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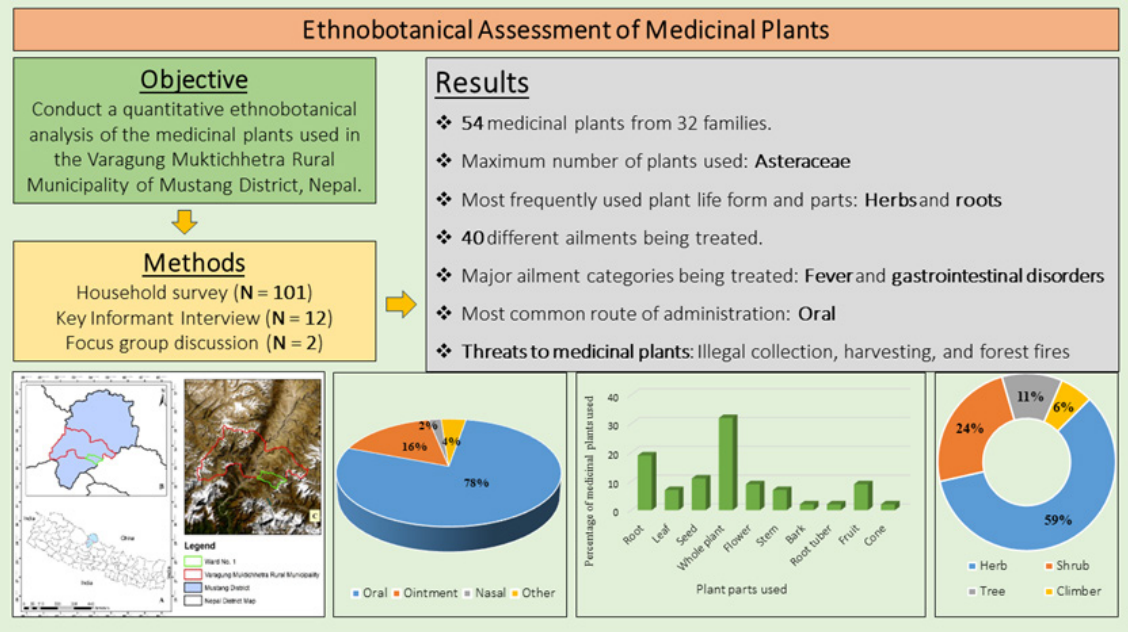

Highlights

- A total of 54 medicinal plants belonging to 32 families are used to treat 40 different ailments, indicating extensive ethnobotanical uses of plants in the study area.
- Asteraceae family represented the maximum number of plants being used as medicine.
- Fever and gastrointestinal disorders were the major ailment categories being treated.

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Ethnobotanical Assessment of Medicinal Plants in Trans-Himalaya of Nepal

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Abstract: Nepal harbors many ethnomedicinal plants distributed throughout the country's diverse geography. It is crucial to document plants' ethnobotanical knowledge for further research and conservation. This study aimed to conduct a quantitative ethnobotanical analysis of the medicinal plants used in the Varagung Muktichhetra Rural Municipality of Mustang District, Nepal. Data were collected through a household survey (N = 101), using snowball sampling with 40% sampling intensity, 12 Key Informant Interviews (KIIs), and two Focus Group Discussions (FGDs). The data was analyzed using different quantitative tools: Informant consensus factor (Fic), Fidelity Level (FL), and Use Values (UV). A total of 54 medicinal plants belonging to 32 families were documented, which were used to treat 40 different ailments. The family Asteraceae represented the maximum number of plants being used. Herbs were most frequently used (59%), and root (n =10) was the most used plant part. *Neopicrorhiza scrophulariiflora* was the most frequently used and preferred species (FL = 65% and UV = 0.62). Fever (Fic = 0.88) and gastrointestinal disorder (Fic = 0.86) were the major ailment categories treated. Oral (76%) was the main route of administration of medicines in the body, and the most used form of medicine preparation was paste (46%). Unsustainable harvesting, illegal collection, and forest fire were the major threats to medicinal plants and were highly significant after applying the non-parametric Friedman test. Enactment of a policy that focuses on conservation, sustainable harvesting, and domestication of highly valued medicinal plants is recommended to policymakers.

Keywords: Ailment; Asteraceae; Diseases; Ethnomedicine; Herb

INTRODUCTION

Since time immemorial, plants have benefited people in a variety of ways, including food, clothes, shelter, fuel, fiber, fodder, socio-religious proposes, and most importantly on medicine (Hamilton, 2004; Bhattarai & Khadka, 2017; Bhattarai, 2018; Rajbhandary et al., 2020; Gautam & Timilsina, 2022). Over 21,000 plant species are utilized by more than 60% of the world population for medicinal purposes (WHO, 2002), with approximately 6,500 species occurring in Asia (Karki et al., 1999; Shrestha & Dhillion, 2003). They are vital components in pharmaceutical industries for drug production (de Boer & Cotingting, 2014); about 25% of modern drugs are derived from natural products having a plant origin (Newman & Cragg, 2012). In Nepal, about 2,500 species are used for medicinal purposes by 80% of the rural population (Sathiyaraj et al., 2015; Kunwar et al., 2021), among the 13,067 plant species (Chaudhary et al., 2020). More than 300 plant species are traded (Ghimire et al., 2016), while 12 are listed and promoted as commercial medicinal plants in Nepal (Shrestha & Das, 2008).

