Ethnomedicinal Uses of Plant Resources in Bethanchowk Rural Municipality of Kavrepalanchowk District, Central Nepal

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Research

Abstract

Background: The rural people from different ethnic groups in Nepal possess vast knowledge regarding medicinal plants and their use in the treatment of human ailment. The aim of this study is to record the local's knowledge about traditional medicine in Bethanchowk Rural Municipality, Central Nepal.

Methods: The ethnomedicinal information was collected with the help of door-to-door interviews and focus group discussions using open ended questionnaire with local people and key informants. A linear regression and Spearman correlation were performed to observe the relationship between the age of respondents and the number of plants described by them. The quantitative data were analyzed by informant consensus factor (ICF) and fidelity level (FL).

Results: The present study has recorded 227 medicinal plant species under 94 families and 200 genera. The most frequently occurring plants were herbs (n = 103) and leaves (n = 54) as plant parts. There was no significant difference ($p = 0.401$) in the knowledge of medicinal plants possessed and the number of plants described by the genders. The Spearman correlation ($\rho = 0.225$) and linear regression justified the weak relationship between the age of the respondents and the number of plants described by them. The ICF value ranged from 0.5 to 0.93, and the highest was observed for gynecological disorder. The FL value ranged from 6.94 to 98.20, with the highest for *Ageratina adenophora* for bleeding, cuts, and wounds.

Conclusion: The traditional medicinal knowledge of local people of Bethanchowk Rural Municipality has been documented in the study. The necessity for such additional documentation and scientific validation of recorded species has been determined by the current investigation.

Keywords: Traditional knowledge, ICF, FL, ailments, knowledge transfer

Background

Traditional medicinal systems are crucial health resources found globally, with particular prevalence in developing nations. Generally, ethnomedicinal information is typically gathered from rural communities residing in remote regions, where there is often insufficient documentation of traditional ethnomedicinal knowledge (Adhikari *et al.* 2019). In developing countries, using plant species as traditional medicines provides rural communities with a practical alternative to current healthcare systems. According to reports, 80% of people in underdeveloped nations receive their primary medical care from traditional practitioners (Rahman *et al.* 2004). The transmission of ethnomedicinal knowledge in rural areas has traditionally relied on oral methods from one generation to another (Maharjan *et al.* 2021). However, this practice is increasingly at risk due to sociocultural changes (Kunwar *et al.* 2016), human migration, and limited dissemination and expansion of ethnomedicinal knowledge (Ojha Khatri *et al.* 2021; Bhaila *et al.* 2022). The conservation of medicinal plant species and the knowledge associated with them can be greatly aided by investigating the interactions between geography, sociocultural factors, and livelihoods. Traditional medicinal knowledge is heavily influenced by geography, ethnicity, age, occupation, education, and culture (Joshi *et al.* 2020).

Nepal has abundant biodiversity due to its diverse physiographic and climatic conditions and also has a robust cultural heritage in traditional medicine, which manifests in various forms such as ethnic or tribal traditions, rituals, spiritual practices, dietary practices, and self-healing methods (Dulal *et al.* 2022). The country hosts a diverse array of 11,971 plant species, comprising 6,973 angiosperms (MoFSC 2014). Among these plant species, 1762 plants were seen to be valuable for medicinal uses (Kunwar *et al.* 2022).

The various ethnic groups that inhabit Nepal's geographical belts rely on locally grown plants and wild plants to meet their fundamental needs and possess a unique body of knowledge related to ethnomedicine (Rokaya *et al.* 2010; Uprety *et al.* 2010; Chaudhary *et al.* 2020; Mallik *et al.* 2020; Dulal *et al.* 2022). Traditional medicine in Nepal has a strong cultural basis and can take many different forms, such as diets, self-healing techniques, rituals or ceremonial acts, ethnic or tribal groupings, and spiritual activities (Koirala & Khaniya 2009). The majority of people in Nepal who live in and around cities depend on traditional treatments, with about 15-20% having access to contemporary medical services (Sharma *et al.* 2004). Nepal is home to 142 ethnic groups (GoN 2021), and approximately 8.4 million indigenous people from various groups live in Nepal's varied terrains. They have rich traditional medical practices, their unique culture, and religious rituals (Rokaya *et al.* 2010).

Indigenous knowledge plays a part in the system of managing natural resources in addition to being accountable for identification. It is thought that medicinal plants are excellent suppliers of unique biomolecules from ancient times. Consequently, it is critical to record their applications since this information not only aids in maximizing the advantages from these plants but also raises the likelihood of their preservation and effective usage in the future (Andrade Cetto 2009; Magar *et al.* 2022). The previous studies have been conducted in the realm of Kavrepalanchowk district (Ojha Khatri *et al.* 2021; Bhaila *et al.* 2022; Dulal *et al.* 2022) and in the lower belt of Kavrepalanchowk district (Ambu *et al.* 2020). The Kavrepalanchok district is located between 85°24’ to 85°49’ E and 27°22’ to 27°85’ N, with altitudes ranging from 275 (Dolalghat/Sunkoshi River) to 3018 m above sea level (Bethanchowk hill). However, the traditional medical knowledge of plants utilized by rural residents in the hills of Bethanchowk Rural Municipality, Kavrepalanchowk, is not documented yet. This study region survey has the potential to greatly benefit future phytopharmacological research in the medical field. In addition, the current study sought to determine whether there was a relationship between the respondents' ages and the plants they described throughout the interview, which may indicate whether or not there is intergenerational knowledge transfer. The study also aimed to compare gender differences regarding the conventional medical knowledge.

Materials and Methods

Study area

The present study was conducted in Bethanchowk Rural Municipality, Kavrepalanchowk District, Central Nepal (Figure 1). The study area is situated at an elevation between 1900 and 3050 meters above sea level. It is located at coordinates 27°51’N and 85°48’E. It lies within the boundaries of Bethanchowk Rural Municipality, covering a total area of 101 km². There are six wards in the Rural Municipality and informants from each of them were included in the investigation. Being located 50 km from Kathmandu, the area is relatively isolated but can still be reached via road networks that link rural municipalities to the capital. Access to modern services like healthcare, education, and electricity were limited in certain areas, depending on infrastructure development. The total population in the study area was 22,775, including 11,386 male and 11,389 female. The number of households was 4,148. The major ethnic groups residing in the study area were Tamang, Newar, Danuwar

and Magar. These communities were typically involved in agricultural sector and have strong cultural ties to the region. Agriculture was the primary economic activity in Bethanchowk, with a focus on subsistence farming. The fertile land and elevation of the region allowed for the cultivation of a variety of crops, including rice, maize, millet, wheat, and vegetables. Many individuals from this area seek employment opportunities in urban centers such as Kathmandu or even abroad.

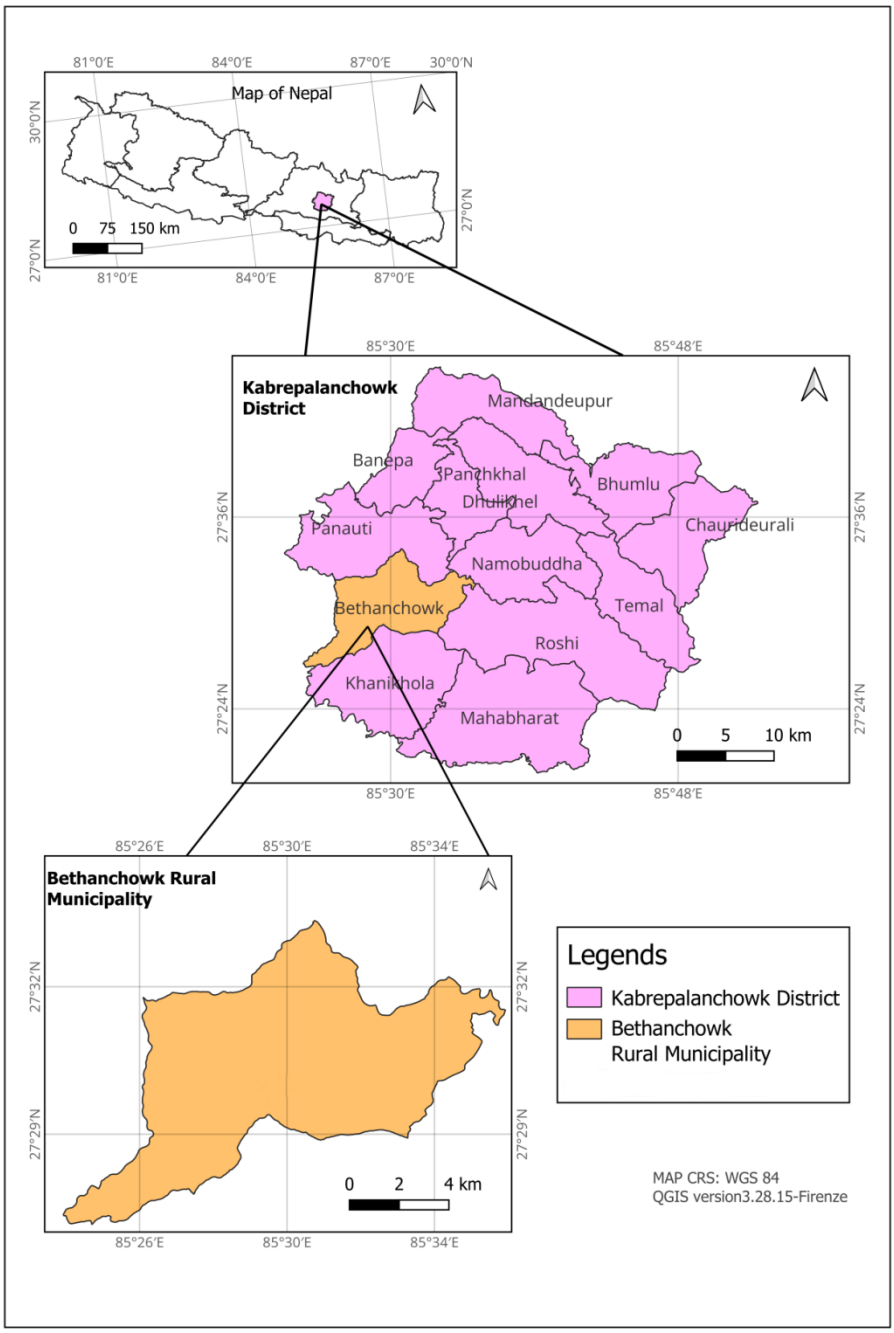

Figure 1. Map of the study area

Primary data collection

Preliminary data collection and a field visit were conducted in April 2024. We finalized the numbers of wards, households, and estimated numbers of respondents to be involved and roughly created a suitable time frame for data collection. After the preliminary visit and pilot survey of the study area, primary data collection of the investigation started from 2nd May to

29th May and 21st June to 6 July. The simple random sampling and snow ball sampling methods were used for the interview in the study. The traditional healers were our key informants, who were selected using the snowball sampling method.

