

Ethnobotanical appraisal of the medicinal flora and funga in Rukum West District, Nepal

Journal:	<i>Botany</i>
Manuscript ID	cjb-2025-0096.R2
Manuscript Type:	Research Article
Date Submitted by the Author:	06-Jan-2026
Complete List of Authors:	Bhandari, Khadka ; Tribhuvan University, Central Department of Botany Khakurel, Dhruva ; Swedish University of Agricultural Sciences (SLU), Umeå Plant Science Centre (UPSC) Uprety, Yadav; Tribhuvan University, Central Department of Botany Rajbhandary, Sangeeta ; Tribhuvan University, Central Department of Botany
Is the manuscript for consideration in a Special Issue or Collection?:	Indigenous Knowledges and Approaches to Botanical Research
Keyword:	biodiversity, deforestation, traditional knowledge, ethnomedicine, useful flora, availability hypothesis

SCHOLARONE™
Manuscripts

Ethnobotanical appraisal of the medicinal flora and funga in Rukum West District, Nepal

Khadka Bahadur Bhandari¹, Dhruva Khakurel², Yadav Uprety^{1,*} and Sangeeta Rajbhandary¹

¹Central Department of Botany, Tribhuvan University, Kirtipur, Kathmandu

²Umeå Plant Science Centre (UPSC), Swedish University of Agricultural Sciences (SLU), S901-83, Umeå, Sweden

*Corresponding author email: yadavuprety@gmail.com

Abstract

Documenting Indigenous and local knowledge is crucial to safeguard it amid biocultural crises. This study employed both qualitative and quantitative ethnobotanical methods to document the medicinal flora and fungi used by a mixed community in one of the least explored regions of western Nepal. A total of 124 species used to treat as many as 63 diseases and disorders were reported by 52 purposively selected informants. Asteraceae and Fabaceae were the most commonly used plant families, with herbs being the dominant growth form, represented by 64 species. Leaves were the most frequently used plant parts in medicinal formulations, followed by roots. Ninety-five percent of the species were gathered from the wild and primarily used to treat dermatological and gastrointestinal conditions, for which higher informant agreement was also recorded. Additionally, *Dactylorhiza hatagirea* and *Neopicrorhiza scrophulariiflora* were the most valued species among the respondents. While this study identified a few novel uses, reports of similar uses for various species highlight the cultural exchange of knowledge and practices among communities. This study also examined threats to medicinal plants and recommended raising public awareness, along with developing locally adapted conservation strategies.

Keywords: availability hypothesis, biodiversity; deforestation; traditional knowledge; ethnomedicine; useful flora

1. Introduction

Plants and people are intricately connected, as the use of plants has existed since the dawn of human civilization. Plants are critical in meeting basic needs such as food, medicine, fibers, dyes, and energy, among many other purposes. Indigenous Peoples and local communities use wild species of plants for subsistence and income generation worldwide. The use of such species is deeply rooted in culture, and thus, it is central to the identity and existence of Indigenous Peoples (IPBES, 2022). Ethnobotany deals with this intricate relationship and reveals important species that could lead to drug discovery and economic prosperity (Kumar et al., 2021; Uprety et al., 2010). However, the knowledge, skills, and practices that Indigenous Peoples held have been declining as rapid socio-economic changes have taken place in the regions where they live. Therefore, documenting traditional knowledge helps protect it in the face of global change (Łuczaj, 2023) and aids in preserving biodiversity at the brink of the sixth mass extinction (Cowie et al., 2022).

It has been estimated that some 10% of the total vascular plant species, of the total 350,000 known species, are used as medicine worldwide (Antonelli et al., 2023). This proportion varies country to country, as up to some 44% of known flora is used as medicinal in India, followed by Sri Lanka (35.2%), Vietnam (29.6%), Nepal (29.36%), China (27.9%) and Indonesia (21.4%) (Oli et al., 2025). This documentation was made possible through scholarly work in ethnobotany worldwide. As there is growing interest among academics to study the indigenous use of plants in new areas, the numbers will likely increase in the future. However, the general loss of Indigenous knowledge due to socio-economic changes, migration, and urbanization should also be acknowledged.

Nepal is small but disproportionately rich in biodiversity, mostly because of its diverse topography and climatic variations (Miehe et al., 2015). Likewise, socio-cultural diversity, with 142 caste/ethnicities speaking 124 mother tongues (NSO, 2021), has resulted in a vast diversity of medicinal use of local flora and funga (Kunwar et al., 2022) revealed through ethnobotanical appraisals (e.g., Bhattarai, 1992; Manandhar, 1995; Bhatta, 1999; Uprety et al., 2009; Bhattarai et al., 2010; Kunwar et al., 2010; Rokaya et al., 2010; Ambu et al., 2020; Karki et al., 2023; Khakurel et al., 2022). Yet, many parts of the country, mostly the middle mountain districts of western Nepal, remained unexplored, resulting in low records of used species in the literature (Kunwar et al., 2022). Therefore, this study aims to fulfil this gap by documenting medicinal plants and fungi from the Rukum West district of the middle mountain region of Nepal. This study also stemmed from the interest of the local government that sought to document the useful species within its jurisdiction for conservation and management planning.

2. Materials and methods

2.1 Description of the study area

This study was conducted in the Rukum West district of Karnali Province, covering parts of Aathbiskot Municipality (Figure 1). The ethnobotanical information was collected from ward numbers one to six (Sylakhadi-Gotamkot and Daaje Danphe Ghetma areas) of the municipality, whereas herbarium specimens were collected from the Chitripatan mountain region because

the informants cited the region for collecting medicinal plants. The Aathbiskot Municipality has 35,917 inhabitants (49.1% men and 50.9% women), distributed among 7,553 households consisting of mixed communities of Kshetri (40%), Bishwokarma (23.31%), Thakuri (12.61%), Magar (11.59%), Pariyar (4.15%), Mijar (3.96%), Brahman (1.60%), Sanyasi (1.58%), Gurung (0.35), Badi (0.33%), Sunuwar (0.19%), Gharti/Bhujel (0.16), Tharu (0.047%), and Musalman (0.03%), in an area of 560.34 km² (CSO, 2021). Of these, Magar, Gurung, Sunuwar, and Gharti/Bhujel belong to the Indigenous nationalities of Nepal. About seventy two percent of household heads were men, while 27.7% were women. The literacy rate was 70.1%, with a men's literacy rate of 76.79% and a women's literacy rate of 63.75%. Some ninety three percent of households use fuelwood as a major source of energy for cooking (CSO, 2021). The neighboring Rukum East district, particularly the Lukum village in Bhume Rural Municipality ward no. 1, holds an annual festival of Shamans during mid-July every year. This festival provides a unique opportunity to share knowledge among the Shamans, who also represent the study areas.

The Aathbiskot Municipality is characterized by the tropical to alpine bioclimatic regions, spanning from 783-5,779m above sea level, with a mean annual rainfall of 1,650 mm. The municipality falls within the Western Himalayan Broadleaf and Subalpine Conifer Forests, and Subalpine Scrub and Meadows ecoregions (TISC/NARMSAP 2002). The area is known for its rich biodiversity, including diverse vegetation. The dominant vegetation in the lower region consists of Sal (*Shorea robusta* C.F.Gaertn.), Sissoo (*Dalbergia sissoo* Roxb. ex DC.), Simal (*Bombax ceiba* L.), Khayar (*Senegalia catechu* (L.f.) P.J.H.Hurter & Mabb.), Chiuri (*Diploknema butyracea* (Roxb.) H.J.Lam), Malu lahara (*Phanera vahlii* (Wight & Arn.) Benth.), and Githa (*Boehmeria rugulosa* Wedd.), while the region from 2,200-2,700m consists of Oak and Alder (*Quercus* species and *Alnus nepalensis*) Forest and Oak and Laurel (*Quercus* species and *Ilex* species) Forest. The middle region (2,800-2,900m) consists of species such as *Ilex dipyrrena* and *Rhododendron arboretum*, while the region between 3,000-3,300m consists of *Tsuga* and Pine Forest. The upper region (3,400-3,500m) consists of *Rhododendron Betula* Forest. The higher elevation areas (3,500-4,200m) consist of alpine grasslands hosting numerous high-value medicinal plant species, including *Nardostachys jatamansi*, *Rheum australe*, *Dactylorhiza hatagirea*, *Neopicrorhiza scrophulariiflora*, and *Aconitum* species. The area above 4,200 m is mostly rocky with sparse vegetation.

[Figure 1]

2.2 Research design

2.2.1 Site selection and ethical approval

The Chitripatan mountain area is an ideal biogeographical location for studying medicinal plants due to its rich biodiversity and unique ecological conditions. The region's variation in altitude creates multiple microclimates that support a wide variety of plant species, many of which have medicinal value. Additionally, the presence of Indigenous communities and traditional healers, with enriched knowledge, enhances ethnobotanical relevance of the region.

Before undertaking this research, permission letters from the Department of Plant Resources, Ministry of Forests and Environment, and the Division Forest Office, Rukum West were

obtained. The objectives of the research were discussed with the local authorities and communities, and written consent was taken. Cultural sensitivities were respected, and their rights over traditional knowledge and natural resources were acknowledged throughout the study. Finally, verbal consent was taken from the respondents for recording their knowledge. The major results were shared with the knowledge holders and local authorities, verbally and in writing, following the research. Consent was also taken for the publication of the results in the form of a scientific paper from the respondents.

2.2.2 Ethnobotanical data collection

The study spanned three field visits in 2021 and 2022 (17-26 July (monsoon) and 16-28 October 2021 (post-monsoon), and 5-20 March 2022 (pre-monsoon)). Primary data was collected during these field visits. The required information regarding the population and households of the study area was taken from the secondary sources (CSO, 2021). The fieldwork consisted of two approaches, i.e., survey and inventory techniques (Cunningham, 2001; Martin, 1995). The primary data collection methods include Focus Group Discussions (FGDs), individual interviews, Key Informant Interviews (KIIs), community resources mapping, and transect walks.

Altogether five FGDs were conducted, with 9-12 people representing most of the ethnic groups, including traditional healers, community leaders, Jhakri/Dhami (Shamans), housewives, and elderly people of different ages and castes. Participants were provided with a comprehensive understanding of the purpose of the study and its importance. Basic information about local names, purpose of use, parts, mode of use, conservation status/threats, and trade value was recorded from these discussions. Participatory resource mapping was conducted during FGDs to locate the important habitats in the study area. Detailed information about the plant used in different categories was obtained through individual interviews and KIIs.

After the focus group discussions, 52 total informants (8 women and 44 men), including 12 key informants identified using purposive sampling, were interviewed to collect detailed information on the local use of plants employing a semi-structured questionnaire. Individual interviews were conducted with general informants (n=40), whereas specialized knowledge holders were identified as key informants who also validated information collected through individual interviews and FGDs. Of the total respondents, 12 were local healers, followed by local herbalists (12), farmers (9), Jhakri/Dhami (Shamans) (9), local leaders (7), housewives (2), and local traders (1). Of these, 31 respondents represent the Kshetri ethnic group, followed by Bishwokarma (12), Magar (7), Gurung (1) and Brahman (1). The majority of the respondents were above 50 years (60%) and illiterate (71%).

The smaller number of female participants was due to their reluctance to take part in discussions when men were present, reflecting cultural behavior. The key informants include 6 traditional healers, 4 medicinal plant collectors, and 2 housewives who frequently use medicinal plants. The careful and purposive identification of such informants was essential to ensure data validity, cultural sensitivity, and the reliability of recorded knowledge (Mengistu et al., 2024). Based on local suggestions, five local people participated in the transect walks, during which different plant specimens cited as medicine were collected.