Indigenous and rural people mainly use plant resources for medicine in developing and developed countries (Luitel et al., 2014; Tomlinson & Akerele, 2015; Kumar & Ashaq, 2021). Besides, medicinal plants have contributed to the subsistence economy of a large population of rural people in Nepal and other countries too (Shackleton & Pullanikkatil, 2019; Lamichhane et al., 2021). Traditional medicine/ ethnomedicine in Nepal has been used extensively by the majority of the population for centuries due to its low cost, abundance, and no side effects (Acharya & Acharya, 2009; Thapa et al., 2020). Ethnomedicine, a blend of botanical and anthropological approaches, delves into the wisdom of ethnic communities regarding plant remedies (Budha-Magar et al., 2020).

Ethnomedicinal knowledge is highly explored and recognized worldwide as it is the basis for the innovation of modern types of medicines (Acharya & Acharya, 2009; Acharya, 2012). Ethnomedicinal studies of plants and documentation contribute to the exploration of medicinal plants (Albuquerque et al., 2013), their traditional uses (Alexiades, 2003), and the discovery of novel drugs (Rahmatullah et al., 2012). The loss of skilled individuals, socioeconomic shifts, and biodiversity decline all contribute to the depletion of traditional ethnobotanical knowledge, making it imperative to document this valuable resource (Singh et al., 2012; Kunwar et al., 2016). Moreover, knowledge about the different medicinal properties of plants is based on necessities, expertise, observation from older people, and trial and error (Malla et al., 2015). Thus, there is a high potential for loss of traditional knowledge as it is restricted to only some members of society, and younger generations are not fascinated due to the availability of modern health systems (Hussain et al., 2018).

In Nepal, ethnobotanical studies have been conducted in different regions of the country (Dhami, 2008; Gaire

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& Subedi, 2011; Malla et al., 2015; Paudel et al., 2018; Kunwar et al., 2021; Poudel et al., 2021). The Mustang district harbors most of the endemic flowering plants of Nepal (78 species), and people are using them for various medicinal purposes (Hamilton & Radford, 2009). Many researchers have mentioned Mustang as a vital place for medicinal plants (Bista & Bista, 2005; Kunwar et al., 2006; Bhattarai et al., 2009a; Bhattarai et al., 2009b); however, it lacks adequate ethnobotanical exploration and documentation (Bista & Bista, 2005; Bhattarai et al., 2010). In addition, the loss of biodiversity in Nepal due to the increase in population, technological advancement, and development of allopathic medicines may also contribute to the loss of valuable indigenous knowledge of plants of several indigenous communities in Nepal (Bhattarai, 2009; Gautam & Timilsina, 2022), including Mustang (Bhattarai et al., 2010). To overcome this problem, the present study aimed to explore the ethnobotanical knowledge of local people on medicinal plants used for the treatment of different ailments in the Varagung Muktichhetra Rural Municipality of Mustang District, Nepal. These findings will add scientific information about ethnomedicinal plants and help policymakers to take action to conserve the most valuable species in the area.

MATERIALS AND METHODS

Study area

The study was conducted in the Varagung Muktichhetra Rural Municipality of Mustang district, Nepal (Figure 1). It lies in the lower Mustang zone situated at Latitude: 28°49' N and Longitude: 83°35' E and to the North-East of the great Annapurna Massif. It covers an area of 885.78 Km^2, extended from 2800 to 5,310 m from mean sea level (MSL). The study was conducted in ward (smallest administrative division) No. 1 of the Rural Municipality of Mustang which includes five villages named Ranipauwa, Jharkot, Lubra, Khinga, and Purang. The study region hosts diverse flora, including dry alpine and subalpine vegetation. This area is characterized by high altitude, low climate, semi-desert environment, rain shadows of Dhaulagiri and Annapurna Himal and monsoon rainfall (King Mahendra Trust for Nature Conservation (KMTNC), 2001-2002). The study area is rich in medicinal plants and the community has rich traditional knowledge (Bista & Bista, 2005). Ward No. 1 has a population of 628 and a household of 198 (CBS, 2011).

Data collection

A traditional healer was identified at the beginning in consultation with local administration and district forest officers, and snowball sampling was carried out for further study. We employed random and snowball sampling techniques (Bhattarai et al., 2010), to identify potential participants and performed a household survey (N = 101) representing a sample of the population across different age groups with a 40% sampling intensity. The data were gathered by key Informant Interviews (KIIs) (N=12) and Focus Group Discussions (FGDs) (N=2) using an open-ended semi-structured questionnaire. Study participants included individuals from various ethnic and socioeconomic backgrounds, including Amchi healers, medicinal plant traders, farmers, hotel or shop owners, footpath traders, homemakers, and village elders. Key informants include elderly individuals (above 50 years old), local leaders, teachers, social workers, heads of government, and non-government organizations (including the Annapurna Conservation Project, District Development Committee, etc.). FDGs include eight individuals each, including traditional faith healers, village heads, and other