The data collection included door-to-door interviews and focus group discussions administering the open-ended questionnaire. Altogether, five focus group discussions were carried out, including the groups of 11, 10, 5, 4 and 4 respondents in 6th, 8th, 12th, 14th, and 21st days of data collection, respectively. For the convenience of demographic data analysis, we categorized the age of respondents into three groups: below 31, 31-60, and above 60 and regarded them as young, adult, and old-age people. We included the respondents that were aged between 14 and 106 to avoid the bias in the knowledge regarding medicinal plants their transfer to younger generations. A semi-structured open-ended questionnaire was prepared for the respondents. It was prepared in English; however, the conversation and question-answer session were carried out in the Nepali language for their convenience. The respondents answered about the detailed use of medicinal plants, with their doses and essential ingredients or plants that need to be mixed with it, the way of preparation, and conservation approaches. The present study strictly followed the code of conduct of the International Society of Ethnobiology (International Society of Ethnobiology 2006). The objectives of the study were explained to each respondent and verbal consent was obtained from them to further publish this data with or without their personal information included.

Plant collection and identification

The plant species were collected with the help of respondents in the study areas. The limited samples of each plant were collected carefully for their sustainable conservation. The details of medicinal plants were noted with their naturally occurring habitat, colors of flower, fruiting time, habit, situated elevation, coordinates with their photographs. The initial identification was done with the help of respondents matching with the local names of those plants in the literature. Finally, we collected and gathered the specimens for the final list. Each specimen was assigned the name of the collector, the collection date, and the name of place collected, coordinates of collected location, elevation, and code. Further identification was carried out in the National Herbarium and Plant Laboratories (KATH), Department of Plant Resources (DPR), Ministry of Forest and Environment, Nepal Government, Godawari, Nepal. The recommended names were cross-matched with the names in the Flora Checklist of Nepal (http://www.efloras.org/flora_page.aspx?flora_id=110) and World Flora Online. The herbarium specimens were prepared and deposited to National Herbarium and Plant Laboratories (KATH).

Statistical and quantitative analysis

The study included both descriptive and inferential analysis. The data sheets for both analyses were prepared in MS Excel 2013. The descriptive and inferential analyses were performed in R software version 4.3.3 (R Core Team 2024). However, the peripheral graph for family number was made with the help of Python version 3.10.12 compiled with GCC 11.4.0 used in Kaggle environment. The descriptive analyses included bar graphs and chord diagrams. However, data were examined for normality test for inferential analyses using the Shapiro-Wilk test. A linear regression and Spearman correlation were performed to observe the relationship between the age of respondents and the number of plants described by them. A chi-square test was performed to find the significant difference between the knowledge of males and females regarding the medicinal plants of the study area. To assess the prevalence, objective measurement, and standardization of ethnomedicinal study, the following quantitative analyses were performed:

Informant consensus factor (ICF)

The ICF highlights the key ailments in the study area and the medicinal plants used for their treatment. It also examines the homogeneity of the informant's knowledge regarding the ailments and the treatment in the study area. ICF was determined using the formula of Heinrich *et al.* (2009).

$$ICF = (Nur-Nt)/ (Nur-1)$$

Where, Nur = Number of use reports from informants for a particular use category; Nt = Number of species that are used for that use category reported by all informants.

Fidelity level (FL)

The FL examines the relative potential of a medicinal plant to heal the particular ailment. It was proposed by the Alexiades (1996). FL was calculated using the given formula:

$$FL (\%) = IP/IU \times 100$$

Where FL = fidelity level; IP = frequency of citation of a species for particular ailments; IU = total number of citations of that species.

Table 2. List of the medicinal plants used by the local inhabitants of Bethanchowk with family, habit, plant parts used, mode of application, and doses.

Scientific name	Local name	Family	W/C	Habit	Parts used	Preparation	Mode of application and uses	Dosages
Abelmoschus esculentus Moench	**Chiple Bhendi**	Malvaceae	C	Shrub	Fruit	Paste	Paste of raw fruits used for broken legs	-
Abrus precatorius L.	**Ratogedi**	Fabaceae	W	Shrub	Seed	Topical	Removes dust particles of eye	Only one seed used for one time for removal
Achyranthes bidentata Blume	**Datiwan/Apamarga**	Amaranthaceae	W	Herb	Root, twig, whole part, seed	Decoction, paste, powder	Decoction for typhoid, and fever, root paste for cuts and wounds. Root powder mixed with bark powder of *Machilus odoratissimus* and boiled properly and a paste like red color and mixed with *Brassica rapa* oil and clean the infected parts with cotton for piles, twig for toothache, whole part fired and smoke from it used for arthritis, and joint pain, seed mixed in cow's milk making rice pudding for immunity	Decoction 1 glass twice per day for 4/5 days, seed pudding gives energy for about 1 week
Acorus calamus L.	**Bojho**	Acoraceae	C	Herb	Rhizome	Chewable, paste	Swallow rhizome for cough, cold and throat problems, blockage voice, topical for animal scabies	Chewable twice a day for 3 days
Actinidia chinensis Planch.	**Kiwi**	Actinidiaceae	C	Climber	Fruit	Chewable	Oral for increasing white blood	Once a day for 1 week
Aegle marmelos (L.) Corrêa	**Bel**	Rutaceae	C	Tree	Fruit, Leaf	Juice	Oral for diarrhea and menstrual pain, diabetes and purifying stomach, blood in stool	1 glass once time for a week
Agave cantala (Haw.) Roxb.	**Ketukey Phul**	Asparagaceae	W	Shrub	Root, Leaf	Chewable, juice	Oral for urinary tract problems	Half glass once a day for 3 days

Ageratina adenophora (Spreng.) R.M.King & H.Rob.	**Kalimuntey/Kaleyjhaar /Banmara**	Asteraceae	W	Shrub	Leaf, Whole part	Juice, paste	Topical for bleeding, cuts and wounds and whole part mixed with *Cynoglossum zeylanicum* for big wounds and covered with Nepali paper	Paste or juice used 2/3 times per day for one week
Allium cepa L.	**Pyaaj**	Amaryllidaceae	C	Herb	Bulb	Soaked	Soaked in water and drink orally for gastritis and heart problem, raw onion mixed with lemon and salt for diarrhea	2/3 times a day and 3/4 times a day
Allium przewalski anum Regel	**Jimbu**	Amaryllidaceae	C	Herb	Leaf	Decoction	Oral for stomachache, cough and cold	1 glass twice a day for 4 days
Allium sativum L.	**Lasun**	Amaryllidaceae	C	Herb	Bulb	Decoction, soaked	Oral for gastritis, soaked water for stomachache	Twice a day
Allium wallichi Kunth	**Ban Lasun**	Amaryllidaceae	W	Herb	Bulb	Decoction	Oral for typhoid	Twice a day
Aloe vera (L.) Burm.f.	**Gheukumari**	Asphodelaceae	C	Herb	Leaf	Gel, juice	Topical for burns, skin cracks, oily faces, acne removal, filtered gel liquid for eye problem, gel soaked in water and juice use for pressure and diabetes	Twice a day
Amaranthus graecizans L.	**bhadey saag**	Amaranthaceae	C	Herb	leaf	Cooked	Vegetable for blood pressure	Cooked for 1 week once a day
Amomum subulatum Roxb.	**Alaichi**	Zingiberaceae	C	Herb	Seed	Decoction	Oral for chest pain, seed powder mixed with bark of *Cinnamomum tamala* and *Phyllanthus emblica* for gastritis	Once a day for 3 days
Ananas comosus (L.) Merr.	**Bhui Katahar**	Bromeliaceae	C	Herb	Fruit	Cooked	Oral for typhoid and also mixed with cow's milk for rice pudding	Once cooked
Areca catechu L.	**Supaari**	Arecaceae	C	Tree	Fruit	Chewable	Oral for Sinusitis	Twice a day
Arisaema flavum (Forssk.) Schott	**Bako**	Araceae	W	Herb	Leaf	Cooked	Cooked as vegetable for throat pain	Once a day for 3 days