2.2.3 Specimen collection and identification

The field notes and photographs were taken during the transect walks done in three different seasons. The collected specimens were tagged in the field. Finally, specimens were pressed, dried, identified, mounted, and preserved following (Forman and Bridson, 1989; Rajbhandary and Rajbhandary, 2015). Standard literature were used for identification (Hara et al., 1979, 1982; Hara and Williams, 1979; Polunin and Stainton, 1984; Stainton, 1988; Rajbhandari and Rai, 2017; Shrestha et al., 2022). Furthermore, for the doubtful species, identification was confirmed by comparing the species with herbarium specimens deposited at KATH (National Herbarium and Plant Laboratories, Godawari), Tribhuvan University Central Herbarium (TUCH), and digital specimens. Voucher specimens were deposited in TUCH. For nomenclature, The Plant List, Catalogue of Life, and Shrestha et al. (2022) were followed. Fungi of Nepal (Aryal, 2024) and Mushrooms of Nepal (Adhikari, 2000) were consulted for fungi.

2.2.4 Data Analysis

Data analysis includes a mix of qualitative and quantitative ethnobotanical methods. The knowledge about the use of medicinal plants was evaluated based on the number of medicinal plants mentioned by each informant. Quantitative indices such as Informant Consensus Factor (ICF), Fidelity Level (FL), and Percentage Respondents' Knowledge (Percentage use-value) were employed. Since it has been generally accepted that a single index can only provide limited information, especially for management and conservation goals, it is necessary to use a variety of indices for thorough data analysis. Microsoft Excel (2013) was used to calculate totals and percentages and to create tables and graphs.

Informant Consensus Factor

ICF measures the consensus or homogeneity in ethnobotanical knowledge shared by informants (Andrade-Cetto and Heinrich, 2011). This was calculated using the following formula:

$$ICF = \frac{Nur - Nt}{Nur - 1}$$

where Nur is the total number of use reports for each disease category, and Nt is the number of species used within that category. The ICF value ranges from 0 to 1, where 0 indicates no shared knowledge or exchange of information among informants and 1 reflects a high level of consensus or knowledge exchange (Heinrich et al., 1998).

Fidelity level

FL is calculated as the percentage of individuals who indicate that a given plant species is used to treat a specific disorder. It demonstrates which plants are most frequently chosen by the respondents for particular health concerns (Silambarasan et al., 2023). It is calculated using the following formula:

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

where Np is the number of informants that claimed use of a particular plant species for a particular disease and N is the total number of informants citing the species for any disease.

A high value of the FL reflects the frequent and preferential use of a particular plant species by informants for the treatment of a specific ailment within the study population. The FL metric is intended to quantitatively assess the relative significance or specificity of a species for addressing a particular therapeutic application.

Percentage Respondents' Knowledge (Percentage use-value)

PRK about the use of a particular species for disease treatment is defined as the proportion of study participants who possess awareness or understanding of the species' medicinal applications for specific health conditions (Tugume et al., 2016; Asiimwe et al., 2021). This metric quantitatively reflects the level of community knowledge related to the therapeutic use of the species. High values of PRK indicate high use reports for a plant, implying its relative importance to the local community for health care needs (Friedman et al., 1986). It is calculated using the following formula:

$$\text{PRK} = \frac{\text{Number of people interviewed citing the species}}{\text{Total number of respondents interviewed}} \times 100$$

Use Value

Use value of species (UV) is a quantitative index that reflects the relative importance of a species in local knowledge (Arulappan et al., 2015). It combines the number of reported uses by informants (Phillips and Gentry, 1993) and is calculated using the following formula:

$$\text{UV} = \text{UV}_i / \text{N}_i$$

where, UV_i is the number of use reports (citations or mentions) by each informant for a particular species and N_i is the total number of informants who participated in the study.

High use values mean that informants report or mention a species many times, while low values mean it is cited only rarely. Every time an informant mentions that a medicinal plant is used for any particular disease or disorder, this counts as a single use-report.

3. Results and Discussion

3.1 Sociodemographic characteristics determining plant use knowledge

Most informants (48%) were aged 50-75, representing the main users of ethnic medicine and the primary custodians of traditional medicinal knowledge amid youth migration to urban centers for education and employment, which disrupts intergenerational transmission. Key informants, with specialized knowledge, showed a significantly higher average score, i.e., average number of medicinal plants reported, (28 ± 1.3) compared to general informants (19 ± 1.6). Ethnobotanical data reveal that both age and informant type significantly affect medicinal plant knowledge. Older individuals, particularly those aged 55 and above, possess more extensive knowledge (mean number of species mentioned was 68 ± 3.5) than younger groups (43 ± 2.6), indicating that prolonged experience and familiarity enhance generational understanding. This finding is consistent with prior research showing that older generations and key informants maintain greater cultural exposure, practical use, and knowledge exchange

over time (Ambu et al., 2020; Ghimire et al., 2004; Gitima et al., 2025). Key informants such as herbal practitioners and frequent medicinal plant users typically have higher expertise than general informants, highlighting their specialized knowledge and direct involvement with these plants, as supported by previous studies (Karki et al., 2023; Khakurel et al., 2022). Nevertheless, as knowledgeable older individuals age and pass away, there is a considerable risk of losing this wisdom due to limited transmission to younger generations (Derso et al., 2024). This underscores the critical need for systematic documentation and effective knowledge transfer to safeguard ethnobotanical traditions.

3.2 Diversity of medicinal plants used in the study area

This study reported 124 species of medicinal flora and funga distributed across 114 genera and 69 families (Table 1). Among them, four species were fungi, and two species each were ferns, and conifers, while the remaining 116 were flowering plants. All species were native, except two invasive alien species (*Ageratina adenophora* (Spreng.) R.M. King & H. Rob. and *Bidens pilosa* L.). Informants cited that most of the medicinal plants (95%) were collected from the wild, while 5% were available in the home gardens. The wild habitats include forests, grasslands, fallow land, and stream or riverbanks. The number of species reported from different habitats demonstrates a strong reliance on natural forests as well as grasslands as a major source of medicinal plants. The species diversity documented is comparable to the other studies conducted in western parts of Nepal (Kunwar et al., 2013; Pyakurel et al., 2018; Rokaya et al., 2010). A higher diversity of species can be attributed to higher ethnic diversity as well as the presence of different ecoclimatic zones in a 5,000 m of elevational gradient that supports the presence of diverse vegetation. Also, the extensive use of medicinal plants in the study area can be attributed to the cultural beliefs in traditional knowledge systems, which are common in many rural communities where knowledge has evolved over generations. Nevertheless, the use of invasive alien species indicates that the traditional pharmacopoeia is open and acculturated, influenced by practical adaptation strategies (Ceuterick et al., 2008), also supporting the availability hypothesis (Hart et al., 2017), as these plants are abundantly available and accessible in marginal lands. The cattle herders grazing their animals in Chitriptan and the surrounding areas—mainly from the Bishwokarma and Kshetri communities—typically use medicinal plants such as *Neopicrorhiza scrophulariiflora* (Pennell) D. Y. Hong and *Dactylorhiza hatagirea* (D. Don.) found in high altitudes. In contrast, people living at lower elevations (783–1200 m), such as those from the Thakuri community, tend to use species available in this range, including *A. adenophora*, because they are more easily accessible. According to the respondents, *A. adenophora* became more widely recognized during the Maoist insurgency in Nepal. At that time, people associated with the Nepali Maoists, including youths moving in and out of different regions, and taking part in wars, likely contributed to the spread and use of this plants as it was believed that the plant treats cut and wounds so effectively that was caused by the wars (plant also known as “Maoist weed” because of this region!). The Asteraceae was the most represented, comprising 6 species, followed by Fabaceae, Lamiaceae, and Rosaceae, each contributing 5 species. This prominence may be attributed to the unique adaptations of the Asteraceae and Fabaceae families. Fabaceae families have their symbiotic relationships, which enable them to grow even in nitrogen-

deficient soils. Their extensive root system also allows these plants to outcompete other plants for resources, giving them a competitive edge in the region (Simonsen et al., 2017). Also, these species are particularly notable or widespread (e.g., in terms of their use, diversity, or abundance), likely because they have developed special traits or features helping them survive, thrive, or be useful in various environments, and possess many secondary metabolites (Rolnik and Olas, 2021).

The distribution of medicinal plant species across various growth forms revealed that herbs were the most prevalent (funga and ferns also combined), accounting for 64 species (53.33%), followed by trees (34, 28.33%), shrubs (15, 12.5%) and climbers (8, 6.66%). The dominance of the herb species is likely due to their wide availability and perceived therapeutic effectiveness. This trend is consistent with the findings reported in other studies from Nepal (Kunwar et al., 2006; Luitel et al., 2014; Rokaya et al., 2010; Shrestha and Dhillion, 2003; Uprety et al., 2010) and elsewhere (Kumar et al., 2011).

3.3 Plant parts, preparation, and additives used for remedies

Leaves were the predominant parts used in medical formulations, constituting 22.5% of the total. This was closely followed by roots (17.5%), while resin and spores represented a smaller fraction (8.33%) (Figure 2). The herbal practitioners revealed that the most frequent use of leaves is because they are readily available, abundant, and efficient to use. Harris et al. (2007) also reported that the leaves are often preferred owing to their accessibility, abundance, and higher concentration of bioactive compounds. The main use of leaves also benefits conservation, as harvesting leaves has little effect on plant survival, supporting ecological sustainability. Although roots and rhizomes are reported as the most frequently used plant parts in many studies (Kunwar et al., 2006; Rokaya et al., 2010; Uprety et al., 2010), they are the second most used plant parts in the current study. Relying heavily on these parts poses risks to the long-term survival of these medicinal plants (Khakurel et al., 2024).

Local informants noted that various parts of medicinal plants are believed to contain distinct therapeutic properties. As a result, different plant organs have been valued and utilized to varying extents, reflecting the traditional herbal medicine practices and experiences of ethnic communities. For instance, seeds of *Trichosanthes tricuspidata* Lour are used to control vomiting, whereas leaf and root juice are frequently used in mensuration disorders.

[Figure 2]

In terms of preparation methods, grinding and making powder or paste was the most frequently employed technique utilized in 49% of cases, followed by making juice (46%) (Figure 3). Another common method for the preparation of medicinal formulation is decoction. Decoction is a widely used water-based extraction technique in which plant material is boiled to extract its active compounds. The rigid parts of plants, such as roots, bark, and stems, were boiled and cooled, then filtered, yielding a concentrated decoction rich in medicinal constituents. Plants used for decoction were *Falconeria insignis* Royle, *Prunus cerasoides* D. Don, and *Alnus nepalensis* D. Don. The popular forms of therapeutic preparation from medicinal plants in different parts of Nepal are juice, paste, decoction, and powder (Bhattarai et al., 2010; Khakurel et al., 2022; Rokaya et al., 2010).

Fresh or raw plant parts were predominantly used in remedy preparation (72%), followed by dried plant parts (28%). For instance, the rhizome of *Acorus calamus* L. was eaten raw to cure a cough. The fresh root of *Imperata cylindrica* (L.) P. Beauv. was eaten to cure roundworms. The raw stem of *Begonia picta* Sm. was eaten to cure roundworms. Dried fruits of *Pyrus pashia* Buch.-Ham. Ex D. Don was taken to cure dehydration. Furthermore, a variety of additives, including milk, oils, or hot water, were incorporated to mitigate toxicity or enhance flavor and efficacy. Water was the most used additive in the remedy preparation. For instance, the leaf paste of *Barleria cristata* L. mixed with mustard oil and applied to snake bite. *Achyranthes aspera* L. was ground, mixed with hot water, and drunk to control piles. The preference for fresh plant parts is generally linked to the enhanced efficacy of the bioactive compounds (Adhikari et al., 2019; Kunwar et al., 2013).

[Figure 3]

3.4 Diseases and disorders treated by medicinal species in the study area

Most species (64% of the total) reported in the study area were used to treat dermatological and gastrointestinal problems (Table 1). The common dermatological problems include wounds, cuts, burns, scabies, and allergies. Species such as *Ageratina adenophora*, *Ainsliaea aptera* DC., *Artemisia indica* Willd., *Bidens pilosa* L., *Leibnitzia nepalensis* (Kunze) Kitam., and *Impatiens balsamina* L. were used to treat various dermatological problems. Similarly, common gastrointestinal disorders such as stomachaches, diarrhea, dysentery, constipation, and roundworms were treated using *Achyranthes aspera* L., *Allium wallichii* Kunth, *Coelogyne cristata* Lindl., and *N. scrophulariiflora*. Other common diseases and disorders treated by medicinal plants include cough and cold, fever, and skeletomuscular problems such as fracture, joint pain, sprain, body swelling and chest pain. The diverse applications of each plant strongly suggest the presence of a wide range of bioactive phytochemicals. These results indicate that dermatological and gastrointestinal problems are commonly occurring with high frequency in the study area. The reasons could be attributed to poor hygiene. Furthermore, these diseases and disorders are not only common in the study area, but they are also a common concern in many parts of the country (Ambu et al., 2020; Karki et al., 2023; Luitel et al., 2014; Rokaya et al., 2014; Shrestha et al., 2016).

