safety, and quality standards. Nepal, a biodiversity hotspot with more than 125 ethnic groups, is particularly rich in ethnobotanical knowledge. National syntheses record 1,515-2,331 medicinal and aromatic plant taxa used across ecological belts, with the mid hills and mountain districts showing the highest richness (Kunwar et al., 2022). Local studies expand this picture, documenting species, preparations, and ailment coverage while also revealing knowledge variation by age, occupation, and other social factors (Das et al., 2021; Karki et al., 2023a; Das et al., 2024a). The Magar, one of Nepal's largest Indigenous nationalities with traditions of gathering, herding, and ritual healing, remain unevenly documented, with most studies focused on the western and central hills; recent work from Arghakhanchi highlights their extensive knowledge (Bhattarai et al., 2025).

The eastern mid hills of Nepal, including Sangurigadhi, combine ecological richness and cultural diversity, making them potential hotspots of ethnomedicinal diversity. Mid-elevations (1,000-2,500 m) host dense human settlement, agroforestry systems, and active exchange networks (Kunwar et al., 2022). However, these landscapes are vulnerable to climate-related changes in temperature and rainfall that may disrupt the distribution of moisture dependent species and complicate seasonal gathering (Chaudhary et al., 2025). Meanwhile, knowledge transmission is shifting from traditional apprenticeship and ritual forms toward more fragmented modes influenced by migration and modern schooling. Studies consistently show steep age related gradients in knowledge retention (Karki et al., 2023b). Among the Magar, younger generations in central and western Nepal exhibit reduced engagement due to habitat change and socio-economic pressures (Budha-Magar et al., 2020).

Contemporary ethnobotany increasingly employs quantitative indices to assess cultural salience, therapeutic breadth, and conservation priorities, with the Use Value (UV) index of Phillips and Gentry (1993a, 1993b) remaining widely applied to measure species importance through informant use reports. It contributes to reproducible national databases and supports the safeguarding of biocultural heritage, which is vital for community health initiatives, equitable benefit sharing in bioprospecting, and adaptive conservation amid environmental and cultural change (WHO, 2019; Kunwar et al., 2022; Chaudhary et al., 2025). Given that much of Nepal's ethnomedicinal knowledge remains undocumented and is threatened by modernization, environmental change, and waning intergenerational transmission, this study has been designed to fill this gap by documenting the medicinal plant species used by the Magar community of Sangurigadhi and Namje, Dhankuta, identifying the ailments they treat, and assessing the cultural significance of key species through use value analysis.

Materials and Methods

Study area

The study area is Namje Village, situated in Ward No. 6 of Sangurigadhi Rural Municipality, Dhankuta District, within Koshi Province of eastern Nepal (Fig. 1). Geographically, it lies in the Mahabharat Hill Range at about 1,391 m above sea level (Mapcarta, 2024). Its coordinates, 26.858° N latitude and 87.345° E longitude, place it in a typical mid-hill environment characterized by terraced landscapes and wide views of valleys and ridges. Dhankuta District as a whole spans elevation from 120 m to 2,702 m, resulting in diverse microclimates and ecological zones (SWMO Dhankuta, 2024).

Data collection and herbarium preparation

Ethnomedicinal data were collected through semi-structured interviews, focus group discussions, participant observation, and guided field walks with local informants, following standard protocols (Martin, 1995; Jain, 2016). Ten key informants (five men and five women), including traditional healers (Dhamis/Jhakris) and elders, were selected based on knowledge and community reputation, with verbal consent obtained before interviews. Information on local plant names, parts used, preparation methods, and therapeutic applications was systematically documented, while plant specimens were collected, photographed, and identified using botanical references. Data reliability was ensured through repeated visits and cross-verification among informants (Cotton, 1996). Voucher specimens were collected for each cited plant species following standard herbarium procedures (Bridson and Forman, 2000). Specimens were pressed, dried, and mounted on herbarium sheets with labels indicating scientific name, local name, collection date, habitat, and collector information. Identification was confirmed using regional floras (Grierson and Long, 1983–2001). Prepared specimens were deposited in the Department of Botany Herbarium, Mahendra Morang Adarsh Multiple Campus, Biratnagar, Nepal, for future reference.