Artemisia indica Willd.	**Titeypati**	Asteraceae	W	Herb	Leaf, whole part	Decoction, juice, paste, steam	Mixed with seed powder of *Choerospondias axillaris* and a paste topical for cuts and wounds, allergies, inhalation for cough and cold, decoction for fever, whole part fired and heat from it for massaging the knee pain, paste for scabies for animals, and used for bathing especially for children to get rid of their weeping behavior, smell for nose blockage and also soak in water overnight and drink water next morning empty for stomach worms (leech)	Decoction for once a day for 5 days, smell for about 1 hr
Asparagus racemosus Willd.	**Kurilo**	Asparagaceae	C	Shrub	Young shoot	Chewable, decoction, cooked	Oral for energy and infertility problems, lactation for buffalo, vegetable for arthritis (mixed with powder of *Hellenia speciosa* and *Piper nigrum*)	Twice a day for 1 week
Astilbe rivularis Buch.-Ham.	**Thulo Okhati**	Saxifragaceae	W	Herb	Root	Powder, cooked	Oral for immunity power and tight muscle for post-natal women, stomachache, diarrhea, gastritis, bodypain, fever, stop bleeding during female problems (powder along with rhizomes of *Bergenia ciliata* and mixed with cowmilk, and jaggery)	Around 4 months for female problems
Bauhinia purpurea L.	**Koiralo**	Fabaceae	C	Tree	Flower	Chewable	Eye pain	Two flowers twice a day for 3/4 days
Begonia sp.	**Makar Kach**	Begoniaceae	W	Herb	Root	Decoction	Anthelmintic	

Berberis asiatica Roxb. ex DC.	**Chutro**	Berberidaceae	W	Shrub	Bark, root, young shoot	Decoction, juice, soaked	Oral for jaundice and diabetes, or also mixed with root powder of *Urtica dioica* with 1 litre of mineral water bottle for jaundice, bark decoction used for eye problem, young shoot mixed with *Rubus ellipticus* and root powder of *Equisetum diffusum* with juice of *Cucumis sativus* and *Saccharum officinarum* for jaundice or also soaked root overnight in water and drink that water next morning empty stomach for lowering blood pressure	Twice a day
Berberis sp.	**Ban Chutro**	Berberidaceae	W	Shrub	Root	Decoction	Oral for jaundice	
Bergenia ciliata (Haw.) Sternb.	**Pakhanbedh**	Saxifragaceae	W	Herb	Rhizome	Powder, cooked	Orally chewable fresh rhizome for stomachache, diarrhea, stop excessive bleeding during mensuration, immunity power for post-natal women, fractures, body pain, muscle tight (Powder along with roots of *Astilbe rivularis* fried with ghee, soup mixed with jaggery and can be used with cowmilk, or also mixed with rice flour with carom seeds, ghee for post-natal)	Twice a day around 4 months

Boehmeria sp.	**Liphey**	Urticaceae	W	Herb	Root	Decoction, paste	Mixed with root of *Urtica dioica* and bark of *Osyris lanceolata* as a paste after cooked used in broken legs and hands	
Brachycorythis obcordata (Lindl. ex Wall.) Summerh.	**Gandol**	Orchidaceae	W	Herb	Rhizome	Steamed	Fever and urine infection	Orally chewed 2 times for day for 5/6 days
Brassaiopsis hainla (Buch.-Ham.) Seem.	**Hatipaila**	Araliaceae	C	Shrub	Fruit	Decoction	Ingestion after mixing inner part of fruit with *Trachyspermum ammi*, *Trigonella foenum-graecum* in water for gastritis	1 glass twice a day for 5/6 days
Brassica rapa L.	**Sarsim/Tori**	Brassicaceae	C	Herb	Seed	Powder	Oral for infertility problems (oil mixed with *Hellenia speciosa* and *Piper nigrum*)	One glass once a day for 1 week mixing with cow's milk
Buddleja asiatica Lour.	**Bhimsen Pati**	Scrophulariaceae	W	Shrub	Leaf	Decoction	Orally used for making 'marcha' nutritious especially in Tamang community	One glass at night time after dinner
Calotropis gigantea (L.) Dryand.	**Aankh**	Apocynaceae	W	Shrub	Latex	Topical	Stop bleeding wounds	As an ointment twice a day
Cannabis sativa L.	**Ganja**	Cannabaceae	W	Herb	Flower	Chewable, powder	Oral for stomachache for both human and domestic animals	Mixing animal's food or powder inhale by human like smoking
Capsicum sp.	**Akabarey**	Solanaceae	C	Shrub	Fruit	Chewable, cooked	Oral for gastritis and stomachache	Twice a day about 4/5 days
Carica papaya L.	**Mewa**	Caricaceae	C	Tree	Fruit, Leaf	Chewable, juice	Oral for jaundice and increasing white blood	One glass twice a day for 1 week
Castanopsis indica A.DC.	**Dhalne Katus**	Fagaceae	W	Tree	Fruit	Paste	Topical crushed paste mixed with black salt for an infected part for arthritis	As an ointment twice a day

Cautleya spicata (Sm.) Baker	**Pahelo Ausadhi**	Zingiberaceae	W	Herb	Rhizome	Cooked, decoction	Oral for gastritis, decoction or cooked with rice flour for typhoid, mixed with leaf of *Artemisia indica*, *Woodfordia fruticosa*, *Nyctanthes arbor-tristis*, *Ficus benghalensis*, *Ficus benjamina* mixed with bark of *Cotoneaster microphyllus*, roots of *Ficus religiosa*, and *Curcuma caesia* firstly fried and cooked in mustard oil and make a paste and used in an infected areas of skin cancer	Twice a day for 15 days
Celtis australis L.	**Khari**	Cannabaceae	W	Tree	Bark	Powder	Bark powder mixed with *Piper nigrum* and topical for eye problem	Once a day for 3/4 days
Centella asiatica (L.) Urb.	**Ghodthaprey**	Apiaceae	W	Herb	Whole part	Paste, juice, decoction, chewable	Whole part juice orally used for urine infection, memory power and diarrhea, cough and cold, stomachache, cooling body, gastritis, decoction for fever, typhoid, leaf orally chewable for diabetes, pressure, headache	Juice 2 times per day, early morning for memory sharpening

Choerospondias axillaris (Roxb.) B.L.Burtt & A.W.Hill	**Lapsi**	Anacardiaeae	C	Tree	Seed, Fruit	Chewable, paste, powder	Fruit orally for purifying stomach, seed powder mixed with bark powder of *Prunus cerasoides* mixed with leaf paste of *Artemisia indica* mixed with ghee for an infected part of broken legs and also for cuts and wounds, seed of *Prunus persica* and *Choerospondias axillaris* powder mixed with hair of deer and rabbit and made a powder for skin burns and filter them and used filtered part used in those broken part for joining	Paste used twice a day for one week and orally 2 3 fruits chewable once a day
Chrysojasminum humile (L.) Banfi	**Jaai**	Oleaceae	C	Shrub	Young shoot, Root	Juice, powder, decoction	Oral for sore throat, cough and cold, tonsils, cholesterol, thyroid, diabetes, blood pressure, fever**,** uric acid, mouth and tongue allergies, root decoction for fever, flower orally used for throat problem, young shoot crushed into powdered and mixed with water and make a juice and drink for fever and young shoot orally chewed or can be used as a powdered after drying and mixed with water and for children (half glass)	2 times per day, one time a day, 3 times per day 1 1 glass, juice 2 times per day

Cinnamomum camphora (L.) J.Presl	**Kapur**	Lauraceae	C	Tree	Fruits	Cooked	Topical for arthritis, orally used paste for toothache with cotton, mixed with honey, lemon, turmeric and rice and chant before eat helps in eating more foods	Fruit inserted in 50 ml mustard oil and that oil is used in pained areas for around 4/5 days
Cinnamomum tamala (Buch.-Ham.) T.Nees & C.H.Eberm.	**Tejpaat**	Lauraceae	C	Tree	Leaf	Decoction	Oral for stomachache, body pain, bark mixed with *Phyllanthus emblica*, *Cuminum cyminum* and *Amomum subulatum* and make a powdered form and take a hot water for gastritis	Once a day
Cirsium wallichii DC.	**Thakal/Thakailo/Chokam**	Asteraceae	W	Herb	Root	Decoction, powder	Fever and urine infection, removing stomach worms once a day, jaundice, stomachache, strengthen hands and legs, root mixed with bark of *Picrasma quassioides*, *Cuscuta reflexa*, juice of *Aloevera* after crushed used in water and take clean water after filtered for jaundice, (decoction, root powder) and mixed in water and used for lungs and liver problems, root crushed and mixed with sugar water for cleaning stomach and cooling body, root mixed with branch of *Rheum australe* and bark of *Picrasma quassioides* powdered for jaundice	Decoction 1 glass twice a day, morning and evening for 1 week

Cissampelos pareira L.	**Batulpatey**	Menispermaceae	W	Climber	Whole plant	Decoction, powder	Oral for menstrual problems, stomachache especially for women, (whole part mixed with root powder of *Thalictrum* sp, bark of *Berberis napaulensis,* mixed with A*loevera* gel with jaggery for menstrual pain, stops abortion, stops heavy bleeding, leaf or whole part used as chewed for toothache, (whole plant crushed into powdered mixed with sugar and juice like came for drink, stop bleeding for human as well as animal wounds), leaf cooked in water and mixed with sugar and that water used for piles, firstly clean and crushed whole plant into powder and make a water soluble and filter with cloth and used in big wounds stops bleeding	Decoction 1 half glass once a day for 7 days
Citrus aurantiifolia (Christm.) Swingle	**Kagati**	Rutaceae	C	Tree	Fruit	Juice	Topical for skin cracks, lemon water for jointpain, diarrhea, raw onion mixed with salt and lemon for diarrhea, root powder decoction for stomachache, firstly leaves were used in fire and soft part of it mashed and used in an infected area with Nepali paper	Twice/thrice per day