3.5 Informants' knowledge and consensus about medicinal plants

A total of 63 diseases and disorders were recorded and grouped into 14 categories (Table 2). The category of dermatological problems presented the highest number of cases (23%) as well as the plant species used (36%). This was followed by gastrointestinal disorders or digestive-system problems and respiratory system disorders, with 31% and 17% of plant species, respectively. Overall, ICF values range from 0.2 to 0.7, indicating medium to high consensus among the informants regarding the various therapeutic uses and effectiveness of specific medicinal plant species, which is consistent with the previous findings (Khakurel et al., 2022; Kunwar et al., 2019; Kutal et al., 2021). The high level of agreement documented for toothache and mouth inflammation (ICF=0.7) and dermatological problems (ICF=0.6) suggests that the local community holds strong confidence in the efficacy of certain plants for treating these conditions, specifically, toothache, stomatitis and also wounds, skin rashes, allergies, burn,

warts, inflammation, cut and wounds, scabies, and bleeding. A high ICF typically indicates that medicinal plants are widely recognized within the community for their therapeutic efficacy, suggesting the potential for significant pharmacological activity. These results demonstrate that local knowledge regarding the use of specific plant species, especially for treating conditions such as toothache and skin disorders, is both extensive and consistent. This high degree of consensus highlights the importance of these plants in traditional healthcare systems and underscores their suitability for targeted phytochemical and pharmacological studies to characterize their bioactive compounds (Vaou et al., 2021). Furthermore, these findings emphasize the cultural relevance and potential clinical value of these species in community-based health interventions.

3.6 Fidelity levels of frequently reported plant species

The highest fidelity level (100%) was obtained for *N. scrophulariiflora* for fever, followed by 96% for *D. hatagirea* for cut and wounds. The fidelity level of the rest of the frequently reported plants ranged from 52 to 92% (Table 3). These values indicate that all informants who reported using *N. scrophulariiflora* use it consistently for fever, underscoring a robust shared traditional knowledge and confidence in its efficacy. This is supported by ethnobotanical and pharmacological literature showing that *N. scrophulariiflora* rhizomes have a long-standing use in traditional medicine across Himalayan regions (Ghimire et al., 2023; Poudeyal et al., 2019). FL values highlighted in the study quantitatively demonstrate the importance and reliability of particular medicinal plants in traditional healthcare (Bencheikh et al., 2024).

3.7 Percentage respondents' knowledge (Percentage use-value)

The percentage use values range from 19% to 96%. Data shows that 60 species had more than 50% of the percentage use value, indicating that a large proportion of respondents recognize, use, or mention a particular plant species for specific medicinal purposes (Table 1). This also reflects the cultural importance, familiarity, and frequency of use of that species within the community. The highest value (96%) was obtained for *D. hatagirea* and *N. scrophulariiflora*, suggesting that most of the individuals within the study population possess both awareness of and practical experience with the plant, utilizing it for consistent therapeutic applications. Such findings indicate that traditional knowledge is deeply rooted and widely practiced within the community. Furthermore, species that are frequently traded tend to yield the highest values for these ethnobotanical indices, as they are not only well-known and commonly used, but also regularly purchased from local markets for the treatment of prevalent health conditions (Lulesa et al., 2025; Turner et al., 2022).

3.8 Use values

The use values of the species range from 0.1 to 2.5. The highest UVs were recorded for *D. hatagirea* (2.5), *N. scrophulariiflora* (2.45), *Paris polyphylla* Sm. (2.35), *Swertia chirayita* (Roxb.) H. Karst (2.25), and *Rheum australe* D.Don. (2.10). The lower level of UVs was recorded for *L. nepalensis* (0.10) and *Berberis angulosa* Wall. ex Hook. & Thomson (0.15). A high use value indicates that a plant is locally significant, culturally important, widely known, and often used, helping to identify key species for pharmacological study and conservation (Campos and Albuquerque, 2021). Local communities prefer these species for their versatility

across multiple uses, ease of remedy preparation, and proven efficacy validated through repeated community trials, showing strong confidence in their application (Rokaya et al., 2010; Karki et al., 2023).

3.9 Potential risks to the medicinal plants

The information obtained from the respondents (and validated during the field visits) indicated that most of the medicinal plants were collected from the wild (95% of the total). This scenario, in which plant species are harvested in large quantities for medicinal and trade values, risks long-term depletion of plant resources and could ultimately drive species to extinction in their natural habitats if unsustainable practices continue (Mykhailenko et al., 2024). The respondents reported that most medicinal plants are increasingly threatened due to growing human impacts on their natural habitats. According to most respondents, the main causes of this decline are deforestation (reported by 75%), agricultural expansion (60%), firewood harvesting (33%), and grazing (29%). Efforts to conserve these plants emerged from a fundamental concern for preserving nature, valuing it for its intrinsic worth and aesthetic beauty as much as for its practical uses. As a result, conservation is recognized as essential to protecting medicinal plants, ensuring their availability for future generations, and maintaining their cultural, ecological, and medicinal significance (Chen et al., 2016). The plant species documented in this study provide multiple services to the local communities beyond their medicinal uses. They are used for making musical instruments (e.g., *Bombax ceiba* L., *Falconeria insignis* Royle), provide essential resources such as food (e.g., *Asparagus filicinus* (Buch-Ham.ex D.Don) Kamble, *Polygonatum cirrhifolium* (Wall.) Royle, species of *Berberis*), and spices (e.g., *Zanthoxylum armatum* DC, and *Amomum subulatum* Roxb.). This wide range of uses highlights their significant cultural and ecological values. Therefore, it is crucial to strengthen conservation and management practices to ensure these plants remain sustainable and accessible for future generations. Protecting these natural resources is vital not only for preserving traditional medicinal knowledge and practices but also for supporting food security (Chen et al., 2016; Hamilton, 2006; Salgotra and Chauhan, 2023) and overall community well-being in the area.

3.10 Novel findings

Most of the plant species documented as traditional medicinal plants in this region have similar use reports across the country, as reported from previous studies (Bhatta, 1999; Kunwar et al., 2019; Kunwar et al., 2013; Kutal et al., 2021; Rokaya et al., 2014; Shrestha et al., 2016; Uprety et al., 2016, 2011). Spores of *Lycoperdon perlatum* Pers. are used to cure fire-burnt wounds, and fruit powder of *Rhus punjabensis* J. L. Stewart ex Brandis is mixed with hot water and given to control dysentery and fever, which has been documented as a new use. In ethnobotanical research, it is common to find that many plants have similar uses across various communities through acculturation (Khadka et al., 2025). This similarity often results in fewer novel findings, as traditional knowledge tends to be shared among cultures, showing the relationship among cultures (Tareau et al., 2020), and reflecting a high human reliance on plants for essential needs such as medicine and food. Although the degree of novelty may be

limited, this does not diminish the importance of ethnobotanical studies (McClatchey et al., 2009). The value of ethnobotanical research lies in its role in preserving traditional knowledge that might otherwise be lost due to modernization and cultural changes (Łuczaj, 2023; Ramirez, 2007). By documenting how different communities use plants, researchers help safeguard cultural heritage and ensure that this information remains accessible for future generations. Additionally, ethnobotanical studies contribute significantly to biodiversity conservation by identifying plants that hold ecological and cultural importance, which encourages sustainable harvesting practices (Eduard, 2023; Pei et al., 2020; Zouraris et al., 2025). Such studies also play a vital role in supporting community health and informing scientific innovation, thereby emphasizing the importance of human-plant interactions across cultures (Balick and Cox, 2020; Ijatuyi et al., 2025; Turner et al., 2022).

3.11 Ethnobotanical research and importance

It is highly important to document traditional knowledge—the information, practices, and beliefs that communities develop over generations through their interactions with the environment. This study is relevant in this sense and contributes to preserving such knowledge that supports biodiversity conservation, provides valuable insights for science and adaptation, and enhances culturally informed environmental management, as also argued by Ijatuyi et al. (2025) and Ogar et al. (2020). Ongoing scientific study and recording of traditional ecological and ethnobotanical knowledge should be supported, and the results should be shared broadly (Børresen et al., 2023; Rosengren et al., 2020). Several studies report that medicinal plants serve as an alternative to conventional medicine in rural areas where access to modern health services is limited. This and other ethnobotanical research highlight that rural communities possess extensive knowledge of local plant species for treating a wide range of ailments, with this knowledge frequently passed down through generations (Rosengren et al., 2020). Determining whether medicinal (and aromatic) plants conservation should occur in natural habitats, nurseries, or both depends on evaluating the benefits and costs of conservation measures and understanding which production systems are most appropriate for each species (Chen et al., 2016; Schippmann et al., 2007). This assessment requires a thorough analysis of conservation value (including ecological, economic, and health benefits), the costs involved (such as protection, cultivation, and management), and the feasibility and productivity of different cultivation methods (Pei et al., 2020; Scherr and McNeely, 2008).

4. Conclusion

This study revealed valuable insights into the relationship between local communities and their use of medicinal plants in Rukum West district. This research documented 124 medicinal species, with the Asteraceae and Fabaceae families being the most common, highlighting their cultural significance. Traditional knowledge was mainly held by older community members, pointing to a potential decline in transmission to younger generations, which threatens the preservation of traditional medicinal wisdom. Leaves are the most frequently used plant parts for making remedies, reflecting a sustainable harvesting practice that reduces harm to plant populations. However, overharvesting of roots poses risks to the long-term survival of certain species. The community's dependence on medicinal plants for various healthcare needs

underscores their cultural and practical importance. The ethnobotanical metrics used in this study together help identify key medicinal plants for pharmacological research and conservation priorities.

The study identified deforestation as a major threat to medicinal plants, mainly due to fuelwood collection and agricultural expansion. Conservation efforts and knowledge preservation remain inadequate to address these challenges. Implementing awareness programs is essential to educate locals about conservation and the dangers of overharvesting. Engaging local stakeholders in resource management can foster stewardship and sustainable practices, especially concerning vulnerable plant parts like roots. Promoting local conservation strategies, such as cultivating plants in home gardens, will also support sustainability. Collectively, these actions will help protect the ethnobotanical heritage and ensure the availability of medicinal plants for future generations, benefiting both biodiversity and traditional healthcare practices.

Author contribution statement

Conceptualization: [KBB, YU, SR]; Methodology: [KBB, YU, SR]; Material preparation and data collection: [KBB], Formal analysis and investigation: [KBB, DK]; Writing - original draft preparation: [KBB, DK, YU]; Writing - review and editing: [YU, SR]; Funding acquisition: [KBB]

Competing interests statement

The authors declare there are no competing interests.

Data availability statement

Data generated or analyzed during this study are provided in full within the published article.

Funding statement

This research was supported by the Aathbiskot Municipality, Rukum West district (no award no. available).

Acknowledgements

We are thankful to the local people for their participation in the study and for sharing valuable knowledge. We would like to thank Mr. Gorkha Bahadur K.C., former Mayor of the Municipality, and Mr. Mani Raj Shah, Chief Administrative Officer, and all the municipality's council members for their support and help in completing this research work. We are also thankful to Mr. Dal Bahadur Shah for his cooperation during the fieldwork.