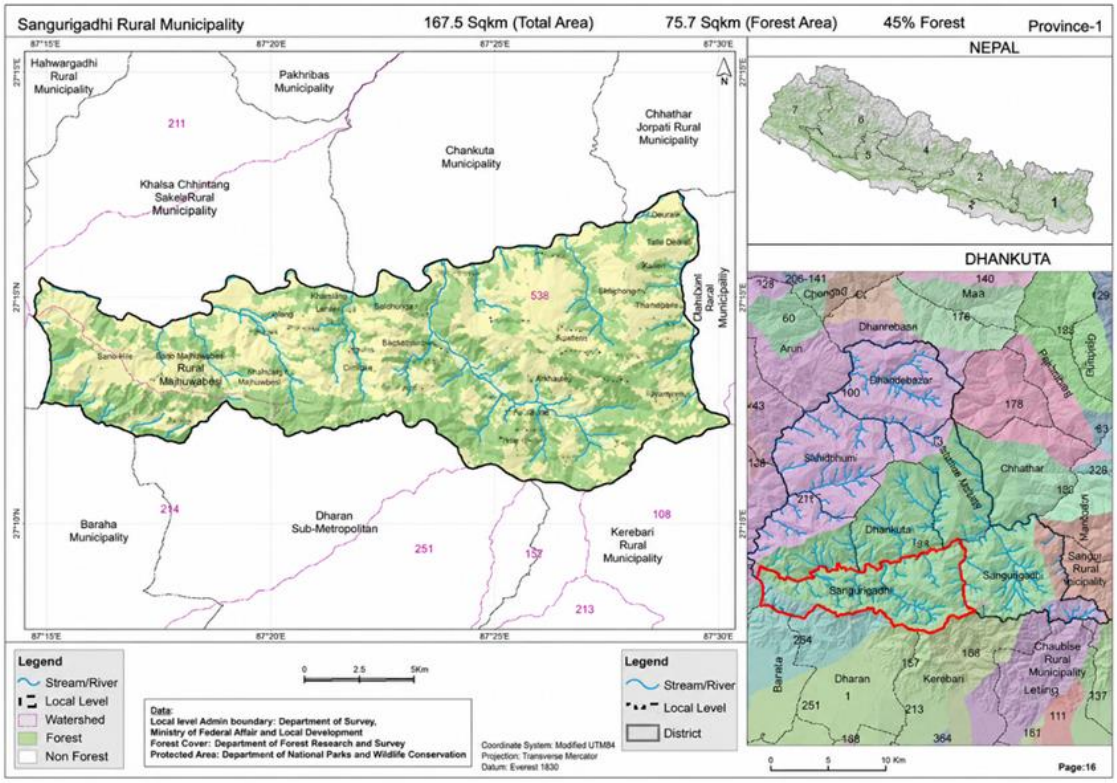

Figure 1. Map of Study Area

***Use value* (UV)**

The Use Value (UV) was calculated using the formula: UV = ∑U/N, where U is the number of use-reports for a species, and N is the total number of informants (Dasari and Nagpal, 2022). A higher UV indicates greater ethnomedicinal importance.

Results

A total of 40 medicinal plant species belonging to 32 families were documented.

Herbs accounted for the largest proportion, followed by shrubs, trees, and climbers. The family Asteraceae contributed the highest number of species. The plants were used to treat 20 categories of ailments, with high blood pressure and diarrhea having the largest number of remedies. *Bergenia ciliata* recorded the highest UV (0.90), followed by *Swertia chirayita* (0.60) and *Centella asiatica* (0.50). Most remedies involved raw use, paste, or decoctions (Table 1).