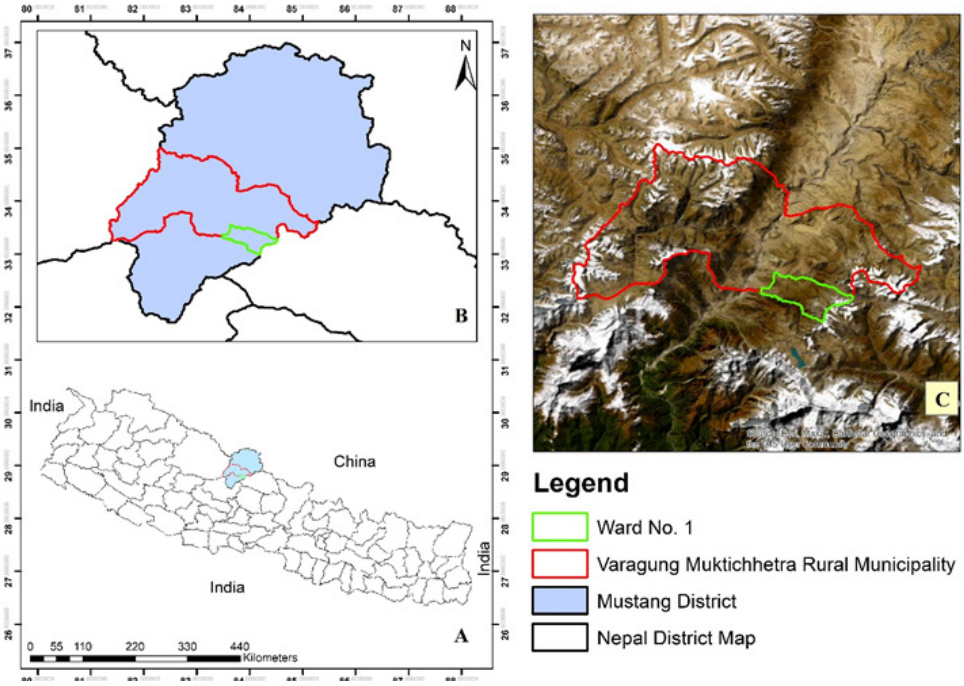

Figure 1: Study area map showing A. Districts of Nepal B. Mustang district, and C. Varagung Muktichhetra Rural Municipality showing Ward No. 1.

local people of different sex and age. During FGDs, basic ethnomedicinal information about medicinal plants, such as status, uses, and priority species, were listed. Plants were identified with the help of standard botanical literature (Stainton, 1988; Adhikari, 2000). The nomenclature of the identified species follows standard literature (Hooker, 1872; Bista et al., 2001), and plant family assignments follow the current Angiosperm Phylogeny Group (Stevens, 2001).

Data analysis

The collected data were pooled and analyzed in SPSS (Version 23) and MS Excel 2013. The tables, graphs, and pie charts represent the overall ethnomedicinal study in Varagung Muktichhetra Rural Municipality, Mustang district, Nepal. The Informant consensus factor (Fic) was calculated according to the formula given by Heinrich et al. (1998) to identify the most important ailment categories and plant species being used to treat those categories.

$$F = \frac{Nurj - Ntj}{Nurj - 1} \quad \text{(i)}$$

Where, Nurj = the number of use-reports in each ailment category j, Ntj = the total number of taxa used in each ailment category j by all informants. Fic values range between 0 and 1, where '1' indicates the highest level of informant consent. In each case, if a plant was mentioned by an informant as 'used', then we considered it as one 'use-report' (Gazzaneo et al., 2005).

The frequently used plant species for treating a particular ailment category was determined by calculating Fidelity Level (FL) (Shaheen et al., 2017).

$$FL_{ij}(\%) = \frac{FCij}{Ni} \quad \text{(ii)}$$

Where FC = the number of informants reporting the use of a given species 'i' for 'j' ailments and N = the total number of informants who mentioned the same plant for any disease. A higher FL denotes the most preferred used plant.

Similarly, Use value (UV) was calculated to measure the importance of individual plant species (Rokaya et al., 2010).

$$UV_i = \frac{\Sigma\, Ui}{Ni} \quad \text{(iii)}$$

Where U_i = the number of use-reports mentioned by each respondent for a given species and N_i = the total number of respondents. Higher use value determines the most important species comparatively. Non-parametric Friedman test was employed to test the major threats to medicinal plants after ranking several threats from the highest to lowest priority based on respondents' responses. The Friedman test was used because threats are ranked and aren't normally distributed (Cleophas et al., 2016).