References

- Adhikari, M.K., 2000. *Mushrooms of Nepal*. P.U. Printers, Kathmandu, Nepal.
- Adhikari, M., Thapa, R., Kunwar, R.M., Devkota, H.P., and Poudel, P., 2019. Ethnomedicinal Uses of Plant Resources in the Machhapuchchhre Rural Municipality of Kaski District, Nepal. *Medicines* 6, 69. <https://doi.org/10.3390/medicines6020069>
- Ambu, G., Chaudhary, R.P., Mariotti, M. and Cornara, L., 2020. Traditional uses of medicinal plants by ethnic people in the Kavrepalanchok district, Central Nepal. *Plants*, 9(6), p.759.
- Andrade-Cetto, A., Heinrich, M., 2011. From the field into the lab: Useful approaches to selecting species based on local knowledge. *Front. Pharmacol.*, 1–5. <https://doi.org/10.3389/fphar.2011.00020>
- Antonelli, A., Fry, C., Smith, R.J., Eden, J., Govaerts, R.H., Kersey, P., Nic Lughadha, E., Onstein, R.E., Simmonds, M.S.J., and Zizka, A., 2023. *State of the World's Plants and Fungi Report 2023* 1–90.
- Arulappan, M.T., Britto, S.J., Ruckmani, K., and Mohan, R. 2015. An ethnobotanical study of medicinal plants used by ethnic people in Gingee Hills, Villupuram District, Tamilnadu, India. *American Journal Ethnomedicine* 2(2): 2348-9502
- Aryal, H.P., 2024. Fungi of Nepal. In: Rokaya, M.B., Sigdel, S.R. (eds) *Flora and Vegetation of Nepal. Plant and Vegetation*, vol 19. Springer, Cham. https://doi.org/10.1007/978-3-031-50702-1_6
- Asiimwe, S., Namukobe, J., Byamukama, R., and Imalingat, B., 2021. Ethnobotanical survey of medicinal plant species used by communities around Mabira and Mpanga Central Forest Reserves, Uganda. *Trop Med Health.*, 49(1):52. doi: 10.1186/s41182-021-00341-z.
- Balick, M.J. and Cox, P.A., 2020. *Plants, people, and culture: the science of ethnobotany*. Garland Science.
- Bencheikh, N., Elbouzidi, A., Baraich, A., Bouhrim, M., Azeroual, A., Addi, M., Mothana, R.A., Al-Yousef, H.M., Eto, B., and Elachouri, M., 2024. Ethnobotanical survey and scientific validation of liver-healing plants in northeastern Morocco. *Front. Pharmacol.* 15, 1–29. <https://doi.org/10.3389/fphar.2024.1414190>
- Bhatta, L.R. 1999. Ethnobotanical study in a village at Rukum District, Nepal. *Banko Jankari*, 9(2):40-43.
- Bhattarai, N.K., 1992. Medical ethnobotany in the Karnali zone, Nepal. *Economic Botany*, pp.257-261.
- Bhattarai, S., Chaudhary, R.P., Quave, C.L., and Taylor, R.S.L., 2010. The use of medicinal plants in the trans-himalayan arid zone of Mustang district, Nepal. *J. Ethnobiol. Ethnomed.*, 6, 1–11. <https://doi.org/10.1186/1746-4269-6-14>
- Børresen, S.T., Ulimboka, R., Nyahongo, J., Ranke, P.S., Skjaervø, G.R., and Røskraft, E., 2023. The role of education in biodiversity conservation: Can knowledge and understanding alter locals' views and attitudes towards ecosystem services? *Environ. Educ. Res.*, 29, 148–163. <https://doi.org/10.1080/13504622.2022.2117796>
- Campos, J. L. A., and Albuquerque, U. P., 2021. Indicators of conservation priorities for medicinal plants from seasonal dry forests of northeastern Brazil. *Ecological Indicators*, 121, 106993.

- Ceuterick, M., Vandebroek, I., Torry, B. and Pieroni, A., 2008. Cross-cultural adaptation in urban ethnobotany: the Colombian folk pharmacopoeia in London. *Journal of Ethnopharmacology*, 120(3), pp.342-359.
- Chen, S.L., Yu, H., Luo, H.M., Wu, Q., Li, C.F., and Steinmetz, A., 2016. Conservation and sustainable use of medicinal plants: Problems, progress, and prospects. *Chinese Med.*, 11, 1–10. <https://doi.org/10.1186/s13020-016-0108-7>
- Cowie, R.H., Bouchet, P., and Fontaine, B., 2022. The Sixth Mass Extinction: fact, fiction or speculation? *Biol. Rev.*, 97, 640–663. <https://doi.org/10.1111/brv.12816>
- Cunningham, A.B., 2001. *Applied Ethnobotany: People, Wild Plant Use and Conservation*. Earthscan Publication Ltd. London and Sterling, VA., USA.
- National Statistics Office (CSO), 2021. *National Population and Housing Census 2021: National Report on Caste/ethnicity, language and religion*. Government of Nepal, Office of the Prime Minister and Council of Ministers, National Statistics Office, Kathmandu.
- Derso, Y.D., Kassaye, M., Fassil, A., Derebe, B., Nigatu, A., Ayene, F., Tamer, M., and Van Damme, P., 2024. Composition, medicinal values, and threats of plants used in indigenous medicine in Jawi District, Ethiopia: implications for conservation and sustainable use. *Sci. Rep.*, 14, 1–18. <https://doi.org/10.1038/s41598-024-71411-5>
- Eduard, C., 2023. Conservation of biodiversity through ethnobotany and traditional knowledge. *J. Biodivers.*, 9, 1. <https://doi.org/10.37421/2376-0214.2023.9.26>.
- Forman, L. and Bridson, D. 1989. *The Herbarium Handbook*. Royal Botanic Gardens, Kew.
- Friedman, J., Yaniv, Z., Dafni, A., and Palewitch, D. 1986. 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*, 16(2-3), 275-287.
- Ghimire, N.P., Gurung, A., Kushal, K.C., Paudel, M.R., Bhattarai, H.D., Poudeyal, M.R., and Ghimire, S.K., 2023. Traditional socio-cultural utilization and harvesting practices of an alpine medicinal herb, *Neopicrorhiza scrophulariiflora* in Khumbu Valley, Nepal. *Ethnobot. Res. Appl.* 26. <https://doi.org/10.32859/era.26.64.1-15>
- Ghimire, S.K., McKey, D., and Aumeeruddy-Thomas, Y., 2004. Heterogeneity in Ethnoecological Knowledge and Management of Medicinal Plants in the Himalayas of Nepal: Implications for Conservation. *Ecol. Soc.* 9. <https://doi.org/10.5751/es-00708-090306>
- Gitima, G., Gebre, A., Berhanu, Y., and Wato, T., 2025. Exploring indigenous wisdom: Ethnobotanical documentation and conservation of medicinal plants in Goba District, Southwest Ethiopia. *Sci. African* 27, e02571. <https://doi.org/10.1016/j.sciaf.2025.e02571>
- Hamilton, A., 2006. Medicinal plant conservation in the Himalaya: Lessons from the field. In *3rd Global Botanic Gardens Congress* (Vol. 2006, pp. 1-4).
- Hara, H., Chater, A.O and Williams, L.H.J., 1982. *An Enumeration of the Flowering plants of Nepal*. Vol.3. British Museum (Natural History), London.
- Hara, H., and Williams, L.H.J., 1979. *An Enumeration of the Flowering Plants of Nepal* Vol.2. British Museum (Natural History), London.

- Harris, C.S., Burt, A.J., Saleem, A., Le, P.M., Martineau, L.C., Haddad, P.S., Bennett, S.A.L., and Arnason, J.T., 2007. A single HPLC-PAD-APCI/MS method for the quantitative comparison of phenolic compounds found in leaf, stem, root and fruit extracts of *Vaccinium angustifolium*. *Phytochem. Anal.*, 18, 161–169. <https://doi.org/10.1002/pca.970>
- Hart, G., Gaoue, O.G., de la Torre, L., Navarrete, H., Muriel, P., Macía, M.J., Balslev, H., León-Yáñez, S., Jørgensen, P. and Duffy, D.C., 2017. Availability, diversification and versatility explain human selection of introduced plants in Ecuadorian traditional medicine. *PloS one*, 12(9), p.e0184369.
- Heinrich, M., Ankli, A., Frei, B., Wieman, C. and Sticher, O., 1998. Medicinal plants in Mexico: Healers' consensus and cultural importance. *Social Science and Medicine*, 47: 1859-1871.
- Ijatuyi, E.J., Lamm, A., Yessoufou, K., Suinyuy, T., and Patrick, H.O., 2025. Integration of indigenous knowledge with scientific knowledge: A systematic review. *Environ. Sci. Policy*, 170, 104119. <https://doi.org/10.1016/j.envsci.2025.104119>
- Karki, D., Khadka, D., Kunwar, R.M., Aryal, P.C., Paudel, H.R., Bhatta, S., and Shi, S., 2023. Ethnomedicinal plants in Champadevi rural municipality, Okhaldhunga district, Nepal. *J. Ethnobiol. Ethnomed.*, 19. <https://doi.org/10.1186/s13002-023-00627-y>
- Karki, S., Dhital, A.P., Uprety, Y., and Ghimire, S.K., 2023. Medicinal plants and their use by an ethnic minority Jirel in Dolakha district, Central Nepal. *Ethnobot. Res. Appl.*, 25. <https://doi.org/10.32859/era.25.18.1-29>
- Khadka, D., Kunwar, R.M., Bussmann, R.W., Bhatta, S., Maharjan, S.R., Cui, D. and Shi, S., 2025. Adaptation in ethnobotanical knowledge of *Prunus cerasoides* among different ethnic groups, religions and culture in Nepal. *Trees, Forests and People*, p.100919.
- Khakurel, D., Uprety, Y., Ahn, G., Cha, J.Y., Kim, W.Y., Lee, S.H., and Rajbhandary, S., 2022. Diversity, distribution, and sustainability of traditional medicinal plants in Kaski district, western Nepal. *Front. Pharmacol.*, 13, 1–15. <https://doi.org/10.3389/fphar.2022.1076351>
- Khakurel, D., Uprety, Y., Karki, S., Khadka, B., Poudel, B.D., Ahn, G., Cha, J.Y., Kim, W.Y., Lee, S.H. and Rajbhandary, S., 2024. Assessing the risks to valuable medicinal plants in Nepal from human activities and environmental factors. *Global Ecology and Conservation*, 51, p.e02860.
- Kumar, M., Sheikh, M.A. and Bussmann, R.W. Ethnomedicinal and ecological status of plants in Garhwal Himalaya, India. *J Ethnobiology Ethnomedicine*, 7, 32 (2011). <https://doi.org/10.1186/1746-4269-7-32>
- Kumar, A., Kumar, S., Komal, Ramchiary, N., and Singh, P., 2021. Role of traditional ethnobotanical knowledge and indigenous communities in achieving sustainable development goals. *Sustain.*, 13, 1–14. <https://doi.org/10.3390/su13063062>
- Kunwar, R.M., Mahat, L., Acharya, R.P., and Bussmann, R.W., 2013. Medicinal plants, traditional medicine, markets and management in far-west Nepal. *J. Ethnobiol. Ethnomed.*, 9, 1–10. <https://doi.org/10.1186/1746-4269-9-24>
- Kunwar, R.M., Nepal, B.K., Kshhetri, H.B., Rai, S.K., and Bussmann, R.W., 2006. Ethnomedicine in Himalaya: A case study from Dolpa, Humla, Jumla and Mustang districts of Nepal. *J. Ethnobiol. Ethnomed.*, 2, 1–6. <https://doi.org/10.1186/1746-4269-2-27>
- Kunwar, R.M., Shrestha, K., Malla, S., Acharya, T., Sementelli, A.J., Kutal, D., and Bussmann, R. W., 2019. Relation of medicinal plants, their use patterns and availability in the lower Kailash Sacred Landscape, Nepal. *Ethnobot. Res. Appl.*, 18, 0–2. <https://doi.org/10.32859/era.18.7.1-14>