Table 1. List of documented plant species used as ethnomedicine by Magar community at Namje, Dhankuta

S.N.	Scientific Name	Local Name	Family	Habit	Source	Parts Used	Ailments Treated	Mode of Application
	Achyranthes aspera L.	Ulto jhar	Amaranthaceae	Herb	Wild	Stem	Expulsion of the placenta after childbirth	Raw, oral
	Ageratina adenophora (Spreng.) R.M. King & H. Rob	Rato Banmara /Rauney/kali jhar	Asteraceae	Shrubs	Wild	Leaves	Cut wounds	Crushed, external
	Aloe vera (L.) Burm. f.	Ghiukumari	Asphodelaceae	Herb	Cultivated	Gel	Fire burn	Raw, external
	Ampelocissus divaricata (Wall. ex M.A. Lawson) Planch.	Puruni lahara	Vitaceae	Climber	Wild	Sap	Neck pain	Raw, oral
	Artemisia indica Wild.	Tetepati/ Ausadhi	Asteraceae	Herb	Wild/ Cultivated	Leaves, Apical part	High Blood pressure	Raw oral
	Astilbe grandis Stapf ex E.H.Wilson	Thulo okhati	Saxifragaceae	Herb	Wild	Rhizome	Broken or fractured bones	Paste, external
	Berberis aristata DC.	Chutro	Berberidaceae	Shrub	Wild	Bark stem	Jaundice Diabetes	Decoction Stem soaked, oral
	Bergenia ciliata(Haw.) Sternb.	Pakhanved	Saxifragaceae	Herb	Cultivated	Rhizome, seeds	Cough, weakness, body ache ,diarrhea	Decoction, crushed and dried, oral
	Cannabis sativa L.	Ganja	Cannabaceae	Herb	Wild	Leaves	Diarrhea in livestock	Raw, oral
	Centella asiatica (L.) Urb.	Ghodtapre	Apiaceae	Herb	Wild	Leaves, stems	Internal neck pain Pneumonia Oral infection	Crushed & Liquid extract, oral
	Chromolaena odorata (L.) R.M.King & H.Rob.	Seto banmara	Asteraceae	Herb	Wild	leaves	Cut wounds	Crushed, external
	Cissus quadrangularis L.	Pakhey hadjoda	Vitaceae	Succulent (herb)	Wild	leaves	Broken or fractured	Crushed, external Paste, bandage
	*Clinopodium unbrosum (*Wall. ex Benth.) Kuntze	Nasuwa	Lamiaceae	Herb	Wild	leaves	Cut wounds	Crushed, external
	Cucurbita foetidissima HBK	Hadjoda lahara	Cucurbitaceae	Herb (vine)	Wild	Leaves, stem	Broken /fractured bones	Paste, external
	Curcuma caesia Roxb.	Kali beshar	Zingiberaceae	Shrub	Cultivated	Rhizome	Green stool	Paste, oral