RESULTS AND DISCUSSION

Life forms of the documented medicinal plants

The study area consists of 54 species of medicinal plants belonging to 32 families and 43 genera for the treatment of 40 different ailments under 13 major categories (Appendix 1). The herbs occupied a major percentage of the plant habit (59%) (Figure 2) which is similar to the previous studies in different regions of Nepal, such as in Rupandehi (Singh, 2015), Jhapa (Ghimire et al., 2016), Chitwan (Poudel & Singh, 2016), Bhojpur (Paudyal et al., 2021), and Kaski (Gautam & Timilsina, 2022). Other research in Dolakha (Shrestha & Dhillion 2003), Humla (Rokaya et al., 2010), Rasuwa (Uprety et al., 2010), and Central Himalaya (Rokaya et al., 2012) of Nepal also revealed the dominance of herbs which is consistent with our findings. The potential reasons for having the highest composition of herbs are high abundance (Rokaya et al., 2010), ease of harvest: collection and transport (Uprety et al., 2010), and higher efficiency of recovery to ailments (Shrestha & Dhillion, 2003). A similar pattern of occurrence (Herbs>shrub>tree>climber) was also observed in the previous study of Bhattarai et al. (2010) in the same district. The Himalayan region, known for its wealth of endemic plant species and medicinal herbs (Kunwar & Duwadee, 2003), is a promising reason for the dominance of herbs in our study (Figure 2). The other reason for having abundant herbs is they are relatively easy to cultivate and can fulfill the demand if needed in higher amounts (Bekalo et al., 2009) and traded nationally and internationally (India and China) (Kaphle et al., 2006).

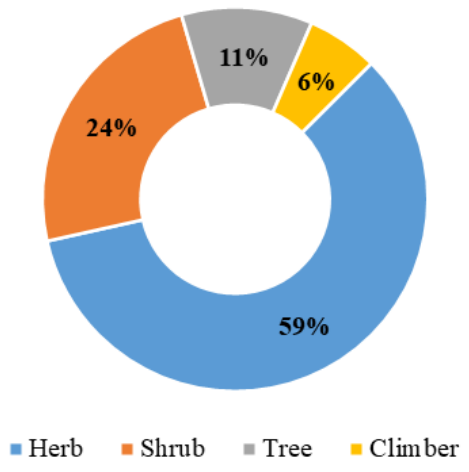

Figure 2: Life forms of medicinal plants used in Varagung Muktichhetra Rural Municipality of Mustang district, Nepal.

Family-wise composition and parts of plants being used for medicinal purposes

The family Asteraceae was dominant with the highest number of species (n = 6), followed by Ranunculaceae (n = 5), Rosaceae (n = 4), and so on (Appendix 1), which is similar to the study of Bhattarai et al. (2010). Several other studies in Kaski (Adhikari et al., 2019; Gautam & Timilsina, 2022), Far western Nepal (Kunwar et al., 2016), Iran (Ghasemi Pirbalouti et al., 2012), Pakistan (Ali & Qaisar 2009), and Northwestern Ethiopia (Mesfin et al., 2009) also reported Asteraceae as the dominant family used for medicinal proposes. The Asteraceae family also records a higher number of useful medicinal plants which were already manifested in Nepal (Kunwar et al., 2018). The other reason for the highest number of species from the Asteraceae might be due to the largest plant family comprising 1600-1700 genera and 24,000–30,000 species worldwide (Funk et al., 2005; Vallès et al., 2013). Moreover, Asteraceae taxa can assume almost every life form: herbs, succulents, lianas, epiphytes, trees, or shrubs, and they are found in all continents, except Antarctica (Funk et al., 2005). The most frequently used plant parts are whole plants (n = 17, 0.31%) followed by root (n = 10, 0.18%), seeds (n = 6, 0.11%), and flower and fruit (n = 5, 0.09%), leaf and stem (n = 4, 0.07%), and bark, root tuber, cone (n = 1, 0.02%) (Figure 3). A similar finding was observed by Muhammad et al. (2016) in Sadda Kurram, a border region between Pakistan and Afghanistan. They reported that members of the Asteraceae family are predominantly herbaceous, and the whole plant is typically used to treat a wide range of ailments. Also, the most selected plant parts may be preferential because such parts contain more active principles in comparison to the least used parts. Leaves, roots, stems, and flowers are physically more vulnerable to attack by herbivores or pathogens than the harder bark or cones and may contain more chemical defense compounds in the form of biologically active secondary metabolites (Bhattarai et al., 2010). However, some studies have indicated that large-scale harvesting of roots, leaves, stems, and flowers can have a negative influence on the survival and continuity of useful medicinal plants and hence impacts the sustainable utilization of plants (Lulekal et al., 2008; Bhattarai et al., 2010).

Important ailment categories being treated using medicinal plants

Various studies, such as Maheshwari (1995) and Jain & Mudgal (1999), have classified ailments into 11 categories. We compared the available literature, including Shrestha et al. (2016), Adhikari et al. (2019), Ambu et al. (2020), and Pangeni et al. (2020) and based on the verbal information provided by the informants (as noted on the datasheet), we identified 13 categories. The value of Fic ranged from 0.33 to 0.88, with fever having the highest Fic value (0.88), followed by gastrointestinal disorder (0.86), ENT (0.85), and least by low energy and nutrition (0.33) (Table 1). A total of 15 species of plants were used to treat fever (Nur = 125), while 13 species of plants were used to treat gastrointestinal disorders (Nur = 93) (Table 1). This finding coincides with the study conducted in the Himalaya region of Dolpa, Humla, Jumla, and Mustang districts (Kunwar et al., 2006), which reports that fever is the most treated ailment category. After fever, the gastrointestinal disorder has the highest Fic value, which is parallel to the findings of (Kunwar et al., 2006; Singh et al., 2012; Rokaya et al., 2014; Malla et al., 2015). The use of a large number of species to cure fever and gastro-intestinal disorders shows that these two ailments are very common in the study area. Therefore, people have developed their own way of treating them by exploring the therapeutic potential of several species (Shrestha et al., 2014).