- Kutal, D., Kunwar, R.M., Baral, K., Sapkota, P., Sharma, H.P., and Rimal, B., 2021. Factors that influence the plant use knowledge in the middle mountains of Nepal. *PLoS One*, 16, 1–15. <https://doi.org/10.1371/journal.pone.0246390>
- Łuczaj, Ł., 2023. Descriptive ethnobotanical studies are needed for the rescue operation of documenting traditional knowledge. *J. Ethnobiol. Ethnomed.*, 19, 1–5. <https://doi.org/10.1186/s13002-023-00604-5>
- Luitel, D.R., Rokaya, M.B., Timsina, B., and Münzbergová, Z., 2014. Medicinal plants used by the Tamang community in the Makawanpur district of central Nepal. *J. Ethnobiol. Ethnomed.*, 10. <https://doi.org/10.1186/1746-4269-10-5>
- Lulesa, F., Alemu, S., Kassa, Z., and Awoke, A., 2025. Ethnobotanical investigation of medicinal plants utilized by indigenous communities in the Fofa and Toaba sub-districts of the Yem Zone, Central Ethiopian Region. *J. Ethnobiol. Ethnomed.*, 21. <https://doi.org/10.1186/s13002-025-00768-2>
- Manandhar, N.P., 1995. A survey of medicinal plants of Jajarkot district, Nepal. *Journal of Ethnopharmacology*, 48(1), pp.1-6.
- Martin, G. J., 1995. *Ethnobotany: A Methods Manual*. London: Chapman and Hill.
- McClatchey, W.C., Mahady, G.B., Bennett, B.C., Shiels, L., and Savo, V., 2009. Ethnobotany as a pharmacological research tool and recent developments in CNS-active natural products from ethnobotanical sources. *Pharmacol. Ther.*, 123, 239–254. <https://doi.org/10.1016/j.pharmthera.2009.04.002>
- Mengistu, M., Kebebew, M., and Meyer-Rochow, V.B. Ethnozoological study of medicinal animals used by the inhabitants of the Kucha District, Gamo Zone, Southern Ethiopia. *J Ethnobiology Ethnomedicine* 20, 72 (2024). <https://doi.org/10.1186/s13002-024-00714-8>.
- Miehe, G., Pendry, C.A., and Chaudhary, R.P. 2015. Nepal: An Introduction to the Natural History, Ecology and Human Environment of the Himalayas; Royal Botanical Garden: Edinburgh, UK.
- Mykhailenko, O., Jalil, B., McGaw, L.J., Echeverría, J., Takubessi, M., and Heinrich, M., 2024. Climate change and the sustainable use of medicinal plants: a call for “new” research strategies. *Front. Pharmacol.*, 15, 1–22. <https://doi.org/10.3389/fphar.2024.1496792>
- Ogar, E., Pecl, G., and Mustonen, T., 2020. Science Must Embrace Traditional and Indigenous Knowledge to Solve Our Biodiversity Crisis. *One Earth*, 3, 162–165. <https://doi.org/10.1016/j.oneear.2020.07.006>
- Oli, B.N., Uprety, Y., and Baral, H.L. 2025 . Non-Timber Forest Products in Nepal: Prospects for Rural Livelihoods and Economic Development. In: Handbook of Sustainable Forestry: Forests for the Future. Routledge.
- Pei, S., Alan, H., and Wang, Y., 2020. Vital roles for ethnobotany in conservation and sustainable development. *Plant Divers.*, 42, 399–400. <https://doi.org/10.1016/j.pld.2020.12.001>
- Phillips, O., and Gentry, A. H., 1993. The useful plants of Tambopata, Peru: I. Statistical hypotheses tests with a new quantitative technique. *Economic Botany*, 47(1), 15-32.
- Polunin, O., and Stainton, J.D.A., 1984. *Flowers of the Himalaya*. Oxford University Press, New Delhi, India.

- Poudeyal, M.R., Meilby, H., Shrestha, B.B., and Ghimire, S.K., 2019. Harvest effects on density and biomass of *Neopicrorhiza scrophulariiflora* vary along environmental gradients in the Nepalese Himalayas. *Ecol. Evol.*, 9, 7726–7740. <https://doi.org/10.1002/ece3.5355>
- Pyakurel, D., Bhattarai Sharma, I., and Ghimire, S.K., 2018. Trade and conservation of medicinal and aromatic plants in western Nepal. *Bot. Orient. J. Plant Sci.*, 11, 27–37. <https://doi.org/10.3126/botor.v11i0.21029>
- Rajbhandari, K.R., and Rajbhandary, S., 2015. Herbarium Preparation and Storage Technique. In: M. Siwakoti & S. Rajbhandary (Eds.), *Taxonomic tools and flora writing* (pp. 70-80). Kathmandu, Nepal: Department of Plant Resources and TU Central Department of Botany.
- Rajbhandari, K.R., and Rai, S.K., 2017. *A Handbook of the flowering plants of Nepal*. Department of Plant Resources. Thapathali Kathmandu Nepal.
- Ramirez, C.R., 2007. Ethnobotany and the loss of traditional knowledge in the 21st century. *Ethnobot. Res. Appl.*, 5, 241–244. <https://doi.org/10.17348/era.5.0.241-244>
- Rokaya, M.B., Münzbergová, Z., and Timsina, B., 2010. Ethnobotanical study of medicinal plants from the Humla district of western Nepal. *J. Ethnopharmacol.*, 130, 485–504. <https://doi.org/10.1016/j.jep.2010.05.036>
- Rokaya, M.B., Uprety, Y., Poudel, R.C., Timsina, B., Münzbergová, Z., Asselin, H., Tiwari, A., Shrestha, S.S., and Sigdel, S.R., 2014. Traditional uses of medicinal plants in gastrointestinal disorders in Nepal. *J. Ethnopharmacol.*, 158, 221–229. <https://doi.org/10.1016/j.jep.2014.10.014>
- Rolnik, A., and Olas, B., 2021. The plants of the asteraceae family as agents in the protection of human health. *Int. J. Mol. Sci.*, 22, 1–10. <https://doi.org/10.3390/ijms22063009>
- Rosengren, L.M., Raymond, C.M., Sell, M., and Vihinen, H., 2020. Identifying leverage points for strengthening adaptive capacity to climate change. *Ecosyst. People*, 16, 427–444. <https://doi.org/10.1080/26395916.2020.1857439>
- Salgotra, R.K., and Chauhan, B.S., 2023. Genetic Diversity, Conservation, and Utilization of Plant Genetic Resources. *Genes (Basel)*. 14. <https://doi.org/10.3390/genes14010174>
- Scherr, S.J., and McNeely, J.A., 2008. Biodiversity conservation and agricultural sustainability: Towards a new paradigm of “ecoagriculture” landscapes. *Philos. Trans. R. Soc. B Biol. Sci.*, 363, 477–494. <https://doi.org/10.1098/rstb.2007.2165>
- Schippmann, U., Leaman, D., and Cunningham, A.B., 2007. A Comparison of Cultivation and Wild Collection of Medicinal and Aromatic Plants Under Sustainability Aspects. *Med. Aromat. Plants*, 75–95. https://doi.org/10.1007/1-4020-5449-1_6
- Shrestha, K., Bhandari, P., and Bhattarai, S., 2022. *Plants of Nepal (Gymnosperms and Angiosperms)*. Heritage publisher and Distributor Pvt. Ltd. Kathmndu, Nepal.
- Shrestha, N., Shrestha, S., Koju, L., Shrestha, K.K., and Wang, Z., 2016. Medicinal plant diversity and traditional healing practices in eastern Nepal. *J. Ethnopharmacol.*, 192, 292–301. <https://doi.org/10.1016/j.jep.2016.07.067>
- Shrestha, P.M., and Dhillion, S.S., 2003. Medicinal plant diversity and use in the highlands of Dolakha district, Nepal. *J. Ethnopharmacol.*, 86, 81–96. [https://doi.org/10.1016/S0378-8741\(03\)00051-5](https://doi.org/10.1016/S0378-8741(03)00051-5)
- Silambarasan, R., Sasidharan, S., Nair J, H., Kumar S, N., R, A., Nair, A.S., and Selavinayagam, K.T., 2023. A multivariate and quantitative assessment of medicinal plants used by the indigenous

- Malayali tribes in the Javadhu hills of Tiruvannamalai district, Tamil Nadu, India. *Heliyon*, 9, e15607. <https://doi.org/10.1016/j.heliyon.2023.e15607>
- Simonsen, A.K., Dinnage, R., Barrett, L.G., Prober, S.M., and Thrall, P.H., 2017. Symbiosis limits establishment of legumes outside their native range at a global scale. *Nat. Commun.* 8, 1–9. <https://doi.org/10.1038/ncomms14790>
- Stainton, J.D.A., 1988. *Flowers of the Himalaya: A supplement*. Oxford University Press, New Delhi, India
- Tareau, M.A., Bonnefond, A., Palisse, M. and Odonne, G., 2020. Phytotherapies in motion: French Guiana as a case study for cross-cultural ethnobotanical hybridization. *J. Ethnobiol. Ethnomed.*, 16(1), p.54.
- TISC/NARMSAP 2002. *Forest and vegetation types of Nepal*. Natural Resource Management Sector Assistance Programme, Ministry of Forests and Soil Conservation, Nepal.
- Tugume, P., Kakudidi, E.K., Buyinza, M., Namaalwa, J., Kamatenesi, M., Mucunguzi, P., and Kalema, J., 2016. Ethnobotanical survey of medicinal plant species used by communities around Mabira Central Forest Reserve, Uganda. *J. Ethnobiol. Ethnomed.*, 12, 1–28. <https://doi.org/10.1186/s13002-015-0077-4>
- Turner, N.J., Cuerrier, A., and Joseph, L., 2022. Well grounded: Indigenous Peoples' knowledge, ethnobiology and sustainability. *People Nat.*, 4, 627–651. <https://doi.org/10.1002/pan3.10321>
- Upreti, Y., Asselin, H., Boon, E.K., Yadav, S., and Shrestha, K.K., 2010. Indigenous use and bio-efficacy of medicinal plants in the Rasuwa District, Central Nepal. *J. Ethnobiol. Ethnomed.*, 6. <https://doi.org/10.1186/1746-4269-6-3>
- Upreti, Y., Poudel, R.C., Asselin, H., Boon, E., 2011. Plant biodiversity and ethnobotany inside the projected impact area of the Upper Seti Hydropower Project, Western Nepal. *Environ. Dev. Sustain.*, 13, 463–492. <https://doi.org/10.1007/s10668-010-9271-7>
- Upreti, Y., Poudel, R.C., Gurung, J., Chettri, N., and Chaudhary, R.P., 2016. Traditional use and management of NTFPs in Kangchenjunga Landscape: Implications for conservation and livelihoods. *J. Ethnobiol. Ethnomed.*, 12. <https://doi.org/10.1186/S13002-016-0089-8>
- Vaou, N., Stavropoulou, E., Voidarou, C., Tsigalou, C., and Bezirtoglou, E., 2021. Towards advances in medicinal plant antimicrobial activity: A review study on challenges and future perspectives. *Microorganisms*, 9, 1–28. <https://doi.org/10.3390/microorganisms9102041>
- Zouraris, D., Graikou, K., Vasileiou, P., Dimitrov, V. et al., 2025. EthnoHERBS: Harnessing traditional herbal knowledge for biodiversity conservation and innovative health solutions. *Comput. Struct. Biotechnol. J.*, 29, 85–94. <https://doi.org/10.1016/j.csbj.2025.03.035>

Figure captions

Figure 1: Location of the Aathbiskot Municipality in Rukum West District, Nepal. (Geographic Coordinate System: GCS_WGS_1984; Base map source: Esri, Maxar, Earthstar Geographics, and the GIS User Community)

Figure 2: Plant parts used for medicinal purposes

Figure 3: Methods of herbal remedy preparation

Draft

Table 1: Medicinal plants used by local communities of Rukum West District, Nepal