	Cuscuta reflexa Roxb.	Magar ko janai/ Janai lahara	Convolvulaceae	Parasitic herb	Wild	Whole plant	Jaundice	Raw, dried powdered, oral
	Dendrobium crumenatum Sw.	Sunakhari	*Orchidaceae*	Herb	Wild/ Cultivated	Seeds	Melasma	Paste, external
	Diplazium maximum (Bedd.) C.Chr.	Kali nigro	Athyriaceae	Herb	Wild	Root	Diarrhea Fecal impaction	Paste, oral
	Drymaria cordata (L.) Willd. ex Schult.	Abijole	Caryophyllaceae	Herb	Wild	Whole plants	Diarrhea in child, stomache	Paste Juice, oral
	Dudleya pulverulenta (Nutt.) Britton & Rose	Not found	Crassulaceae	Herb	Wild	leaf	High Blood pressure	Raw
	Juglans regia L.	Okhar	Juglandaceae	Tree	Cultivated	Hard cover of fruits	Pneumonia	Paste, oral
	Justicia adhatoda L.	Basak	Acanthaceae	Shrub	Wild	stem	Malaria fever	Raw, oral
	Kalanchoe pinnate (Lam.) Pers.	Pathar chatta	Crassulaceae	Herb	Wild/	Leaf	High B.P.	Raw, oral
	*Lyonia ovalifolia (*Wall.) Drude	Angeri	Ericaceae	Shrub	Wild	Apical part	Skin itching	Crushed, external
	Mallotus philippensis (Lam.) Müll.Arg.	Sindure	Euphorbiaceae	Tree	Wild	Outer cover	Gastric	Decoction, oral
	Mucuna macrocarpa **Wall.**	Baldhyangro	Fabaceae	Woody climber	Wild	latex	Cut wounds	Raw, external
	*Myrica esculenta*Buch.-Ham. ex D.Don	Kafal	Myricaceae	Tree	Wild	Outer cover	Stomachache Gastric	Decoction, oral
	Nephrolepis cordifolia (L.) C.Presl	Pani amala	Nephrolepidaceae	Herb	Wild	Tuber	Jaundice	Raw, oral
	Ocimum tenuflorum L.	Tulsi	Lamiaceae	Herb	Cultivated	Leaves, apical part	Cough, fever, Sore throat	Raw,decoction, oral
	Phytolacca acinosa Roxb.	Jaringo	Phytolaccaceae	Shrub	Cultivated	Apical part Root	Body ache Jaundice	Cooked Crushed and extract, oral
	Plantago major L.	Local chiraito	Plantaginaceae	Herb	Wild	Leaf	Piles	Powdered
	Rhododendron arboreum Sm.	laliguras	Ericaceae	Shrub	Wild	Petals	Fish bone stuck in throat	Raw, oral
	Rubus ellipticus Sm.	Rato Aiselu	Rosaceae	Shrub	Wild	Apical part	Diarrhea	Raw, oral
	Rubus niveus Thunb.	Seto aiselu	Rosaceae	Shrub	Wild	Apical part	Bloody stool, Diarrhea	Raw, oral
	Smilax ovalifolia Wall. ex A.DC.	Kukur daine	Smilacaceae	Climbing shrub	Wild	Root	Pneumonia	Paste, oral
	Solanum viarun dunal Dunal	Kalchedo	Solanaceae	Shrub	Wild	Seeds	Tooth cavity	Burned, external
	Swertia	Chiraito	Gentianaceae	Herb	Wild	Leaf	Fever, High	Decoction,

	chirayita(Roxb. ex Fleming) Karst.						B.P., Weakness, Headache, Outbreak on chicken	Raw, oral
	Tinospora cordifolia (Willd.) Miers	Gurjo	Menispermaceae	Herb	Wild / Cultivated	Stem	High BP, corona	Boiled and juice extract, oral
	Urtica dioica L.	Sisnu	Urticaceae	Herb	Wild	leaves	Broken bones in livestock's	Paste, external
	Vernonia amygdalina Del.	Not found	Asteraceae	Shrub	Cultivated	leaves	High B.P.	Raw, oral

Habit form of documented plants

In terms of plant habit, herbs accounted for the largest proportion of medicinal plants, followed by shrubs, trees, and a few ferns. The following bar graph illustrates the distribution of medicinal plant species according to their growth habit (herb, shrub, climber, etc.). It presents both the number of species recorded under each habit category and their corresponding percentage with respect to the total number of documented species (Fig. 2).

Form of medication (preparation method)

The majority of medicinal plants are used in their raw form or after simple physical processing, such as drying, grinding into powder, preparing infusions or teas, and extracting juice. The following pie chart illustrates the various forms in which the documented medicinal plants are used for the treatment of ailments. It shows the proportion of plant preparations such as raw, paste, crushed, decoction, juice, and others, highlighting the most commonly practiced modes of traditional remedy preparation among the Magar community (Fig. 3).

Plant families and percentage of ailments treatment

The ethnomedicinal survey in Namje, Dhankuta, revealed that a total of 40 plant species belonging to 32 families are used to treat various ailments. Among these, the family Asteraceae was dominant, contributing 4 species (11.11% of total ailment cases treated), reflecting its widespread ethnomedicinal importance across the Himalayan region. Several families, including Saxifragaceae, Crassulaceae, Rosaceae, Vitaceae, and Ericaceae, each contributed 2 species (5.56%), highlighting their moderate but consistent role in traditional healthcare. The remaining 26 families, such as Lamiaceae, Solanaceae, Cucurbitaceae, Zingiberaceae, and Fabaceae, were represented by a single species each (2.78%). This distribution indicates that while a few families provide multiple medicinally important species, the majority of families are represented by only one species, underlining the broad taxonomic diversity of the local pharmacopoeia. Such diversity suggests that the Magar community of Namje draws upon a wide ecological base for healthcare needs, integrating both dominant and less-represented plant families into their ethnomedicinal system (Fig. 4).