Most frequently used plant species for treating a particular ailment category

We found *Neopicrorhiza scrophulariiflora* (Kutki) as the most frequently used medicinal plant (FL = 65%). *N. scrophulariiflora* was used for the treatment of fever (Nur = 41; use value = 0.62) (Table 2). A high preference for *N. scrophulariiflora* in the study area might be due to its effectiveness toward fever and respiratory tract illness and its frequent availability in the high mountain region of Nepal (Rokaya et al., 2010; Ghimire et al., 2023).

Route of administration of medicinal plants in the body

The medicinal plant preparations were administered to the local people through different routes, including oral, ointment, nasal, and others (Figure 4). Oral (78%) was the most commonly used route of administration and was followed by ointment (16%), others (4%), and nasal (2%) (Figure 4). Similar observations have been observed in other ethnobotanical studies in Mustang (Bhattarai et al., 2010) and Ethiopia (Hunde et al., 2004; Lulekal et al., 2008). Previous studies in Kaski (Adhikari et al., 2019), Parbat (Thapa, 2013; Malla et al., 2015); Dolakha (Shrestha & Dhillion, 2003); and Dang (Sigdel & Rokaya, 2011) also reported oral as the most common route of administration in the body. This finding indicates that people usually follow the easiest means of mode of admission of medicine: oral (Rokaya et al., 2010).

Preparation methods of medicine from the plants

The paste (N= 25, 46%) was the most used form of preparation followed by powder (N= 11, 20%) and others (Figure 5). Our finding is consistent with the results of (Gautam & Timilsina 2022; Shrestha et al., 2014) in the Kaksi and Rasuwa districts of Nepal. Vijayakumar et al. (2015) in India also reported paste as the most common preparation and administration method. This might be due to the widespread use of paste preparation for treating ailments among tribal communities worldwide (Giday et al., 2010; Amri & Kisangau, 2012; Ullah et al., 2013). Also, the most frequent use of paste might be due to the easy preparation and effectiveness of herbal drugs (Singh et al., 2017). While our finding is contrary to the studies of (Shrestha & Dhillion, 2003; Burlakoti & Kunwar, 2008; Malla & Chhetri, 2009; Singh et al., 2012; Malla et al., 2015), which reported juice as the most frequently used dosage form.

Major threats to medicinal plants

Unsustainable harvesting, illegal collection, deforestation,

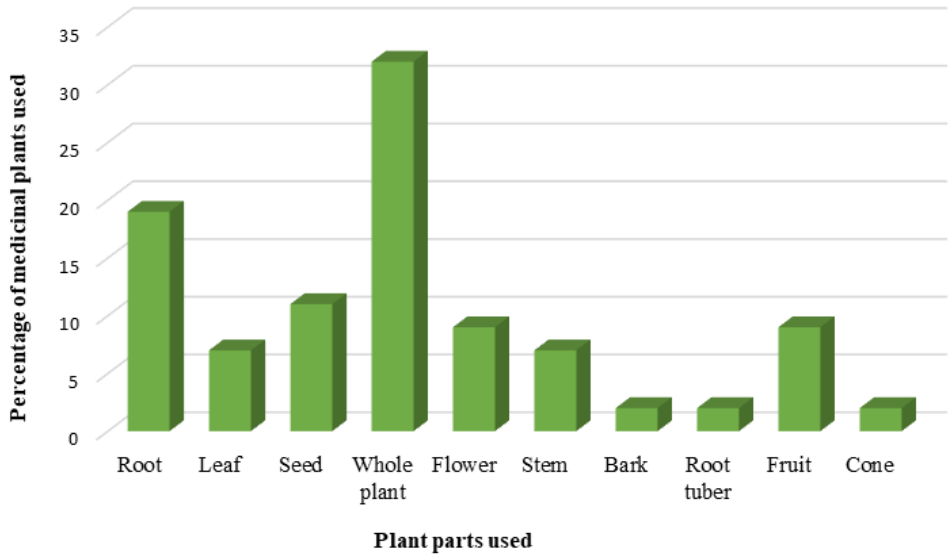

Figure 3: Parts of plants being used for medicinal purposes in Varagung Muktichhetra Rural Municipality of Mustang district, Nepal.

Table 1: Important ailment categories in the Varagung Muktichhetra Rural Municipality of Mustang district.

S.N.	Ailment categories	Use reports (Nur)	Number of taxa (Nt)	Nur-Nt/Nur-1	Informant consensus factor (F_{ic} value)
1	Fever	125	15	125-15/125-1	0.88
2	Gastro-intestinal disorder	93	13	93-13/93-1	0.86
3	ENT	57	9	57-9/57-1	0.85
4	Cough and Cold	70	11	70-11/70-1	0.85
5	Circulatory disorder	40	7	40-7/40-1	0.84
6	Dermatological disorder	34	6	34-6/34-1	0.84
7	Headache	37	7	37-7/37-1	0.83
8	Cuts and wounds	20	5	20-5/20-1	0.78
9	Respiratory disorder	14	4	14-4/14-1	0.76
10	Ophthalmic disorder	6	3	6-3/6-1	0.6
11	Dental problem	5	3	5-3/5-1	0.5
12	Urinary problem	3	2	3-2/3-1	0.5
13	Low energy and Nutrition	4	3	4-3/4-1	0.3

Table 2: Fidelity Level value of different medicinal plants.