S. N.	Family	Scientific Name	Collection No.	Vernacular Name	Origin*	Life Form	Parts Used	Mode of Use	Use Value (%)	Use Value of overall usefulness (UV)
1	Acanthaceae	<i>Barleria cristata</i> L.	RWN79		W	H	Ys, Lf	Paste of young shoots and leaves is mixed with mustard oil and applied to snake bite wounds.	53.8	0.65
2		<i>Justicia adhatoda</i> L.	RWN77	Asuro	W	S	Lf, Rt	Dry leaf and root powder is smoked to control asthma and cough.	42.3	0.90
3	Acoraceae	<i>Acorus calamus</i> L.	RWN1	Bojho	C	H	Rh	Fresh rhizome is directly chewed to cure cough. Rhizome juice is used to cure diarrhea and dysentery.	78.8	1.15
4	Agaricaceae	<i>Lycoperdon perlatum</i> Pers.	RWN184	Fusfuse Chyau	W	H	Sp	Spore powder is used to cure fire-burned wounds.	26.9	0.85
5	Amaranthaceae	<i>Achyranthes aspera</i> L.	RWN47		W	H	Wp	Whole plant is grounded and mixed with hot water and drunk to control piles.	46.2	0.85
6	Amaryllidaceae	<i>Allium sativum</i> L.		Lasun	C	H	Tb, Lf	Two - three pieces of the bulb are directly eaten every morning to control gastric. Bulbs are used for fever and cough. Partially burned bulbs are eaten for stomach disorders.	61.5	0.75
7		<i>Allium stracheyi</i> Baker	RWN33	Lasun	W	H	Tb	Two - three tuber pieces are eaten in the morning and evening for gastritis.	48.1	0.15
8		<i>Allium wallichii</i> Kunth	KBR120	Ban Lasun	W	H	Wp	Whole plant is grounded, mixed with hot water and given to control dyspepsia (<i>Apach</i>) and diarrhea.	25.0	0.70
9	Anacardiaceae	<i>Rhus punjabensis</i> J.L.Stewart ex Brandis	RWN181	Bhage Chuk	W	S	Fr	One teaspoon of fruit powder is mixed with hot water and given to control dysentery and fever.	19.2	0.90
10	Apiaceae	<i>Centella asiatica</i> (L.) Urb.	RWN35	Ghodtapre	W	C	Lf	Leaf juice is used to control fever. Leaf powder is mixed with hot water and drunk to improve memory power.	92.3	1.30

11		<i>Heracleum candicans</i> Wall. ex DC.	RWN179	Chatare	W	H	Fr	Fresh fruits are chewed for cough and diarrhea.	25	0.74
12	Apocynaceae	<i>Calotropis procera</i> (Aiton.) W.T. Aiton	KBR118	Ankh	W	S	Lf	Dried leaves are smoked for asthma and cough.	45	0.65
13	Asparagaceae	<i>Agave americana</i> L.	KBR116	Ketuki	W	H	Lf	Leaf juice is used to control toothache.	19.2	0.55
14		<i>Agave cantala</i> (Haw.) Salm-Dyck	KBR115	Ketuki	W	H	Lf	Fresh leaf paste is kept on the teeth to control pain.	30.8	0.75
15		<i>Asparagus filicinus</i> (Buch-Ham.ex D.Don) Kamble	RWN77	Kurilo	W	H	Ys, Rt	Apical shoots are cooked and eaten as a tonic to increase appetite. Root juice is used to reduce fever.	88.5	1.60
16		<i>Polygonatum cirrhifolium</i> (Wall.) Royle	KBR114	Khiraulo	W	H	Rh	Rhizome juice is used as a tonic.	67.3	1.20
17	Asphodelaceae	<i>Aloe vera</i> (L.) Burm.f.		Gheu Kumari	C	H	Lf	Leaf juice is applied to fire-burned wounds.	53.8	0.95
18	Asteraceae	<i>Ageratina adenophora</i> (Spreng.) R.M. King & H.Rob.	KBR112	Ban mara	W (IAS)	H	Lf	Juice from the grounded leaf and apical shoot is applied to cut wounds.	69.2	0.65
19		<i>Ainsliaea aptera</i> DC.	RWN74	Ekdale	W	H	Wp	Whole plant juice is used to cure cut wounds.	40.4	0.60
20		<i>Artemisia indica</i> Willd.	RWN21	Titepati	W	H	Lf	Juice from leaves and apical shoots is applied to cut wounds.	63.5	1.50
21		<i>Bidens pilosa</i> L.	KBR111	Kali kuro	W (IAS)	H	Ys, Sd, Lf	Paste of apical shoots and seeds is applied on cut wounds. Juice of young leaves is applied to skin allergies like scabies.	55.8	1.14
22		<i>Dahlia pinnata</i> Cav.	KBR110	Laure ful	W	H	Tb	Tuber juice is used to control fever.	46.2	0.25
23		<i>Leibnitzia nepalensis</i> (Kunze) Kitam.	RWN80	Jhurla	W	H	Lf	Fiber is kept on cuts to control bleeding.	23.1	0.10
24	Balsaminaceae	<i>Impatiens balsamina</i> L.	RWN171	Tiuri	W	H	Ys, Lf	Paste of apical shoots and leaves is applied to the cut wounds.	53.8	0.70
25	Begoniaceae	<i>Begonia picta</i> Sm.	RWN29	Makarkanche	W	H	St	Young stem is directly chewed or juice is drunk to control roundworms.	59.6	0.65
26	Berberidaceae	<i>Berberis angulosa</i> Wall. ex Hook.f. & Thomson	KBR108	Rato mushe Chutro	W	S	Br	Bark juice is used to control roundworms.	61.5	0.15

27		<i>Berberis aristata</i> DC.	KBR107	Chutro	W	S	Ys, Br	Young apical shoots are directly chewed or bark juice is used to control roundworms and blood pressure.	65.4	0.90
28		<i>Berberis asiatica</i> Roxb. ex DC.	RWN53	Chutro	W	S	Ys, Br	Fresh apical juice is chewed or bark juice is used to control worms.	75	1.20
29	Betulaceae	<i>Alnus nepalensis</i> D.Don	KBR106	Uti	W	T	Br	Bark of this plant and <i>Prunus ceracoides</i> are boiled together for one to two hours and the extracted decoction is applied on the wounds.	53.8	0.75
30	Boraginaceae	<i>Arnebia benthamii</i> (Wall. ex G.Don) I.M. Jhonston	KBR103	Maharangi	W	H	Rt	Dried root is mixed with oil and used for hair care.	51.9	0.65
31	Cannabaceae	<i>Cannabis sativa</i> L.	RWN13	Bhango	W	H	Fl	Young inflorescence is rubbed in both hands to obtain latex, which is applied to the cut wound.	46.2	1.90
32	Caprifoliaceae	<i>Nardostachys jatamansi</i> (D. Don) DC.	KBR102	Bhutle	W	H	Rt	Plant is used as a tonic and to cure headache problems.	78.8	1.25
33		<i>Valeriana hardwickei</i> Wall.	RWN03	Samayo	W	H	Rh	Paste or powder obtained by grinding fresh or dry rhizome is mixed with hot water and filtered. The filtrate is used in an eye infection.	82.7	0.80
34	Caryophyllaceae	<i>Drymaria cordata</i> (L.) Willd. ex Schult.	KBR101	Abijalo	W	H	Lf	The juice obtained by grinding fresh leaves is used to control fever and paste is applied on the cut wound.	69.2	0.35
35	Convolvulaceae	<i>Cuscuta reflexa</i> Roxb.	RWN14	Akasbeli	W	C	Wp	Juice obtained after grinding the whole plant is drunk to cure jaundice and diarrhea.	73.1	1.10
36	Coriariaceae	<i>Coriaria napalensis</i> Wall.	RWN15	Machaino	W	T	Br	Bark paste is applied to the fracture.	50	0.70
37	Costaceae	<i>Hellenia speciosa</i> (J. Koenig) S.R.Dutta	RWN167	Betlauri	W	H	St	Stem juice is used to control fever.	46.2	0.75
38	Cucurbitaceae	<i>Cucurbita pepo</i> L.		Farsi	C	C	Sd	Seeds of this plant and <i>Solena heterophylla</i> are mixed and chewed to treat stomatitis.	50	0.55
39		<i>Solena heterophylla</i> Lour.	RWN166	Golkakri	W	C	Sd	Grounded seeds are used in stomatitis.	53.8	0.20

40		<i>Trichosanthes tricuspidata</i> Lour	RWN73	Indreni lahara	W	C	Sd, Lf, Rt	Seeds are used to control vomiting. Leaf and root juice is used in mensuration disorder.	44.2	0.45
41	Cyperaceae	<i>Cyperus rotundus</i> L.	KBR100	Mothe	W	H	Tb	Tuber juice is used to control typhoid, diarrhea, stomach disorder and dysentery.	40.4	0.65
42	Ericaceae	<i>Lyonia ovalifolia</i> (Wall.) Drude	RWN20	Ayaar	W	T	Ys, Lf	Paste of apical shoots and leaf is used to control scabies (<i>Luto</i>).	42.3	1
43		<i>Rhododendron arboreum</i> Sm.	RWN2	Gurans	W	T	Fl	Fresh flowers are chewed or dried flower powder is mixed with hot water and drunk to control diarrhea.	50	0.20
44	Euphorbiaceae	<i>Falconeria insignis</i> Royle	KBR98	Khiri	W	T	Br	Decoction of bark is applied on baby's stomach to treat stomach disorder.	38.5	0.60
45		<i>Jatropha curcas</i> L.	RWN156	Sajiwon	W	S	Sd	Seed powder or oil is used to control fire-burned wounds.	40.4	0.75
46		<i>Macaranga denticulata</i> (Blume) Mull.Arg.	RWN65	Malyat	W	T	Ys	Fluid obtained by breaking apical shoots or fresh petiole is applied on cut wounds.	63.5	0.70
47		<i>Ricinus communis</i> L.	RWN64	Aril	W	S	Ys, Lf	Leaves and apical shoots together with <i>Cannabis sativa</i> and mustard oil are mixed and applied on snake bite.	48.1	0.65
48	Fabaceae	<i>Bauhinia variegata</i> L.	RWN63	Koiralo	W	T	Br	Bark juice is used to cure diarrhea.	34.6	0.55
49		<i>Dalbergia latifolia</i> Roxb.		Sal	W	T	Br	Bark and wood are used as a tonic and also used to control worms.	30.8	0.75
50		<i>Indigofera cassioides</i> Rottler ex DC.	RWN121	Saginu	W	T	Rt	Root juice is used to control chronic diarrhea.	21.2	0.60
51		<i>Phanera vahlii</i> (Wight & Arn.) Benth.	RWN49	Malu lahara	W	S	Fl	Juice from flower and water are mixed and given in poisoning caused by <i>Aconitum spicatum</i> .	23.1	0.65
52		<i>Senegalia catechu</i> (L.f.) P.J.H. Hurter & Mabb.	RWN151	Khayer	W	T	Br	Bark juice is used to control joint pain.	44.2	0.35
53	Fagaceae	<i>Quercus lanata</i> Sm.	RWN123	Bajh	W	T	Wd	Juice of heartwood is used to control joint pain.	48.1	0.75
54	Ganodemataceae	<i>Ganoderma lucidum</i> (Curtis) P. Karst.	RWN125	Rato Peneu Chyau	W	H	Wp	Whole plant paste is applied on a cut wound.	69.2	0.85