Clerodendrum villosum Blume	**Rajbeli**	Lamiaceae	W	Shrub	Leaf	Paste	Topical for skin treatment	As an ointment twice a day
Coccinia grandis (L.) Voigt	**Golkakri**	Cucurbitaceae	W	Climber	Fruit	Cooked, decoction	Oral for fever	Twice a day for 3 days
Coriandrum sativum L.	**Dhaniya**	Apiceae	C	Herb	Fruit	Decoction	Oral for fever and chest pain	Twice a day for 3 days
Coriaria nepalensis Wall.	**Machaino**	Coriariaceae	W	Shrub	Fruit	Chewable	Ripe fruits for indigestion	3/4 fruits orally chewed once a day
Cotoneaster microphyllus Wall. ex Lindl.	**Khareto**	Rosaceae	W	Shrub	Bark	Cooked	Bark mixed with leaf of *Artemisia indica*, *Woodfordia fruticosa*, *Nyctanthes arbor-tristis, Ficus benghalensis, Ficus benjamina*, roots of *Ficus religiosa*, *Cautleya spicata* and *Curcuma caesia* firstly fried and cooked in mustard oil and make a paste and used in an infected areas of skin cancer	Twice a day for 15 days
Cucumis sativus L.	**Kakra**	Cucurbitaceae	C	Herb	Fruit	Chewable, juice	Oral for jaundice, mouth allergies	Orally chewed twice a day for one week
Cucurbita pepo L.	**Pharsi**	Cucurbitaceae	C	Herb	Young shoot	Chewable	Oral for throat problem	Once a day for 2/3 days

Cuminum cyminum L.	**Jeera**	Apiaceae	C	Herb	Fruit	Decoction	Mixed with *Acorus calamus*, *Zingiber officinale*, *Zanthoxylum armatum* taken orally for cough and cold, fever and (mixed with turmeric, and ginger for throat problems, stomachache), bark of *Cinnamomum tamala* mixed with *Phyllanthus emblica*, *Amomum subulatum* and make a powder form in hot water for gastritis	2 glass twice a day for 5 days
Curcuma caesia Roxb.	**Kalo Haledo**	Zingiberaceae	W	Herb	Rhizome	Cooked	Mixed with leaf of *Artemisia indica*, *Woodfordia fruticosa*, *Nyctanthes arbor-tristis*, *Ficus benghalensis*, *Ficus benjamina* mixed with bark of *Cotoneaster microphyllus*, roots of *Ficus religiosa*, and *Cautleya spicata* firstly fried and cooked in mustard oil and make a paste and used in an infected areas of skin cancer	Twice a day for 15 days

Curcuma longa L.	**Besar**	Zingiberaceae	C	Herb	Rhizome	Decoction, paste	Oral for stomachache, 1 cup of curd and 1 teaspoon turmeric for stomach disorders, or also mixed with *Ocimum tenuiflorum* for cough and cold, topically used in cuts and wounds, bark of *Schima wallichiana* and *Myrica esculenta* grinded and mixed with root of *Rubus ellipticus*, and turmeric and salt for stomach pain and gargling for throat pain. The bulb of *Zephyranthes carinata* mixed with turmeric and maize flour and make a paste for broken parts, *Zanthoxyllum armatum* and turmeric antipoisonous, turmeric powdered mixed with iodine and mustard oil for removing blood from teeth and toothache, also can be used cotton filled with both and leave it for half an hour	
Curcuma sp.	**Haledo**	Zingiberaceae	C	Herb	Rhizome	Cooked, decoction	Cooked with rice flour orally eaten for menstrual pains, stomach disorders decoction for stomachache	Decoction for twice a day

Cuscuta reflexa Roxb.	**Aaksahbeli/Pahelo Laharo**	Convolvulaceae	W	Herb	Whole plant	Juice, paste	Oral for jaundice and fever, or mixed with root of *Berberis asiastica*, and crushed into powder and make a liquid in a bottle for jaundice, or mixed with *Myrica esculenta*, *Osyris weightiana* and *Urtica dioica* boiled and make a paste and used in fracture with Nepali paper, or mixed with bark of *Picrasma quassioides* powder and *Urtica dioica* and made a liquid for jaundice	Twice a day, thrice a day, or 6 glass per day
Cynodon dactylon (L.) Pers.	**Dubo**	Poaceae	W	Herb	Leaf	Decoction, paste, chewable, inhaled	Fever, and blood pressure, paste for wounds and cuts, decoction for diarrhea, crushed and smell for sinusitis, leaf orally chewed before food early morning for diabetes, also used as a paste in fracture part	Decoction once glass a day, paste used as an ointment for 5 days
Cynoglossum zeylanicum (Sw. ex Lehm.) Thunb. ex Brand	**Kanikey Kuro**	Boraginaceae	W	Herb	Leaf	Juice, paste, decoction	Juice for cuts and wounds, face allergy, root crushed and decoction for arthritis	2 or 3 drops of leaf juice in eye twice a day or decoction 2ml 3ml not more than 5 ml around 5 days
Cyperus rotundus L.	**Mothey/Kankolawalaa**	Cyperaceae	W	Herb	Root	Decoction	Oral for fever	1 glass once a week
Dactylicapnos macrocapnos (Prain) Hutch.	**Kane Laharo**	Papaveraceae	W	Climber	Latex	Topical	Latex used for ear problems	1 2 drop for 3 days
Dactylorhiza hatagirea (D.Don) Soo	**Panchaule**	Orchidaceae	W	Herb	Root	Decoction	Oral for immune system	One or two spoon mixed with water or powder once a day

Daphne bholua Buch.-Ham. ex D.Don	**Nepali Kagaj/Lokta**	Thymelaeaceae	W	Shrub	Bark	Topical	Used in fracture for covering	
Datura stramonium L.	**Dhaturo**	Solanaceae	C	Shrub	Leaf	Fired	Dried smoke and leaves for asthma	Inhalation of fired dried plants smoke 2/3 times a day for 3/4 days
Dendrobium amoenum Wall. ex Lindl.	**Hardjorne**	Orchidaceae	W	Herb	Bulb	Paste	Mixed with *Urtica dioica* and slug for fracture	As an ointment once time until it gets detached from the infected part
Deparia boryana (Willd.) M.Kato	**Kali Neeuro**	Athyriaceae	W	Fern	Whole plant	Cooked	Cooked as a vegetable as a vitamin	Once a day for one week
*Diospyros kak*i L.f.	**Haluwabedh**	Ebenaceae	C	Tree	Fruit	Juice	Raw fruits get crushed mixed with water and filter with cloth and drink for stomachache	About half glass per day
Diploknema butyracea (Roxb.) H.J.Lam	**Cheuri**	Sapotaceae	W	Tree	Seed	Cooked	Seed as a ghee for diabetes and pressure	Used twice a day as an ointment for 5 days
Disporum cantoniense (Lour.) Merr.	**Seto Jara**	Colchicaceae	W	Herb	Root	Paste, powder	Mixed with *Urtica dioica, Gerardiana diversifolia* and *Rhaphidophora glauca* topically for fracture	Three or four times and changes within a month
Drepanostachyum falcatum (Nees) Keng f.	**Nigalo**	Poaceae	C	Shrub	Whole plant	Juice	Water used for drinking especially for children stopping urinate in bed	Twice a day
Drymaria cordata Willd. ex Schult.	**Abhijaalo**	Caryophyllaceae	W	Herb	Whole plant	Fired	Fired whole plants and inhale smoke for cough and cold	2/3 times a day
Elatostema sessile J.R.Forst. & G.Forst.	**Gaglaatey**	Urticaceae	W	Shrub	Leaf	Cooked	Cooked as vegetable for blood pressure especially in a Tamang society	For 1 week
Eleusine coracana (L.) Gaertn.	**Kodo**	Poaceae	C	Herb	Fruit	Cooked	Oral for diabetes and corona virus	Once a time for 1 week
Entada rheedei Spreng.	**Pangro**	Fabaceae	W	Liana	Seed	Paste	Seed rubbed and a paste for cuts and wounds for both animals and human beings	As an ointment twice a day

Equisetum diffusum D.Don	**Kurkurey Jhaar**	Equisetaceae	W	Herb	Root	Powder, juice	Oral for jaundice, urine pain, fever. For stomachache mixed with *Berberis* sp, *Cissampelos pareira* and *Berberis napaulensis*	Grinded juice about 2 litre used twice a day before meal around 15 days strictly avoided alcohol at that time
Eriochloa villosa (Thunb.) Kunth	**Janai Jhaar**	Poaceae	W	Herb	Whole plant	Paste	Paste used for blisters, called "Janai Khatira" in Nepali	Twice a day as an ointment
Erythrina arborescens Roxb.	**Roringo**	Fabaceae	W	Tree	Bark	Juice	Fever	Twice a day for 3/4 days
Eulaliopsis binata (Retz.) C.E.Hubb.	**Babiyo**	Poaceae	W	Herb	Bark	Paste, powder	Bark powdered mixed with cow's milk and paste used in an affected areas for sprains, crack skins	Twice a day as an ointment for a week
Euphorbia hirta L.	**Dudhey Jhaar**	Euphorbiaceae	W	Herb	Latex	Topical	Cuts and wounds	Twice a day for 3/4 days
Euphorbia royleana Boiss.	**Seeudi**	Euphorbiaceae	C	Herb	Leaf	Latex	Topical for earache, throne fired and smoke of it used for knee pain, latex used with cotton and used for toothache and removing pus of wounds	
Fagopyrum acutatum Mansf. ex K.Hammer	**Phapar**	Polygonaceae	C	Herb	Fruit	Powder, cooked	Oral for diabetes	Once a day for 1 week
Fagopyrum tataricum (L.) Gaertn.	**Titey Phapar**	Polygonaceae	C	Shrub	Seed	Cooked	Cooked for diabetes	Once a day
Ferula assa-foetida L.	**Hing**	Apiaceae	C	Herb	Seed	Chewable	Chewed as toothache	Twice a day for 4/5 days
Ficus auriculata Lour.	**Timilo**	Moraceae	C	Tree	Latex	Topical	Stop bleeding of wounds and cuts	