S. N.	Scientific name (i)	Ailment category (j)	FCij	Ni	FLij (%)
1	*Neopicrorhiza scrophulariiflora*	Fever	41	63	65
2	*Rosa sericea*	Cough and cold	32	51	63
3	*Bergenia ciliata*	Diarrhoea and dysentery	29	47	62
4	*Aconitum orochryseum*	Sinusitis	33	55	60
5	*Cissampelos pareira*	Gastritis	22	37	59
6	*Berberis aristata*	Heart problem	16	29	55
7	*Viola biflora*	Headache	12	30	40
8	*Artemisia gmelinii*	Skin wounds	8	25	32
9	*Prunella vulgaris*	Pneumonia	6	20	30
10	*Cirsium falconeri*	Urine problem	2	15	13
11	*Halenia elliptica*	Low energy	2	20	10
12	*Taraxacum tibetanum*	Eye problem	2	30	7
13	*Anisodus luridus*	Dental problem	2	35	6

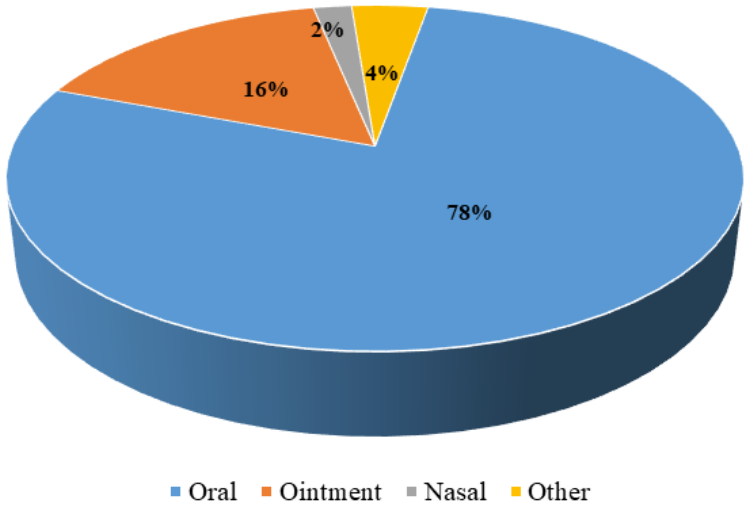

Figure 4: Different modes of administration of medication prepared with medicinal plants.

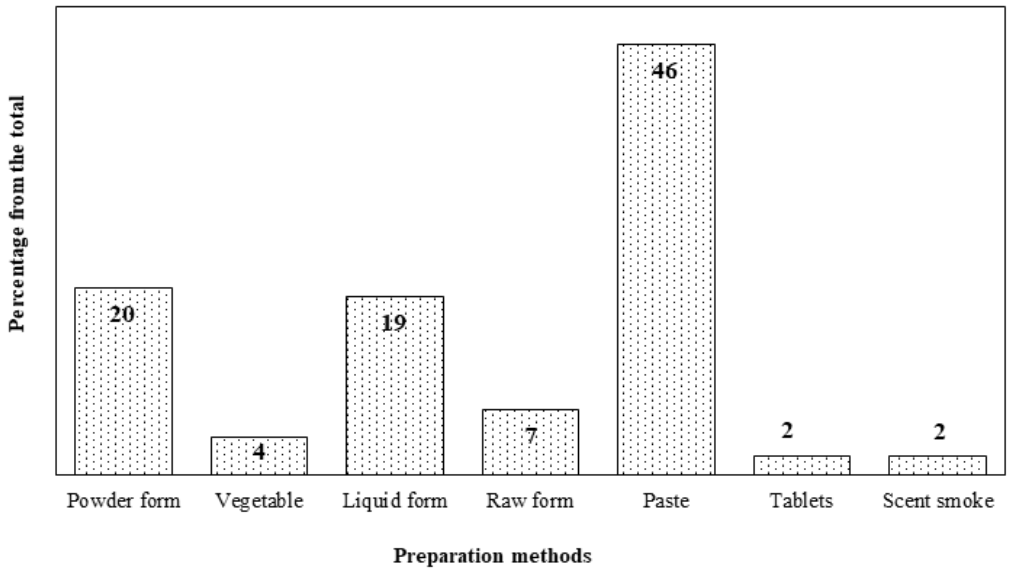

Figure 5: Methods of preparation of medicinal plants (as a percentage of the total).