55	Gentianaceae	<i>Swertia chirayita</i> (Roxb.) H.Karst	RWN81	Tite	W	H	Wp	Leaf juice is used to control blood pressure and cough.	92.3	2.25
56		<i>Geranium nepalense</i> Sweet	RWN15	Ragatjari	W	H	Rt	Root juice is used to cure bacillary dysentery.	51.9	0.35
57	Juglandaceae	<i>Juglans regia</i> L.	RBR94	Okhar	W	T	Br	Bark is tied on fracture.	55.8	0.45
58	Lamiaceae	<i>Colebrookea oppositifolia</i> Sm.	KBR95	Dhulsu	W	S	St	Stem hairs are peeled out and applied on cut wounds.	46.2	0.90
59		<i>Elsholtzia blanda</i> (Benth.) Benth.	KBR96	Ban silam	W	H	Lf	Leaf paste is applied on the body to prevent leeching.	40.4	0.85
60		<i>Mentha arvensis</i> L.	KBR93	Pudina	W	H	Lf	Leaf juice is used to control fever and cough.	63.5	1.55
61		<i>Ocimum basilicum</i> L.	KBR92	Bamari ful	W	H	Lf	Leaf juice is used to control headache and fever.	69.2	1.40
62		<i>Ocimum tenuiflorum</i> L.		Tulasi	C	H	Lf	Leaf is used to control cough and cold.	65.4	0.75
63	Lauraceae	<i>Cinnamomum tamala</i> (Buch-Ham.) T. Nees & C.H. Eberm	RWN107	Surkaulo	W	T	Br	Bark juice is used to control diarrhea.	42.3	1.25
64	Liliaceae	<i>Lilium nepalense</i> D.Don	RWN125	Tite-piralu	W	H	Tb	Tuber paste is used on fire-burned wounds.	46.2	1.17
65	Linaceae	<i>Reinwardtia indica</i> Dumort.	KBR89	Pyauli	W	S	Ys	Juice from apical shoots and leaves is applied on cut wounds.	53.8	0.65
66	Loranthaceae	<i>Scurrula parasitica</i> L.	RWN128	Aijheru	W	H	St	Stem paste is used to cure fractures.	46.2	0.82
67	Lythraceae	<i>Woodfordia fruticosa</i> (L.) Kurz	RWN129	Dhayero	W	S	Br	Bark paste is applied to fire-burned wound.	44.2	0.45
68	Malvaceae	<i>Bombax ceiba</i> L.	KBR86	Simal	W	T	Rt	Root juice is used to control diarrhea and worms	46.2	0.55
69		<i>Grewia serrulata</i> DC.	RWN15	Bhimal	W	T	Br	Bark juice is used to control roundworms.	30.8	0.75
70	Melanthiaceae	<i>Paris polyphylla</i> Sm.	RWN16	Satuwa	W	H	Tu	Tuber paste is used on cut wounds and juice is used to cure eye problems.	92.3	2.35
71	Meliaceae	<i>Melia azedarach</i> L.	KBR85	Bakaino	W	T	Sd	Seed powder is used to control worms.	30.8	0.75
72	Menispermaceae	<i>Cissampelos pareira</i> L.	RWN153	Badalpate	W	C	Rt	Root juice is used to control diarrhea	32.7	0.65
73		<i>Tinospora cordifolia</i> (Willd.) Hook.f. & Thomson	RWN150	Gurjo	W	C	St	Stem juice is used to control piles.	36.5	0.70

74	Moraceae	<i>Ficus auriculata</i> Lour.	RWN152	Timila	W	T	Ys, Yf	Apical shoots and young fruits are given to cure diarrhea.	26.9	0.85
75		<i>Ficus benghalensis</i> L.	RWN148	Bar	W	T	Lt	Milky latex is used to control fungal infection (<i>Dag</i>).	30.8	0.75
76		<i>Ficus palmata</i> Forssk.	RWN03	Berulo	W	T	Lt	Milky latex is used to control furuncles (<i>Pilo</i>).	26.9	0.65
77	Morchellaceae	<i>Morchella esculenta</i> Fr.	RWN04	Guchi Chyau	W	H	Wp	Plant juice is used to cure headache and fever.	50	1.25
78	Myrtaceae	<i>Syzygium cumini</i> (L.) Skeels	RWN06	Jamun	W	T	Fr, Sd	Fruits and seeds are chewed to control diabetes.	40.4	0.45
79	Nephrolepidaceae	<i>Nephrolepis cordifolia</i> (L.) C. Presl	RWN07	Pani amala	W	H	Tb	Tuber juice is used to control malarial fever.	36.5	1
80	Oleaceae	<i>Fraxinus floribunda</i> Wall.	RWN75	Lakuri	W	T	Br	Bark is tied on fracture.	30.8	0.35
81	Ophiocordycipitaceae	<i>Ophiocordyceps sinensis</i> (Berk.) G.H. Sung, Hywel-Jones & Spatafora	RWN08	Jiban Buti	W	H	Wp	Whole plant is taken as a tonic.	88.5	1.35
82	Orchidaceae	<i>Coelogyne cristata</i> Lindl.	KBR60	Pani pakhada	W	H	Tb	Pseudobulbs are used as aphrodisiacs and treat constipation.	42.3	1
83		<i>Dactylorhiza hatagirea</i> (D.Don.) Soo	KBR68	Panch auule	W	H	Tb	Tuber paste is applied on cut wounds.	96.2	2.50
84	Oxalidaceae	<i>Oxalis corniculata</i> L.	KBR108	Charmilo	W	H	Lf	Fresh leaf is eaten to cure piles.	40.4	1.12
85	Papaveraceae	<i>Meconopsis paniculata</i> (D.Don) Prain	RWN107	Chote	W	H	Rt	Root paste is applied to cut wounds.	51.9	1.25
86	Phyllanthaceae	<i>Phyllanthus emblica</i> L.	RWN18	Amala	W	T	Fr	Fruit powder is one of the constituents of <i>Triphala churna</i> taken in stomach disorders.	48.1	1.21
87	Pinaceae	<i>Cedrus deodara</i> (Roxb. Ex D.Don) G.Don	RWN13	Dhyar	W	T	St	Oil extracted from wood is used to control scabies (<i>Luto</i>).	55.8	0.30
88		<i>Pinus roxburghii</i> Sarg.	KBR64	Sallo	W	T	Re	Resin is used to cure physical pain.	40.4	0.40
89	Plantaginaceae	<i>Neopicrorhiza scrophulariiflora</i> (Pennell) D.Y. Hong	RWN80	Katuwa	W	H	Rh	Rhizomes and roots are used to treat high blood pressure, fever, bile and other intestinal pain.	96.2	2.45

90		<i>Plantago major</i> L.	RWN113	Kane jhar	W	H	Lf, Rt	Fresh 5-6 leaves are chewed every day to control piles. Root juice is used to treat roundworms.	44.2	1.10
91	Poaceae	<i>Cynodon dactylon</i> (L.) Pers.	KBR63	Dubo	W	H	Lf	Apical shoots and leaf juice are used to treat nasal bleeding and cut wounds.	51.9	0.75
92		<i>Imperata cylindrica</i> (L.) Raeusch.	KBR61	Siru gahs	W	H	Rt	Fresh root is chewed or root juice is used to treat roundworm.	30.8	1.25
93		<i>Thysanolaena latifolia</i> (Rox. ex Hornem.) Honda	KBR59	Amriso	W	H	Rt	Root paste is used to control physical pain.	21.2	0.95
94	Polygonaceae	<i>Rheum australe</i> D.Don.	KBR58	Padam challo	W	H	Rt	Root paste is used to control physical pain. Stem and petiole juice is used to control fever.	71.2	2.10
95		<i>Rumex nepalensis</i> Spreng.	KBR56	Hale	W	H	Rt	Paste from root of this plant and <i>Rheum australe</i> is applied to cure the sprain (<i>Markeko laagi</i>).	63.5	1.40
96	Pteridaceae	<i>Cheilanthes albomarginata</i> C.B. Clarke	RWN134	Don Sinki	W	H	Wp	Burned ash is used to cure ear problems.	36.5	0.90
97	Ranunculaceae	<i>Aconitum spicatum</i> (Bruhl) Stapf	RWN21	Bikh	W	H	Tb	Tuber powder is mixed with fried wheat flour and used to kill mice.	73.1	0.75
98		<i>Delphinium vestitum</i> Wall. ex Royle	RWN32	Atis	W	H	Rt	Root powder is used as an anthelmintic.	78.8	1.45
99		<i>Thalictrum foliolosum</i> DC.	KBR51	Tikuli Jhar	W	H	Rt	Root juice is used to control joint pain.	44.2	0.80
100	Rosaceae	<i>Prinsepia utilis</i> Royle	KBR422	Dotayalo	W	S	Sd	Oil is used to cure allergic problems.	53.8	0.65
101		<i>Prunus cerasoides</i> Buch-Ham. Ex D.Don	KBR31	Paiyeu	W	T	Br	Decoction obtained by cooking the bark of this plant and <i>Alnus nepalensis</i> bark is used to cure wounds.	48.1	1.72
102		<i>Prunus persica</i> (L.) Batsch	KBR24	Aru	W	T	Fr	Seed oil is applied to skin allergies.	36.5	0.66
103		<i>Pyrus pashia</i> Buch-Ham. Ex D.Don	RWN23	Mahel	W	T	Fr	Dried fruits are eaten to balance dehydration.	50	0.75
104		<i>Rosa macrophylla</i> Lindl.	KBR22	Kesar	W	S	Fr	Fresh fruits are chewed, or fruit powder juice is used to control asthma.	48.1	0.51
105	Rubiaceae	<i>Rubia manjith</i> Roxb.	KBR14	Macheto	W	H	Rt	Root juice is used to control malarial fever.	51.9	1.20

106	Rutaceae	<i>Aegle marmelos</i> (L.) Correa	KBR13	Bel	W	T	Fr, Rt	Ripen fruit juice is given to treat constipation and dyspepsia. Root juice is used to control diarrhea.	40.4	0.43
107		<i>Boenninghausenia albiflora</i> (Hook.) Rchb. ex Meisn.	RWN37	Charuwa Jhar	W	H	Lf	Fresh leaf is fried in mustard oil and applied on the skin to control skin allergies.	61.5	0.41
108		<i>Zanthoxylum armatum</i> DC.	RWN101	Timur	W	T	Fr	Fruit powder is applied to fire-burned wounds.	86.5	2.15
109		<i>Zanthoxylum oxyphyllum</i> Edgew.	RWN71	Siltimur	W	T	Fr	Fruits are used to relieve toothache.	75	0.65
110	Sapindaceae	<i>Aesculus indica</i> (Wall ex.Cambess) Hook.	RWN08	Pangro	W	T	Sd	Seed powder paste is used to cure furuncles (<i>pilo</i>).	30.8	0.75
111	Sapotaceae	<i>Diploknema butyracea</i> (Roxb.) H.J. Lam	RWN27	Chiuri	W	T	Sd	Seed oil is used to cure cold injuries.	23.1	0.52
112	Saxifragaceae	<i>Astilbe rivularis</i> Buch.Ham. ex D.Don	RWN89	Nyauli pati	W	H	Rh	Rhizome powder is used as a tonic in pre and post-pregnancy.	88.5	1.75
113		<i>Bergenia ciliata</i> (Haw.) Sternb.	RWN64	Silapari	W	H	Tb	Fresh tuber is directly chewed to control cough. Rhizome juice is used to cure gastritis and kidney stones.	50	1.45
114	Solanaceae	<i>Nicandra physalodes</i> (L.) Gaertn.	KBR13	Dhaturo	W	H	Lf, Fr	Leaf juice is used to control amoebiasis.	42.3	0.75
115		<i>Nicotiana tabacum</i> L.	KBR11	Kacho Surti	W	H	Lf	Leaf juice is used to kill insects in the ear.	73.1	0.85
116	Taxaceae	<i>Taxus contorta</i> Griff.	RWN55	Laito	W	T	Br	Bark juice is used to control chest pain.	69.2	1.25
117	Urticaceae	<i>Elatostema platyphyllum</i> Wedd.	KBR09	Golfe Jahr	W	H	Rt	Root juice is used to cure <i>Ganogola</i> .	59.6	0.5
118		<i>Urtica dioica</i> L.	KBR07	Sisno	W	H	Rt, Ys	Root paste is applied to cure sprain (<i>Markinu</i>).	59.6	1.45
119		<i>Pouzolzia rugulosa</i> (Wedd.) Acharya & Kravtsova	RWN11	Githo	W	T	Br	Bark Juice is used to control constipation.	55.8	1.15
120	Viburnaceae	<i>Viburnum mullaha</i> Buch-Ham. ex D.Don	RWN69	Malewa	W	S	Fr	Fruit juice is used to cure asthma.	46.2	0.75
121	Vitaceae	<i>Ampelocissus rugosa</i> (Wall) Planch	KBR05	Purina	W	C	St	Stem juice is used to control the eye wound as well as eye swelling (<i>Phulopareko</i>).	26.9	0.65