Plant species used to treat various ailments

The ethnobotanical survey revealed that the most frequently treated ailments among the Magar community were high blood pressure (30% of documented species) and diarrhea (25%), indicating that cardiovascular and gastrointestinal issues are common health concerns in the region. These were followed by treatments for fractured bones (15%), jaundice (10%), cut wounds (10%), and cough (10%), reflecting the community's reliance on plant-based remedies for both acute injuries and chronic conditions. The prominence of these treatments underscores the dependence of the Magar people on traditional medicine, particularly in areas where access to modern healthcare services is limited or inconsistent. Beyond general health issues, certain practices

carry significant cultural and reproductive importance. For instance, *Achyranthes aspera* ("Ulto Jhar") was traditionally used to expel the placenta after childbirth, demonstrating the community's deep ethnomedicinal knowledge regarding women's reproductive health. Such practices highlight not only the practical utility of medicinal plants but also the intergenerational transfer of specialized knowledge, which often fills gaps left by conventional biomedical systems (Fig. 5).

Use value (uv) of reported medicinal plants

In Namje, Dhankuta, the Use Value (UV) of 40 reported medicinal plants shows notable variation. Among them, *Bergenia ciliata* (Pakhanved, UV = 0.90) is the most frequently used species, indicating its high medicinal significance in the community. This is followed by *Swertia chirayita* (Chiraito, UV = 0.60) and *Centella asiatica* (Ghodtapre, UV = 0.50), both widely recognized for their therapeutic applications. *Ageratina adenophora* and *Cissus quadrangularis* have a UV of 0.40, reflecting moderate usage. In contrast, the majority of species (25 plants) recorded a UV of only 0.10, suggesting limited or specific uses within traditional medicine. Overall, the data highlights that while a few plants are highly valued and frequently utilized, most species are used sparingly, revealing an unequal distribution of traditional medicinal knowledge and reliance within the community (Fig. 6).