forest fire, climate change, and lack of knowledge transmission were the major identified threats observed from the participants' responses. The major priority of respondents to the threat activities was an illegal collection of medicinal plants, with the highest mean rank of 4.79, followed by unsustainable harvesting (mean rank = 3.98). Likewise, climate change was ranked as the least threat (Table 3). The higher Chi-square value of 131.722 (N = 101, df = 5, Asymp. Sig. = 0.000) showed high significance in the different perceptions of various activities causing threats to medicinal plants at a 1% level of significance (P = 0.000 < 0.01). Bhattarai (2020) also reported similar threats to medicinal plants in the Ilam district of Nepal. Furthermore, the increase in population, technological advancement, and development of allopathic medicines pose the greatest threat to indigenous traditional medicine (Gautam & Timilsina, 2022). Most of the respondents and Amchis informed that most of the highly valued medicinal plants are illegally harvested by the local people (Hamilton, 2004). The people sometimes harvest before the flowering season, and they uproot the whole plant of highly valued ones without knowing the useful parts of plants. Most of the key informants also mentioned that the people overharvest and collect haphazardly to sell to the neighboring districts and countries illegally. According to the Amchis, a huge number of medicinal plants vanish due to deforestation and forest fires every year. Also, less interest of the young generation in the conservation and use of traditional medicinal plants due to a lack of proper guidance and knowledge transmission is supposed to be a threat to their conservation (Miya et al., 2020; Wanjohi et al., 2020; Gautam & Timilsina, 2022). Therefore, indigenous knowledge and the ethnomedicinal importance of different plant species must be explored, documented, and passed through different generations which could widen the scope of modern herbal medicine science (Miya et al., 2021).

Table 3: Threats ranking for the medicinal plants.

Threats identified	Mean rank
Climate change	2.23
Lack of Knowledge transmission	2.58
Forest fire	3.47
Deforestation	3.95
Unsustainable harvesting	3.98
Illegal collection	4.79

CONCLUSION

This study provides strong evidence that the people of the Waragung Muktichhetra rely heavily on medicinal plants and the respondents possess rich ethnobotanical knowledge about their uses. The use reports showed the huge demand for locally available medicinal plants in the region. The study documented 54 species of medicinal plants for the treatment of 40 different ailments, with fever and gastrointestinal disorders as the major ailments categories. People were also aware of the risk of the extinction of valuable medicinal plants. The study found *N. scrophulariiflora* to be the most preferred species of medicinal plant. Furthermore, the illegal collection is a major threat to medicinal plants. Hence, there is an urgent need to prioritize the highly valued medicinal plants and should take effective steps toward their sustainability.

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DECLARATION OF CONFLICT OF INTEREST

The authors declare no conflict of interest.

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Appendix 1: Medicinal plants recorded from the study area with their ailment categories and use value

S.N.	Scientific Name	Vernacular Name	Family name	Life forms	Parts Used	Ailment categories	Use reports	Use value
1	*Aconitum naviculare* (Brühl) Stapf	Bikh	Ranunculaceae	H	R	Fever and headache	41	0.40
2	*Aconitum orochryseum* Stapf	Nirmashi	Ranunculaceae	H	WP	Cough, cold, bile, sinusitis, fever, and allergy	55	0.54
3	*Aconitum spicatum* (Brühl) Stapf	Chandruk	Ranunculaceae	H	WP	Wounds, tonic, fever, allergy, and cuts	10	0.09
4	*Allium carolinianum* Redouté	Rotangtea	Amaryllidaceae	H	L	Nutrition and cold	3	0.02
5	*Allium wallichii* Kunth	Ban Lasun	Alliaceae	H	WP	Fever, cough, cold, headache, and tonsillitis	35	0.34
6	*Alnus nepalensis* D.Don	Uttis	Betulaceae	T	B	Chronic fever and headache	20	0.19
7	*Anisodus luridus* Link ex Spreng.	Bajharbang	Solanaceae	H	Sd	Teeth problem and diarrhoea	35	0.34
8	*Arisaema flavum* (Forssk.) Schott	Banko	Araceae	H	RT	Blood disease, sinusitis, and skin disease	5	0.04
9	*Artemisia dubia* Wall. ex Besser	Titepati	Asteraceae	H	L	Allergy and skin wounds	12	0.11
10	*Artemisia gmelinii* Weber ex Stechm.	Fumung	Asteraceae	H	WP	Nose swelling, ear pain, allergies, and skin wounds	25	0.24
11	*Artemisia indica* Willd.	Khankhar	Asteraceae	H	WP	Sinusitis and fever	19	0.18
12	*Asparagus filicinus* Buch.-Ham. ex D.Don	Ban Kurilo	Asparagaceae	H	R	Pneumonia, cough, and cold	6	0.05
13	*Berberis aristata* DC.	Chutro	Berberidaceae	Sh	R	Diarrhoea, blood circulation, Jaundice, and dysentery	29	0.28
14	*Berberis ceratophylla* G.Don	Kyerpa	Berberidaceae	Sh	Fl	Body pain and Swelling problem	32	0.31
15	*Bergenia ciliata* (Haw.) Sternb.	Pakhanbed	Saxifragaceae	H	R	Diarrhoea, digestive disorder, dysentery, and red eye problem	47	0.46