122	Zingiberaceae	<i>Amomum subulatum</i> Roxb.		Alaichi	C	H	Fr	Seeds are fried in mustard oil and applied on body swelling.	28.8	1
123		<i>Curcuma longa</i> L.		Besar	C	H	Tb	Tuber paste is applied on wounds. Boiled juice is used to cure tonsillitis.	53.8	1.15
124		<i>Zingiber officinale</i> Roscoe		Aduwa	C	H	Tb	Tuber powder is used to cure stomach disorders and is also used as spices.	50	1.5

Origin: W- Wild, C- Cultivated, IAS- Invasive Alien Species; Life Form: H- Herbs, C- Climbers, S- Shrubs, T- Trees; Parts Used: Rh- Rhizome, Ro- Root, Wp- Whole plant, Lf- Leaf, Ba- Bark, Ys- Young shoot, Fr- Fruit, Fl- Flower, Lt- Latex, Se- Seed, St- Stem, Tu- Tuber

Table 2: Informant consensus factor (ICF) for different disease and disorder categories

S.N.	Use Category	Ailments	Number of taxa	Use Citations	ICF
1	Dermatological problems	Wounds, Skin rashes, allergies, fire burn, warts, inflammation, cut wounds, scabies, bleeding control, scabies, fungal infection, furuncle (Pilo), cold injuries, amoebiasis	43	70	0.6
2	Cold and respiratory system disorders	Cough, cold, asthma, tuberculosis, sinuses, fever	21	30	0.45
3	Stress and insomnia	Improve memory power, dehydration,	9	11	0.25
4	Toothache and mouth inflammation	Tooth ache, stomatitis	4	6	0.7
5	Skeletomuscular disorders	Chest pain, back pain, arthritis, broken and painful bones, neck pain, fracture, Joint pain, sprain, body swelling	14	21	0.5
6	Hypertension	High blood pressure, palpitations,	8	12	0.57
7	Gastrointestinal disorders/Digestive disorders	Stomachaches, ulcers, vomiting, diarrhea, appetite boosting, dysentery, constipation, piles, gastric, dyspepsia, control roundworms, typhoid, intestinal pain,	36	57	0.60
8	Insect bites	Snake bite, Mosquito bites	4	6	0.65
9	Eye related issues	Eye infection, eye pain, eye wound (<i>Phulopareko</i>)	3	4	0.5
10	Tonic	Increase strength, increase appetite,	6	7	0.2
11	Ear problems and Nose	Ear infection, Ear pain, nose bleeding	3	4	0.5
12	Infectious and parasitic diseases	Malaria, headache, jaundice, anthelmintic	6	8	0.4
13	Reproductive Health care and Mensuration Problems	Pre- and post-pregnancy health care, Mensuration disorder	3	4	0.5
14	Others	Poisonous, hair fall control	4	5	0.33

Table 3: Most frequently used plants in each ailment category based on the highest fidelity level

S.N.	Plant Species	Family	Therapeutic Use	Np	N	FL (%)
1	<i>Neopicrorhiza scrophulariiflora</i> (Pennell) D. Y. Hong	Plantaginaceae	Fever	19	19	100
2	<i>Dactylorhiza hatagirea</i> (D.Don.) Soo	Orchidaceae	Cut and Wounds	24	25	96
3	<i>Rheum australe</i> D.Don.	Polygonaceae	Fever	22	24	92
4	<i>Ocimum tenuiflorum</i> L.	Lamiaceae	Cough and cold	25	28	89
5	<i>Acorus calamus</i> L.	Acoraceae	Cough	22	25	88
6	<i>Swertia chirayita</i> (Roxb.) H.Karst	Gentianaceae	Fever	28	32	88
7	<i>Impatiens balsamina</i> L.	Balsaminaceae	Cut and Wounds	23	28	82
8	<i>Artemisia indica</i> Willd.	Asteraceae	Cut and Wounds	16	20	80
9	<i>Scurrula parasitica</i> L.	Loranthaceae	Fracture	8	15	53
10	<i>Calotropis procera</i> (Aiton.) Aiton fil.	Apocynaceae	Cough and cold	11	21	52

Np= number of informants that claimed use of a particular plant species

N= the total number of informants citing the species for any disease

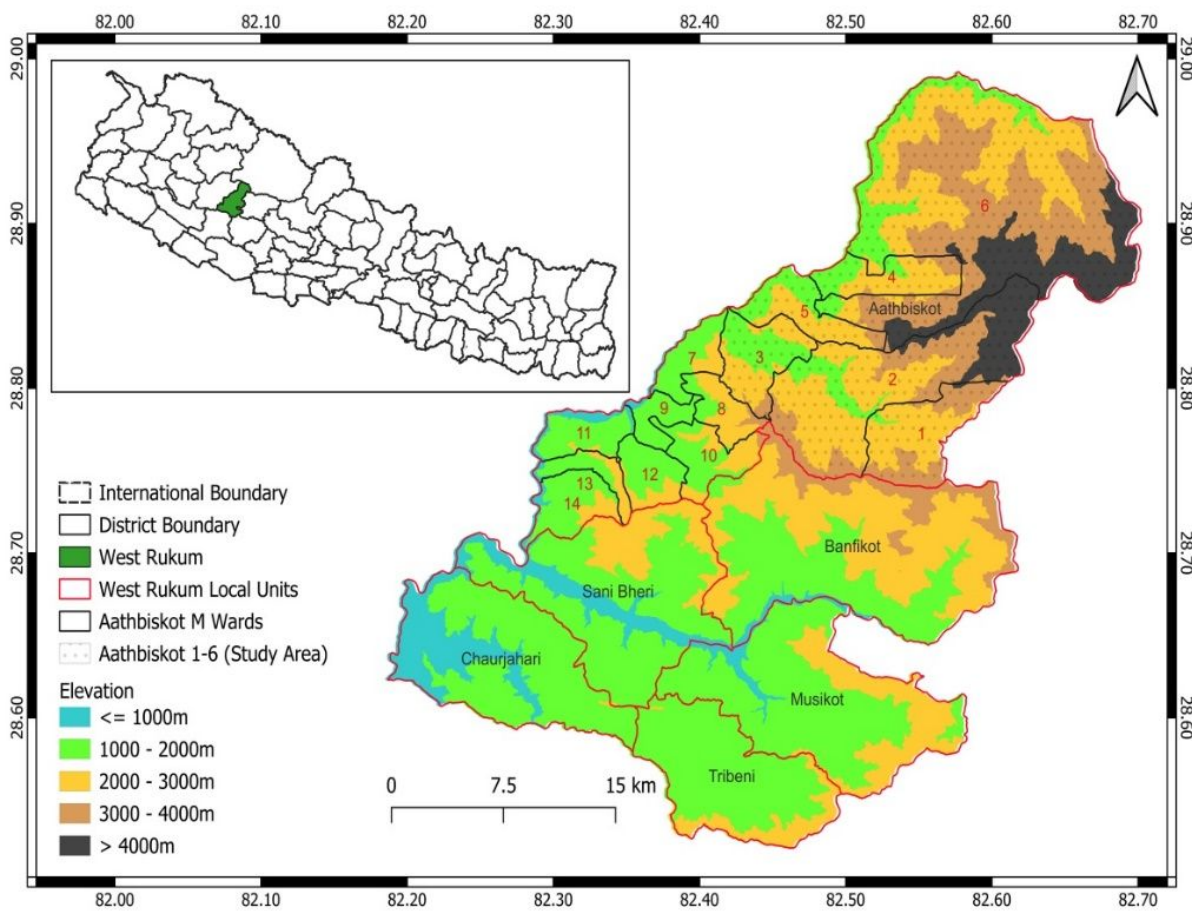


Figure 1

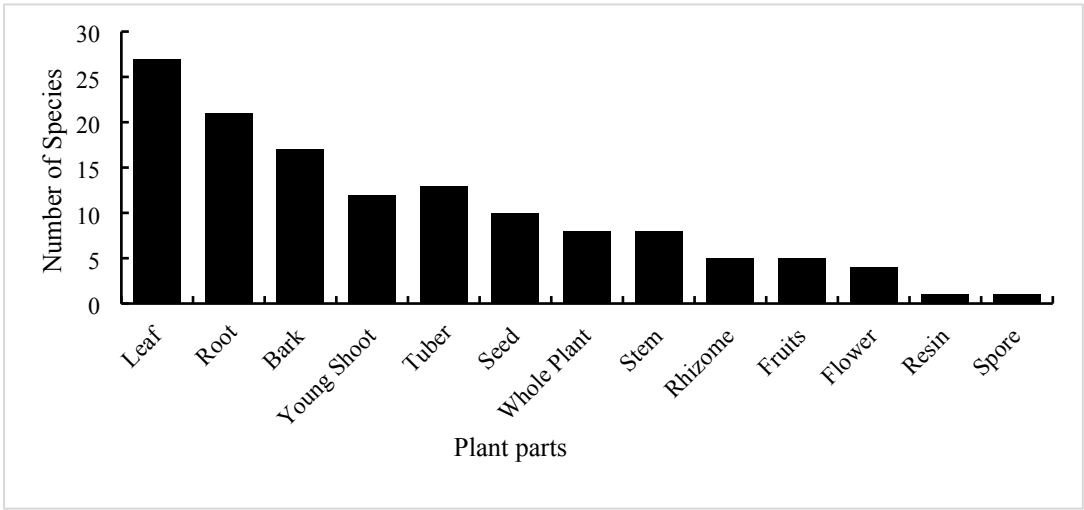


Figure 2

Draft

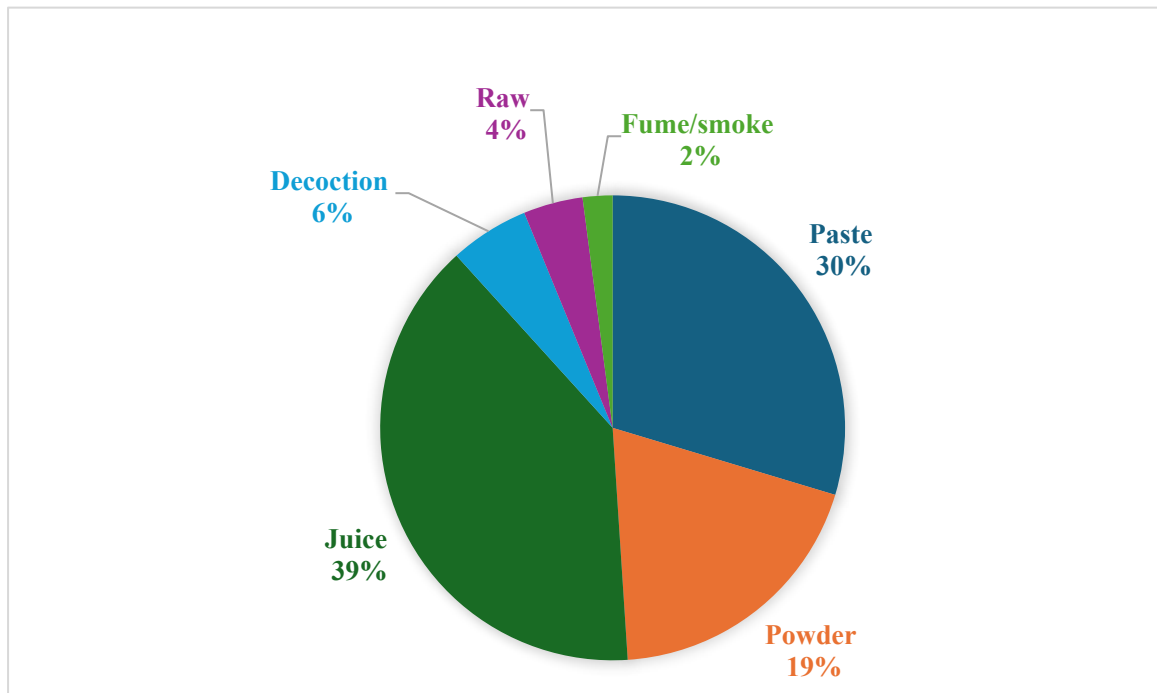


Figure 3