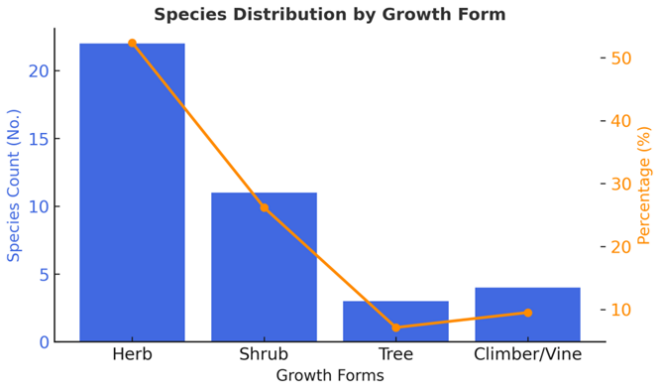

Figure 2. Habit of documented plants

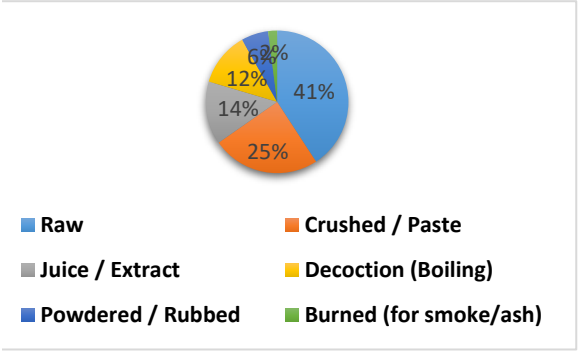

Figure 3. Mode of preparation

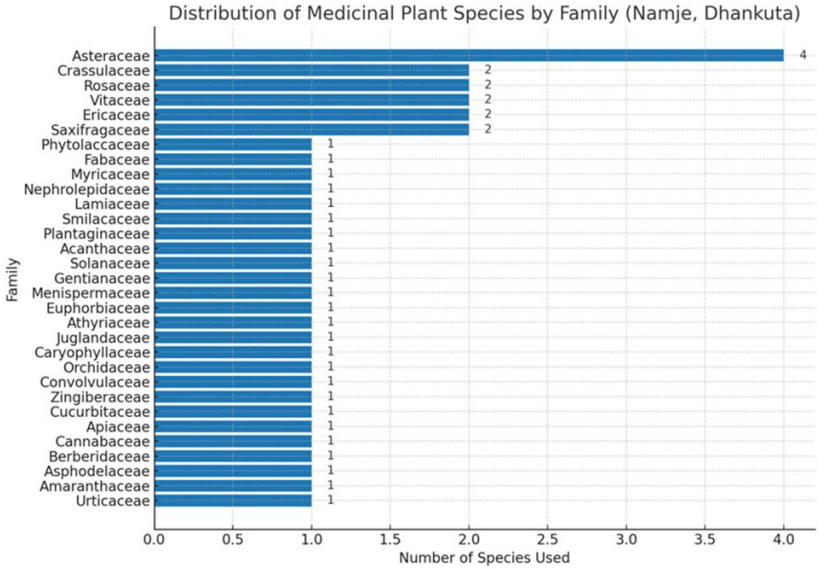

Figure 4. Distribution of Medicinal plants by family at Namje, Dhankuta

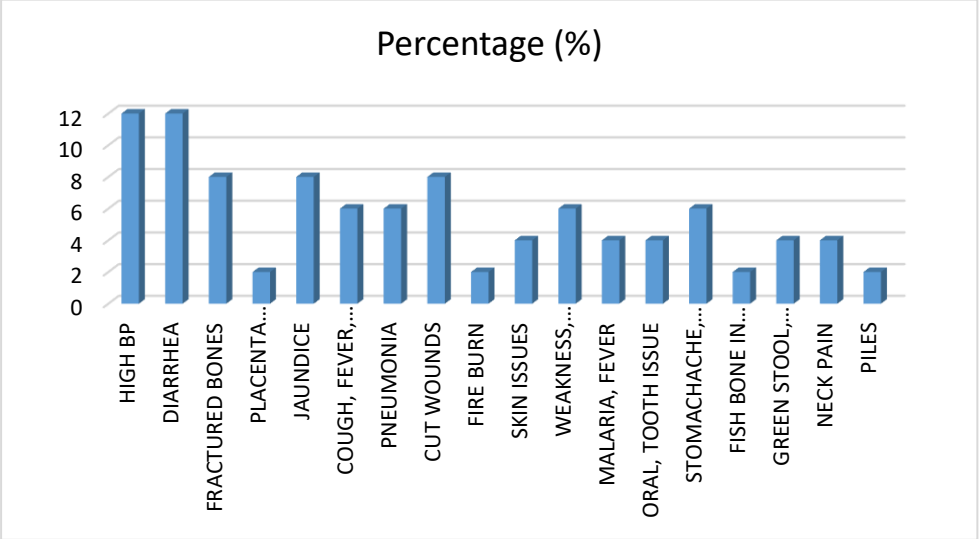

Figure 5. Uses of plant species used to treat various ailments

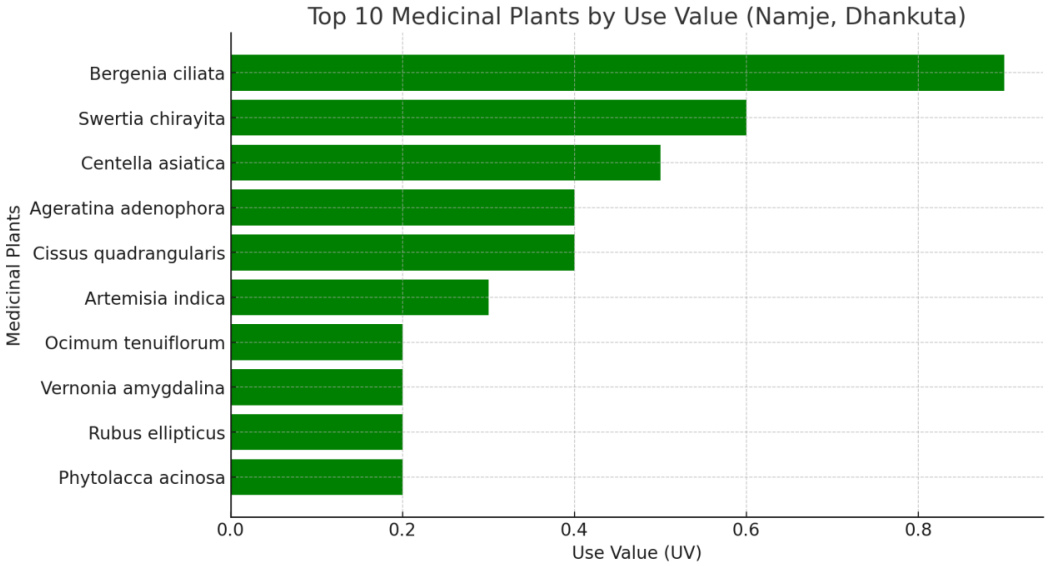

Figure 6. Use Value (Uv) of Reported Medicinal Plants at Namje, Dhankuta

Discussion

This study documented 40 medicinal plant species belonging to 32 families used by the Magar community of Namje, Dhankuta, reflecting the ecological richness of the mid-hill region and the community's close relationship with local flora. The dominance of Asteraceae aligns with patterns observed in other parts of Nepal, where the family is consistently prominent in ethnomedicinal research (Acharya, 2012; Budha-Magar et al., 2020). The most frequently treated ailments were high blood pressure and diarrhea, with additional uses for fractured bones, jaundice, wounds, and cough. Such findings demonstrate reliance on plant-based remedies for both chronic and infectious conditions in contexts where biomedical access is limited, a trend similarly noted among Rai, Limbu, and indigenous groups in Saptari (Das et al., 2024a, 2024b; Paudyal et al., 2021).

Certain species carried distinct cultural importance, such as Achyranthes aspera used for placenta expulsion, underscoring the Magar's traditional knowledge of reproductive health (Rai & Singh, 2015). Several other uses overlapped with neighboring groups, including Ageratina adenophora for wounds, Ageratum conyzoides for diarrhea, Aloe vera for burns, and Cissus quadrangularis for fractured bones,