Ficus benghalensis L.	**Bar**	Moraceae	C	Tree	Leaf	Cooked	Mixed with leaf of *Artemisia indica, Woodfordia fruticosa*, *Nyctanthes arbor-tristis, Ficus benjamina*, roots of *Ficus religiosa*, *Cautleya spicata* and *Curcuma caesia* firstly fried and cooked in mustard oil and make a paste and used in an infected areas of skin cancer	Twice a day for 15 days
Ficus benjamina L.	**Swaami**	Moraceae	C	Tree	Leaf	Cooked	Mixed with leaf of Artemisia indica, *Woodfordia fruticosa*, *Nyctanthes arbor-tristis*, *Ficus benghalensis*, roots of *Ficus religiosa*, *Cautleya spicata* and *Curcuma caesia* firstly fried and cooked in mustard oil and make a paste and used in an infected areas of skin cancer	Twice a day for 15 days
Ficus religiosa L.	**Peepal**	Moraceae	C	Tree	Bark	Cooked, paste	Topical for burn skin	Twice a day for 7 days
Fragaria nubicola (Lindl. ex Hook.f.) Lacaita	**Gadey Ainselu/Bhui Ainselu**	Rosaceae	W	Herb	Root	Paste, decoction	Root paste for blisters "Janai Khatira", leaf decoction for fever	Decoction twice a day for 2/3days
Fraxinus floribunda Wall.	**Lakuri**	Oleaceae	W	Tree	Bark	Paste	Bark mixed with *Osyris weightiana* and *Rhaphidophora glauca* cooked as a paste used for sprain	
Ganoderma sp.	**Rato Chyau**	Ganodermataceae	W	Fungi	Whole plant	Cooked	Oral for eye problem	
Gardenia jasminoides J.Ellis	**Indrakamal**	Rubiaceae	C	Shrub	Fruit	Powder	Fruit powder for urinary infection	Powder mixed with water once a day for 4/5 days

Gaultheria fragrantissima Wall.	**Dhasingrey**	Ericaceae	W	Shrub	Leaf, root	Juice, decoction	Juice or oil extracted for cough and cold, root decoction for fever, toothpaste	Decoction 1 glass a day for 2/3 days, and juice inhale from nose thrice a day
Geranium sp.	**Tiro**	Geraneaceae	W	Shrub	Leaf	Juice, powder	Grinded and juice used in an infected areas of cuts and wounds	
Girardinia diversifolia (Link) Friis	**Allo**	Urticaceae	W	Herb	Leaf	Decoction, paste	Oral for diabetes, roots mixed with *Urtica dioica*, *Disporum cantoniense* with liana of *Rhaphidophora glauca* for broken legs and hands, and rheumatism	
Glycine max (L.) Merr.	**Bhatmas**	Fabaceae	C	Herb	Seed	Chewable, paste	Raw seed chewable paste used for carbuncle	
Glycyrrhiza glabra L.	**Jethi Madhu**	Fabaceae	C	Shrub	Rhizome	Chewable, decoction	Oral for cough and cold, decoction for immune power for post-natal women and enhances lactation in women	Decoction once glass a day,
Gonostegia triandra (Blume) Miq.	**Chiple Jhaar/Maslahari**	Urticaceae	W	Herb	Root	Cooked, paste	Mixed with *Urtica dioica*, *Senegalia catechu* and cooked and make a paste and used for broken part and covered with Nepali paper for fracture, or also mixed with *Osyris weightiana, Quercus leucotrichophora* for fracture, or also liana mixed with bark of *Machilus odoratissimus* crushed into smaller and make a paste for knee pain	
Gossypium hirsutum L.	**Kapas**	Malvaceae	C	Shrub	Fiber	Topical	Dipped in mustard oil for ear problem	

Helianthus annuus L.	**Tara Mandal/Suryamukhi Tel**	Asteraceae	C	Herb	Seed	Oil	Orally oil as cooked vegetables for mouth allergies	Once a day for 3 day
Hellenia speciosa (J.Koenig) S.R.Dutta	**Bedlauri**	Costaceae	C	Herb	Root, bulb	Powder, Inhalation	Smelled for unconscious and epilepsy, bulb and root powder mixed with roots of *Asparagus racemosus*, *Piper nigrum* and *Brassica rapa* for increasing energy and also for infertility problems	Smelled 2/3 times, once for 3 days
Hemionitis anceps (Blanf.) Christenh.	**Damkanni**	Pteridaceae	C	Fern	Whole part	Fired	Fired whole plant and ashes used in an infected part of cuts and wounds	
Herpetospermum pedunculosum C.B.Clarke	**Bankarela**	Cucurbitaceae	W	Climber	Root	Juice	Used for fever and urinary infection	One glass a day for 3 days
Hibiscus rosa-sinensis L.	**Ghanti Phool**	Malvaceae	C	Shrub	Leaf, flower	Chewable	Orally for fever, bp, uric acid	3/4 times a day chewed
Hordeum vulgare L.	**Jau**	Poaceae	C	Herb	Fruit	Powder	Powder mixed with ghee, root powder of *Rhaphidophora glauca*, *Berberis asiastica*, *Urtica dioica,* bark powder of *Myrica esculenta,* leaf of *Picrasma quassioides* and maize flour and make as a medicine and used for diabetes, bp, diarrhea, fever, corona virus	3 teaspoon a day for 3 days
Hydrangea febrifuga (Lour.) Y.De Smet & Granados	**Wasak**	Hydrangeaceae	W	Shrub	Leaf	Steamed	Body pain	

Hydrocotyle javanica Thunb.	**Ghodthaprey**	Araliaceae	W	Herb	Leaf, Root	Chewable, Powder, paste	Oral for cooling body, gastritis, fever, headache, typhoid, paste for blisters, in Nepal it is called "Janai Khatira", and leaf and roots were firstly cleaned and then after crushed into powder for urine infection, chewable for memory enhancer, diarrhea, cough and cold, whole plant decoction for stomachache	Twice a day
Imperata cylindrica (L.) Raeusch.	**Siru**	Poaceae	W	Herb	Root	Decoction, powder	Root mixed with *Equisetum diffusum*, *Prunus persica* and *Artemisia indica* leaf grinded and powder decoction, roots are also used for fracture	Decoction for twice a day
Inula cappa (Buch.-Ham. ex D.Don) DC.	**Gaaitiharey Jhaar**	Asteraceae	W	Shrub	Root	Decoction	Jaundice	Twice a day for 1 week
Jasminum multiflorum (Burm.f.) Andrews	**Beli Puspa**	Oleaceae	C	Shrub	Flower	Decoction	Decoction of flower is used for cough and asthma	Twice a day for one week
Juglans regia L.	**Okkhar**	Juglandaceae	C	Tree	Leaf, fruit	Paste, chewable	Paste for vitiligo, orally chewable for toothache and fruits for enhancing memory	
Juniperus recurva Buch.-Ham. ex D.Don	**Dhupi**	Cupressaceae	C	Tree	Leaf	Roasted	Inhalation as oxygen provider	
Justicia adhatoda L.	**Asuro**	Acanthaceae	W	Shrub	Leaf, whole part	Decoction	Oral for fever, headache, and inhalation for cough and cold, whole part decoction for jaundice	Once a day of one glass at evening for 3 days
Kalanchoe pinnata (Lam.) Pers.	**Pattharchatta**	Crassulaceae	C	Herb	Leaf	Chewable, juice	Oral for kidney stone	Twice a day early morning and evening
Lablab purpureus (L.) Sweet	**Tatey Simi**	Fabaceae	C	Climber	Leaf	Paste	Topical for skin allergies	

Laphangium affine (D.Don) Tzvelev	**Bokey Phool**	Asteraceae	W	Herb	Leaf	Paste	Topical for cuts and wounds	
Lepidium sativum L.	**Chamsur**	Brassicaceae	C	Herb	Whole plant	Cooked	Oral for body pain, fever	
Leucas cephalotes (Roth) Spreng.	**Dornapuspa**	Lamiaceae	W	Herb	Whole plant	Decoction	Orally for jaundice	Twice a day half glass
Linum usitatissimum L.	**Aalas**	Linaceae	C	Herb	Seed	Decoction, powder, oil	Oil for cough, powder decoction for cough, sinusitis	Once a day for 3 days of 1 glass
Litsea cubeba (Lour.) Pers.	**Siltimur**	Lauraceae	C	Tree	Seed	Decoction, chewable	Oral for gastritis, stomachache and high blood pressure, seed decoction for diarrhea, orally chewed part used for cuts and wounds, and toothache	Decoction of half glass once a day
Lobelia pyramidalis Wall.	**Eklo Bhir**	Campanulaceae	W	Shrub	Latex	Topical	Latex used for wounds while ear piercing	
Ludwigia adscendens (L.) H.Hara	**Jadelo**	Onagraceae	W	Herb	Whole plant	Juice	Water present in plant used for eye problem	
Lycopodium japonicum Thunb.	**Nagbeli Lahara**	Lycopodiaceae	W	Fern	Whole part	Decoction	Jaundice	Twice a day
Lyonia ovalifolia (Wall.) Drude	**Angeri**	Ericaceae	W	Tree	Leaf	Paste	Topical for scabies, initial part as a paste mixed with onion for scabies, seed of *Solanum aculeatissimum* gets dried and place in its leaf and smoke from it for toothache,	