16	*Cannabis sativa* L.	Ganja	Cannabaceae	Sh	Sd	Gastritis and constipation	44	0.43
17	*Caragana brevispina* Benth.	Bebali Kanda	Fabaceae	Sh	Fl	Blood disease, urine problems, and allergy	25	0.24
18	*Caragana gerardiana* Royle	Tanglikhtha	Fabaceae	Sh	Fr	Fever and headache	32	0.31
19	*Carum carvi* L.	Jeera	Apiaceae	H	Sd	Cough, cold, tonsillitis, sinusitis, and headache	25	0.24
20	*Cirsium falconeri* (Hook.f.) Petr.	Thakilo	Asteraceae	H	WP	Wounds and urine problem	15	0.14
21	*Cissampelos pareira* L.	Gujargano	Menispermaceae	C	R	Gastritis and constipation	37	0.38
22	*Clematis barbellata* Edgew.	Junge Lahara	Ranunculaceae	C	St	Jaundice and skin disease	26	0.25
23	*Clematis tibetana* subsp. *vernayi* C.E.C.Fisch.	Yaawangma	Ranunculaceae	C	WP	Gastritis and low energy	5	0.04
24	*Cupressus torulosa* D.Don ex Lamb.	Ghuejhokpa	Cupressaceae	T	Fl	Sinusitis, cough and cold	12	0.11
25	Dactylorhiza hatagirea D.Don	Chugo	Orchidaceae	Sh	Fr	Low energy and nutrition	2	0.01
26	*Fragaria nubicola* (Lindl. Ex Hook.f.) D.Don	Bhui Ainselu	Rosaceae	H	Fr	Diarrhoea and dysentery	24	0.23
27	***Halenia elliptica* D.Don**	Tikta	Gentianaceae	H	WP	Fatigue and low energy	20	0.19
28	*Hyoscyamus niger* L.	Khursani Jwanu	Solanaceae	H	Sd	Gingivitis and tooth pain	2	0.01
29	*Juglans regia* L.	Okhar	Juglandaceae	T	Fr	cough, cold, and chest pain	27	0.26
30	*Lindelofia longiflora* (DC.) Baill.	Badhakuro	Boraginaceae	H	R	Boils and headache	7	0.06
31	*Lonicera myrtillus* Hook.f. & Thomson	Phanghama	Caprifoliaceae	Sh	Sd	Blood overflow problem	23	0.22
32	*Maharanga emodi* (Wall.) DC.	Maharangee	Boraginaceae	H	WP	High Blood pressure	18	0.17
33	*Myricaria rosea* W.W.Sm.	Jillethi	Tamaricaceae	Sh	L	Asthma and lung disease	9	0.08
34	*Nardostachys grandiflora* DC.	Jatamasi	Valerianaceae	H	WP	Diarrhoea, fever, gastritis, and headache	46	0.45
35	*Neopicrorhiza scrophulariiflora* (Pennell)	Kutki	Plantaginaceae	H	R	Fever, cough, cold, and headache	63	0.62
36	*Origanum vulgare* L.	Ramtulasi	Lamiaceae	H	WP	Sinusitis	5	0.04

37	*Oxyria digyna* (L.) Hill	Yupha	Polygonaceae	H	WP	Constipation and gastritis	29	0.28
38	*Pinus wallichiana* A.B.Jacks.	Gobre Sallo	Pinaceae	T	Co	Tuberculosis and cough	21	0.20
39	*Prunella vulgaris* L.	Balbhuti	Lamiaceae	H	WP	Pneumonia, cough, and cold	20	0.19
40	*Rheum australe* D.Don	Padamchal	Polygonaceae	H	R	Malarial fever and cough	45	0.44
41	*Rhododendron anthopogon* D.Don	Sunpati	Ericaceae	Sh	St	Loss of appetite, stomach, and vomiting	35	0.34
42	*Rhododendron arboreum* Sm.	Gurans	Ericaceae	T	Fl	Bronchitis and fever	28	0.27
43	*Rosa macrophylla* H.Lév.	Bhanise Kanda	Rosaceae	Sh	St	Diarrhoea, dysentery, eye disease, and jaundice	21	0.20
44	*Rosa sericea* Lindl.	Bhote Gulab	Rosaceae	Sh	WP	Cough, cold, fever, blood pressure, headache, eye problem, and low energy	51	0.51
45	*Rubus foliolosus* D.Don	Gatha	Rosaceae	Sh	St	Fever	15	0.14
46	*Solanum nigrum L.*	Kalo Bihi	Solanaceae	Sh	Sd	Pneumonia, cough, and cold	29	0.28
47	*Stellera chamaejasme* L.	Rekemukta	Thymelaeaceae	H	Fl	Bone problem and fever	10	0.09
48	*Taraxacum eriopodum* DC.	Chayathi	Asteraceae	H	WP	Eye disease and allergy	6	0.05
49	*Taraxacum tibetanum* Hand.-Mazz.	Khurmo	Asteraceae	H	R	Cough, cold, gastritis, and eye problem	30	0.29
50	*Taxus baccata* L.	Loth Salla	Taxaceae	T	Fr	Fever, cancer, cough, and cold	33	0.32
51	*Thymus linearis* Benth.	Akheeno	Lamiaceae	H	WP	Fever, stomachache, and toothache	37	0.36
52	*Urtica dioica* L.	Sishno	Urticaceae	H	L	Blood pressure, urine, and heart problem	26	0.25
53	*Valeriana jatamansi* Jones ex Roxb.	Napu	Valerianaceae	H	R	Headache, cuts, wounds, eye disease, and fever	44	0.43
54	*Viola biflora* L.	Makdawa	Violaceae	H	WP	Loss of appetite, headache, and wounds	30	0.29

(Abbreviations used: H= Herb, Sh = Shrub, C = Climber, T = Tree, W = Whole plant, R = Root, L = Leaf, F = Fruit, St = Steam, Sd = Seed, RT = Root tuber, and C = Cone)