pointing to cultural exchange and shared ecological adaptation (Das et al., 2021). At the same time, unique practices in Namje highlight localized ecological availability and cultural traditions. The decline of Dhami and Jhankri healers, combined with youth migration, threatens intergenerational transmission of this knowledge, raising concerns about its preservation for future generations.

Overall, the findings reveal that the Magar community of Namje maintains a rich yet vulnerable ethnomedicinal tradition of ecological, cultural, and healthcare value. Urgent documentation, validation, and conservation are necessary not only for safeguarding biocultural heritage but also for providing potential pharmacological insights and supporting sustainable healthcare alternatives in biodiversity-rich regions of Nepal.

Conclusion

This ethnobotanical study recorded 40 medicinal plant species from 32 families used by the Magar community of Namje, Dhankuta. Asteraceae was most represented, with plants mainly treating high blood pressure and diarrhea (6 species each), followed by fractures (5), jaundice, stomachache, and wounds (4 each). Unique uses included placenta expulsion (Achyranthes aspera) and treating fish bones stuck in the throat. The highest use value was for Bergenia ciliata (0.90), followed by Swertia chirayita (0.60) and Centella asiatica (0.50). The findings show strong reliance on herbal remedies for primary healthcare and their pharmacological potential, but highlight threats from climate change, development, and declining youth interest, underscoring the need for conservation and community engagement.

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