Machilus odoratissimus Nees	**Caulo**	Lauraceae	C	Tree	Bark	Cooked, paste	Topical for fracture, or also mixed with *Zephyranthes carinata*, red mud, slug, *Osyris weightiana making* a paste for fracture, or also bark mixed with liana of *Gonostegia triandra* crushed into smaller and make a paste and used for knee pain	
Berberis napaulensis (DC.) Spreng.	**Jamane Mandro**	Berberidaceae	C	Tree	Bark	Decoction	Bark powder mixed with root powder of *Cirsium verutum* and *Coccinia grandis*, and leaf of *Artemisia indica* for jaundice, or also mixed with root powder of *Thallictrum* sp and *Aloevera* gel with jaggery for menstrual pain	1 glass twice a day
Mangifera indica L.	**Aanp**	Anacardiaceae	C	Tree	Young shoot	Chewable	Oral for immunity	2/3 times a day
Melia azedarach L.	**Bakaino**	Meliaceae	C	Tree	Bark	Powder	Topical for leech pain	
Mentha spicata L.	**Babari/Pudina**	Lamiaceae	C	Herb	Leaf, Shoot	Pickle, paste, decoction	Oral for indigestion, body pain, pressure, cooling body, cough and cold, young shoot for throat problem, gastritis, fever, diabetes, loss of appetite, leaf paste used for cuts and wounds, toothache, or also mixed with *Stephania glandulifera,* and *Cissampelos pareira* of decoction filter with cloth and used filtered part for jaundice	Decoction 2 times per day
Momordica charantia L.	**Karela**	Cucurbitaceae	C	Herb	Fruit	Cooked, juice	Oral for high blood pressure	Half glass once a day for 3 days

Musa × paradisiaca L.	**Kera**	Musaceae	C	Herb	Bark, stem	Juice	Topical for earache, bark for typhoid	Squeezed water from node 2 3 drops
Myrica esculenta Buch.-Ham. ex D.Don	**Kafal**	Myricaceae	W	Tree	Bark, fruits	Cooked, paste, powder	Fruits for diarrhea, bark mixed with *Osyris weightiana* and buffalo dung for fracture, or also mixed with *Urtica diocia, Rubus ellipticus* and *Saurauia napaulensis* and cooked as a paste and covered the injured part with Nepali paper for fracture, fruits orally for diarrhea, bark powder for sinusitis, and gastritis	Paste as external, fruits eaten for 3/4 days, and powder inhaled 2 3 times a day
Myristica fragrans Houtt.	**Jaiphal**	Myristicaceae	C	Tree	Fruit	Chewable, cooked	Chewable, cooked, stomachache, for removing cold problem cooked with ghee	
Nasturtium officinale R.Br.	**Khole Saag**	Brassicaceae	W	Herb	Whole plant	Cooked	Oral for high blood pressure, stomachache, diabetes, jaundice	Daily use for 7 days
Rorippa micrantha (Roth) Jonsell	**LahareyChamsur/Thulo Chamsur/Desi Chamur**	Brassicaceae	C	Herb	Leaf	Cooked	Oral for body pain, stop heavy bleeding during mensuration	Once a day
Nephrolepis cordifolia (L.) C.Presl	**Paani Amala**	Nephrolepidaceae	W	Herb	Fruit	Chewable	Oral for jaundice and cooling body, diabetes	
Nicotiana tabacum L.	**Surti**	Solanaceae	C	Shrub	Leaf	Juice	Leaf juice for ear pain	2 drops twice a day for 3 days

Nyctanthes arbor-tristis L.	**Parijaat**	Oleaceae	C	Tree	Leaf	Cooked, decoction, paste	Leaf decoction for fever, or mixed with leaf of *Artemisia indica*, *Woodfordia fruticosa*, *Nyctanthes arbor-tristis*, *Ficus benghalensis*, *Ficus benjamina* mixed with bark of *Cotoneaster microphyllus*, roots of *Ficus religiosa*, and *Cautleya spicata* firstly fried and cooked in mustard oil and make a paste and used in an infected areas of skin cancer	Twice a day for 15 days
Ocimum sp.	**Nautali Jhaar/Tulasi Jhaar**	Lamiaceae	W	Shrub	Leaf	Paste	Leaf paste for cuts and wounds, leaf paste used for burning areas	
Ocimum tenuiflorum L.	**Tulsi**	Lamiaceae	C	Shrub	Leaf	Chewable, decoction	Oral for cough and cold, throat problem, purify blood, or also mixed with sugar water for stomach pain, fever and high pressure, or also mixed with *Zanthoxylum armatum* and boiled water for gastritis and stomachache	2 times per day
Origanum vulgare L.	**Ram Tulsi**	Lamiaceae	C	Shrub	Leaf	Tea	Tea for cough and cold and immune system	
Oroxylum indicum (L.) Kurz	**Tatey Phool/Deuta Phool**	Bignoniaceae	W	Tree	Seed	Juice	Seed crushed and juice for fever, throat problem especially for child	1 spoon twice a day
Oryza sativa L.	**Dhaan**	Poaceae	C	Herb	Fruit	Cooked	Cooked and wrapped in cloth for eye problem	Once a day for 10 days

Osyris lanceolata Hochst. & Steud.	**Nundhiki**	Santalaceae	W	Shrub	Bark	Decoction, paste	Topical for fracture, sprain, knee pain, or also bark mixed with roots of *Urtica dioica* and *Myrica esculenta* powder and as a paste used for broken part with Nepali paper	2 times a day
Oxalis corniculata L.	**Chariamilo**	Oxalidaceae	W	Herb	Whole plant	Chewable, paste	Oral for headache, soak leaf overnight in water and drink next morning for sinusitis, leaf paste for cuts and wounds	2 times per day
Paris polyphylla Sm.	**Satuwa**	Melanthiaceae	C	Herb	Bulb	Decoction, paste	Bulb paste for snakebite, dogbite, cuts and wounds, skin burns, or decoction for gastritis, uric acid, fever, typhoid, stomachache, immune power	
Persea sp.	**Hadicaulo**	Lauraceae	W	Tree	Bark	Paste	Grinded with *Citrus aurantiifolia*, *Cynodon dactylon*, *Urtica dioica* and make a paste used with bamboo cover and covered with nepali paper for broken legs and hands	
Persicaria hydropiper (L.) Delarbre	**Pirrey Jhaar**	Polygonaceae	W	Herb	Leaf, branch, flower	Paste	Topically used for snakebite while mixed with *Zanthoxyllum armatum*, and also for toothache	
Phalaris arundinacea L.	**Seto Dubo**	Poaceae	C	Herb	Leaf	Decoction, paste, juice	Leaf decoction for urine pain, or also mixed with *Cirsium wallichii* and *Centella asiatica* for uterus cancer, leaf paste for vitiligo, leaf mashed and juice for fever	2 times per day

Phyllanthus emblica L.	**Amala**	Phyllanthaceae	C	Tree	Fruit	Chewable	Oral for stomachache	2 times per day,
Phytolacca acinosa Roxb.	**Jaringo**	Phytolaccaceae	C	Herb	Whole plant	Cooked, powder	Oral for high blood pressure, diabetes, root powder fried with egg for fever in Tamang society, bulb get rubbed and used in burned part, young shoot as body pain and jaundice, typhoid, vegetable for cancer	Once a day for 1 week
Picrasma quassioides (D.Don) Benn.	**Neem/Neemkath**	Simaroubaceae	C	Tree	Stem, bark, leaf, twig	Decoction, soaked	Oral for fever, diabetes, high blood pressure and topical for cuts and wounds, or also mixed with root of *Rumex nepalensis* and *Cirsium wallichii* for jaundice, or also mixed with *Cuscuta reflexa*, root of *Cirsium wallichii* and juice of A*loevera* after crushed used in water for jaundice, leaf boiled for bathing for skin allergies, twigs for toothache, bark decoction for diarrhea, typhoid	Filtered water 4/5 teaspoon morning and evening twice a day
Piliostigma malabaricum (Roxb.) Benth.	**Taaki**	Fabaceae	W	Tree	Young shoot	Topical	Orally for Vitamin B	
Pinus roxburghii Sarg.	**Salla**	Pinaceae	W	Tree	Stem	Latex	Topical for skin cracks	
Piper longum L.	**Pipla**	Piperaceae	W	Climber	Fruit	Chewable	Oral for sore throat and tonsil, cough and cold	Twice per day for 5 days
Piper nigrum L.	**Marich**	Piperaceae	W	Climber	Fruit	Chewable, decoction	Oral for cough and cold, decoction for stomachache, seed chewed paste for eye problem, removing cold from body,	Twice a day

Plantago sp	**Hiley Jhaar/Mula/Suirey Jhaar**	Plantaginaceae	C	Herb	Root, Leaf	Chewable, decoction, juice	Oral for piles, fever, typhoid, or also root soak overnight and drink for gastritis	2 3 days or twice a day
Pogostemon benghalensis (Burm.f.) Kuntze	**Rudilo**	Lamiaceae	C	Shrub	Leaf	Decoction	Oral for child illness, cough and cold, fever, throat pain	Half glass once a day for 3 days
Pogostemon sp.	**Mirrey Jhaar**	Lamiaceae	W	Shrub	Root	Paste, decoction	Root grinded and used as a paste in crack areas of skin, decoction for typhoid	Twice a day
Polygonatum verticillatum (L.) All.	**Khiraula**	Asparagaceae	W	Herb	Twig	Juice, paste	Tonic	
Potentilla fulgens Wall. ex Sims	**Bajradanti**	Rosaceae	W	Shrub	Leaf, Root	Juice	Topical for toothache	
Prunus cerasoides Buch.-Ham. ex D.Don	**Painyu**	Rosaceae	W	Tree	Bark	Decoction, paste	Topical for skin burn, or also mixed with *Urticia dioica*, slug, *Myrica esculenta*, *and Daphne bholuwa for fracture, or also mixed with Urticia dioica, Senegalia catechu* and *darsan stone, Quercus leucotrichophora,* for broken legs and hands, or also mixed with bark powder of *Osyris weightiana, Urticia dioica*, *Senegalia catechu*, and *Quercus leucotrichophora* cooked and used as a paste for the broken legs and covered with Nepali paper	
Prunus domestica L.	**Aarupokhara**	Rosaceae	C	Tree	Fruit	Juice	Indigestion	1 glass a day
Prunus persica (L.) Batsch	**Aaru**	Rosaceae	C	Tree	Seed	Paste, powder	Topical for skin allergies	

Psidium guajava L.	**Amba**	Myrtaceae	C	Tree	Leaf, bark	Soaked, decoction	Leaf soaked in water for diarrhea, bark decoction for stomach pain	
Punica granatum L.	**Anar**	Lythraceae	C	Shrub	Leaf	Decoction	Leaf decoction for blood stool.	Twice a day for 3 days
Pyracantha crenulata (D.Don) M.Roem.	**Ghaghaaru**	Rosaceae	C	Shrub	Bark, Fruits	Raw, paste	Bark paste for burning skin, edible fruits for diarrhea, stomach pain	
Pyrus pashia Buch.-Ham. ex D.Don	**Mayal**	Rosaceae	W	Tree	Fruit	Juice	Fruit mashed and juice for eye problem	Juice used in eye 2 4 drops
Quercus leucotrichophora A.Camus	**Baanjh**	Fagaceae	W	Tree	Bark	Cooked, paste	Topical for fracture, bark paste for burning areas	
Raphanus raphanistrum subsp. sativus (L.) Domin	**Mula**	Brassicaceae	C	Herb	Leaf	Decoction, juice	Topical for earache, jaundice	Decoction twice a day
Rauvolfia serpentina Benth. ex Kurz	**Sarpaganda**	Apocynaceae	W	Shrub	Root	Powder	Grinded powder for fracture	
Remusatia vivipara (Roxb.) Schott	**Jaluko**	Araceae	C	Herb	Bulb	Paste	Bulb mixed with small branches of *Taxus mairei* making paste with help of stone for skin cancer	
Rhaphidophora glauca (Wall.) Schott	**Kaanchirno**	Araceae	W	Climber	Liana	Paste, powder	Topical for fracture	
Rheum australe D.Don	**Padamchalno**	Polygonaceae	W	Herb	Bulb	Paste	Bulb paste for wounds, fracture	
Rhododendron arboreum Sm.	**Laaligurans**	Ericaceae	W	Tree	Flower	Chewable	Oral for throat stuck like fish bone, diabetes	
Rhus chinensis Mill.	**Bhakimlo**	Anacardiaceae	W	Tree	Fruit	Chewable	Stomachache, diarrhea	
Rhus parviflora Roxb	**Pithauli**	Anacardiaceae	W	Tree	Bark	Decoction	Gastritis	One glass a day for 3 days
Rosa sp.	**Gulab**	Rosaceae	C	Shrub	Young shoot	Chewable, paste	Young shoot orally for cooling body, paste for allergies	
Roscoea sp.	**Kurkureygattha/Saktigumba**	Zingiberaceae	C	Herb	Bulb	Paste	Topical for fracture	

Salvia rosmarinus Spenn.	**Rosemarry**	Lamiaceae	C	Herb	Leaf	Tea	Oral for diabetes and pressure	As a one cup of tea at morning a week
Rostellularia obtusa Nees	**Phuli Jhaar**	Acanthaceae	W	Herb	Leaf	Paste	Leaf paste for cuts and wounds	
Rubia manjith Roxb.	**Majitho/Charcharey**	Rubiaceae	W	Shrub	Whole plant	Decoction	Oral for infertility problems, fever	Once a day
Rubus ellipticus Sm.	**Ainselu**	Rosaceae	W	Shrub	Root, Young shoot	Decoction, chewable, paste	Oral for diabetes, sore throat, fever, or also root mixed with bark of *Schima wallichiana* for stomach pain, or also mixed with *Osyris weightiana,* red mud, *Quercus leucotrichophora,* for broken legs, root decoction for jaundice	Decoction once a day, external as a paste
Rubus paniculatus Sm.	**Kalo Ainselu**	Rosaceae	W	Shrub	Root	Paste, powder	Root mixed with *Urticia dioica,* bark of *Myrica esculenta* and *Senegalia catechu* mashed and make a powder paste and used for broken areas and decoction for acidity	
Rumex nepalensis Spreng.	**Halhaley**	Polygonaceae	W	Herb	Root, twig	Paste, decoction	Topical for ringworm and skin allergies, scabies, or also mixed with *Cirsium wallichii* and *Picrasma quassioides* making root powdered for jaundice, root decoction for stomachache	
Saccharum officinarum L.	**Ukhu**	Poaceae	C	Herb	Fruit	Chewable, juice	Oral for jaundice, or also mixed with initial part of *Berberis asiatica*, *Rubus ellipticus*, *Equisetum diffusum* and *Cucumis sativus* for jaundice	Juice 2 times per day for 10 days

Saurauia napaulensis DC.	**Gogan**	Actinidiaceae	W	Tree	Bark	Decoction, powder	Bark decoction for typhoid, or also mixed with roots of *Urtica dioica* and *Rubus ellipticus* and bark of *Myrica esculenta* cooked as a paste covered the injured part with Nepali paper	2 glass of a juice after cooked then became 1glass and used once a day for a week
Schima wallichii (DC.) Korth.	**Chilaune**	Theaceae	W	Tree	Bark	Powder	Mixed with root of *Rubus ellipticus* for stomach pain, gastritis, bark powder paste for cuts and wounds	Dry powder soaked in water and and 1 teaspoon cooked in water and used oncea day for 15 days
Senecio sp.	**Mohinijhaar**	Asteraceae	W	Herb	Twigs	Topical	Twigs used for headache	Cap used as external
Senegalia catechu (L.f.) P.J.H.Hurter & Mabb.	**Khayer**	Fabaceae	W	Tree	Bark	Decoction, paste	Topical for fracture, broken legs and hands or also mixed with bark of *Myrica esculenta* and *Senegalia catechu* mashed and make a powder or paste used in for broken areas	
Sesamum indicum L.	**Til**	Pedaliaceae	C	Herb	Fruit	Powder	Make powder and mixed with water and chant some mantras given be specific key person to increase appetite	
Setaria italica (L.) P.Beauv.	**Kagano**	Poaceae	C	Herb	Seed	Decoction	Seed decoction for stone problem	1 kg of seed boiled in water for 20/25 days, soaked overnight and use next morning once a day
Shorea robusta C.F.Gaertn.	**Saal**	Dipterocarpaceae	W	Tree	Resin	Topical	Crack skins	Gel like used in crack skin for 7 days
Sicyos edulis Jacq.	**Iskush**	Cucurbitaceae	C	Climber	Fruit	Cooked	Oral for high blood pressure	Daily use for 7 days
Smallanthus sonchifolius (Poepp.) H.Rob.	**Ground Apple**	Asteraceae	C	Herb	Fruit	Chewable	Diabetes	
Smilax aspera L.	**Kukurdaino**	Smilaceae	W	Climber	Whole plant	Cooked	Oral for purifying blood	Once a day at evening

Solanum aculeatissimum Jacq.	**Kanthakaari**	Solanaceae	C	Shrub	Fruit	Smoke	Inhalation for toothache	2 times once a day for 5 days
Solanum lycopersicum L.	**Tamatar**	Solanaceae	C	Herb	Fruit	Paste	Topical for burns	
Solanum nigrum L.	**Kamai/Kawai**	Solanaceae	W	Herb	Fruit	Chewable, paste	Topical used for headache especially for child fever	
Solanum tuberosum L.	**Aalu**	Solanaceae	C	Herb	Fruit	Paste	Topical for burns	
Spinacia oleracea L.	**Palung**	Amaranthaceae	C	Herb	Young shoot	Cooked	Antibacterial	Once a day for 1 week
Stellaria vestita Kurz	**Kharaney Jhaar**	Caryophyllaceae	W	Herb	Root	Juice	Blood in stool	3 teaspoon a day for 3 days
Stephania glandulifera Miers	**Gujar Gaano**	Menispermaceae	W	Vines	Whole plant	Powder, cooked	Mixed with bark of *Schima wallichii* and cooked in cow milk for gastritis	
Swertia angustifolia Buch.-Ham. ex D.Don	**Chiraito**	Gentianaceae	W	Herb	Root	Decoction, powder	Powder and decoction for fever	Root soak overnight in water and consume water next morning
Swertia nervosa (G.Don) Wall. ex C.B.Clarke	**Kalo Chiraito**	Gentianaceae	W	Herb	Root	Soaked	Oral for fever	Root soak overnight in water and consume water next morning
Symplocos pyrifolia Wall. & G.Don	**Kalikath/Kaalidana**	Symplocaceae	W	Tree	Seed	Decoction	Seed powder boiled in water for diarrhea	2 spoon a day
Syzygium aromaticum (L.) Merr. & L.M.Perry	**Lwang**	Myrtaceae	C	Tree	Fruits	Chewable	Topical for toothache	2 times a day
Tagetes erecta L.	**Sayapatri**	Asteraceae	C	Shrub	Flower, leaf	Juice, paste, chewable	Leaf paste for cuts and wounds, juice of flowers for throat problems, fever, black part of flower used for menstrual cramps, flower mashed and used for nose pain, leaf orally chewed for diarrhea, mouth allergies	Twice a day
Taxus mairei (Lemee & H.Lév.) S.Y.Hu	**Patey Sallo/Lauth Salla**	Taxaceae	C	Tree	Leaf, Stem	Decoction	Tea for cancer treatment of skin diseases	1 cup daily

Terminalia bellirica (Gaertn.) Roxb.	**Barro**	Combretaceae	W	Tree	Seed	Chewable, powder	Powder mixed with water for cough and cold, stomachache, immune, headache	1 glass a day for 4/5 days
Terminalia chebula Retz.	**Harro**	Combretaceae	W	Tree	Seed	Chewable, powder	Cough and cold, powder mixed with water for stomachache, immune, headache	1 glass a day for 4/5 days
Tetrastigma obtectum (Wall. ex M.A.Lawson) Planch. ex Franch.	**Pani Laharo/Purino Laharo**	Vitaceae	W	Climber	Whole plant	Juice	Water from it used for eye problem	2/3 drops for 5/6 days
Thalictrum sp.	**Tiktikey Jhaar**	Ranunculaceae	W	Herb	Root	Decoction, powder	Oral for jaundice, menstrual problems, fever, or also mixed with bark of *Berberis napaulensis* and *Aloevera* gel with jaggery for menstrual problems, or also mixed with root decoction of *Cuscuta reflexa* and *Coccinia grandis* for jaundice	Twice a day for 1 week
Tinospora sinensis (Lour.) Merr.	**Gurjo**	Menispermaceae	W	Climber	Whole plant	Juice	Oral for cough and cold, throat problem, stomachache	1 glass per day for 3 day or also chewed twice a day
Trachyspermum ammi Sprague	**Ajmedh/Juwano**	Apiaceae	C	Herb	Fruit	Decoction	Oral for cough and cold, stomachache	1 glass twice a day for 5 days
Tridynamia spectabilis (Kurz) Parmar	**Sikari Lahara**	Convolvulaceae	W	Climber	Whole plant	Paste	Joint pain	
Trifolium repens L.	**Teenpatey jhaar**	Fabaceae	W	Herb	leaf	Paste, juice, chewable	Leaf paste or juice used in cuts and wounds, orally chewed for fever	Twice a day
Trigonella foenum-graecum L.	**Methi**	Fabaceae	C	Herb	Fruits	Decoction	Oral for memory power	1/4 glass after meal twice a day for 1 week
Urtica dioica L.	**Sisnu**	Urticaceae	W	Herb	Root, Leaf	Cooked, powder	Topical for fracture and oral for diabetes	Cooked once a day for a week

Valeriana hardwickii Wall.	**Samayogatha/Runchey Jhar/sugandhawal**	Caprifoliaceae	C	Herb	Root	Decoction, powder	Smelled for unconscious and epilepsy	Smell 1/2 times in a day
Valeriana sp.	**Jatamasi**	Caprifoliaceae	C	Herb	Root	Inhalation	Roots are used for smelling for unconsciousness (chopne betha) and epilepsy	Smell 2 3 times until the person wake up in normal condition
Withania somnifera (L.) Dunal	**Aswaganda**	Solanaceae	W	Shrub	Bulb	Decoction	Gastritis, diabetes, pressure	Twice a day
Woodfordia fruticosa (L.) Kurz	**Dhayero**	Lythraceae	W	Shrub	Flower	Chewable, decoction	Orally chewed for piles	2/3 flowers a day for 7/8 days. Meat, black pulse and fried maize were strictly avoided that time
Zanthoxylum armatum DC.	**Timur**	Rutaceae	C	Shrub	Fruit	Chewing, decoction, topical	Mixed with mustard oil and massage for water allergies or also mixed with turmeric for anti-poisonous, snakebite, dogbite	Twice a day
Zea mays L.	**Makai**	Poaceae	C	Herb	Fruit	Decoction	Filtered water for pressure	Once a day 1 glass for one week
Zephyranthes carinata Herb.	**Bhuichampa**	Amaryllidaceae	C	Herb	Bulb	Paste	Topical for, fracture, skin allergies	Paste used with covering with tighten cloth, leaving each one day
Zingiber officinale Roscoe	**Aduwa/Sutho**	Zingiberaceae	C	Herb	Rhizome	Chewable, decoction	Oral for stomachache, sore throat	Twice a day for 4 days

Footnote: C = Cultivated, W = Wild

Results and Discussion

Demographic Structure and Ethnomedicinal Knowledge

The present study has highlighted the valuable knowledge possessed by the local respondents of Bethanchowk Rural Municipality. A total of 415 respondents were involved in the study. Among the total respondents, 12 were the key respondents. The respondents in the study areas were involved in farming (n = 221), housewife (n = 114), business (n = 33), jobs (n = 16), study (n = 15), healer (n = 12), social work (n = 4), and students (n = 15) (Table 1). Regarding the literacy of respondents, 76.4% were literate and 23.6% were illiterate. Among them, 415 (211 male and 204 female) were individually interviewed and 34 (32 Male and 2 Female) were involved in focus group discussion. There was no significant difference ($p = 0.401$) in the knowledge of medicinal plants possessed and the number of plants described by the genders (Figure 2). On average, males and females in the study area described 12 and 11 plants, respectively. These findings suggest that both genders described approximately the same number of medicinal plants. Both genders were comfortable sharing their knowledge regarding medicinal plants, which agreed with the previous study (Bhaila *et al.* 2022). However, some literature has reported the social taboo that believes only men should be involved in traditional medicinal treatments and practices (Cheikhyoussef *et al.* 2011). The female respondents in the present study did not hesitate to answer the interviewers, who were unknown males to them. The present result was supported by Bhaila *et al.* (2022), unlike in Pakistan (Umair *et al.* 2017). This reflects that cultural norms and attitudes towards gender roles in knowledge sharing about medicinal plants differ across the regions or communities.

The number of respondents with the age below 31, 31 to 60, and above 60 involved in the investigation was 56, 236, and 123, respectively. The R square value ($R^2 = 0.0405$; $p = 0.376$) suggested that only 4.05% of the variation in the number of plants described could be explained by the respondent's age (Figure 3). The R square value was extremely low, suggesting that the age was not a strong predictor for plants described. Moreover, the Spearman correlation ($\rho = 0.225$, $p = 0.598$) also justified the weak correlation between the age of the respondents and the number of plants described by them. The recent results from linear regression and correlation may express two forms of conclusion. Firstly, the knowledge sharing regarding medicinal plants by the older generation to the younger generation in the study area might be significant. Second, factors other than age, such as personal experience, cultural background, or social learning, may have played a crucial role in determining the knowledge regarding medicinal plants. However, the present result was in contrast to previous literature (Mussarat *et al.* 2014; Ojha Khatri *et al.* 2021; Magar *et al.* 2022; Bhaila *et al.* 2022). These literature have reported that old age people had vast knowledge regarding medicinal plants compared to younger generation. Therefore, the knowledge regarding medicinal plants varies along the regions, communities, and ethnicities.

Table 1. The frequency of demographic categories recorded in the study area

Category	Groups	Number of respondents
Age group	Below 31	56
	31-60	236
	Above 60	123
Gender	Male	211
	Female	204
Education	Illiterate	98
	Literate	317
Occupation	Business	33
	Farmer	221
	Healer	12
	Housewife	114
	Job	16
	Socialist	4
	Students	15

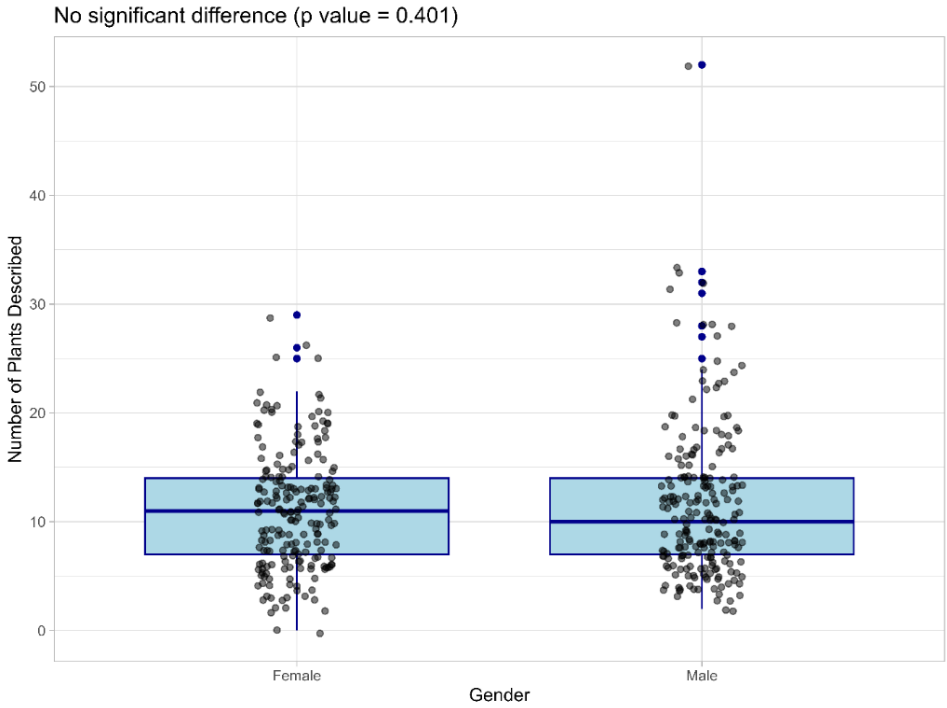

Figure 2. Box plot of gender and number of plants described by them with p value obtained from t-test.

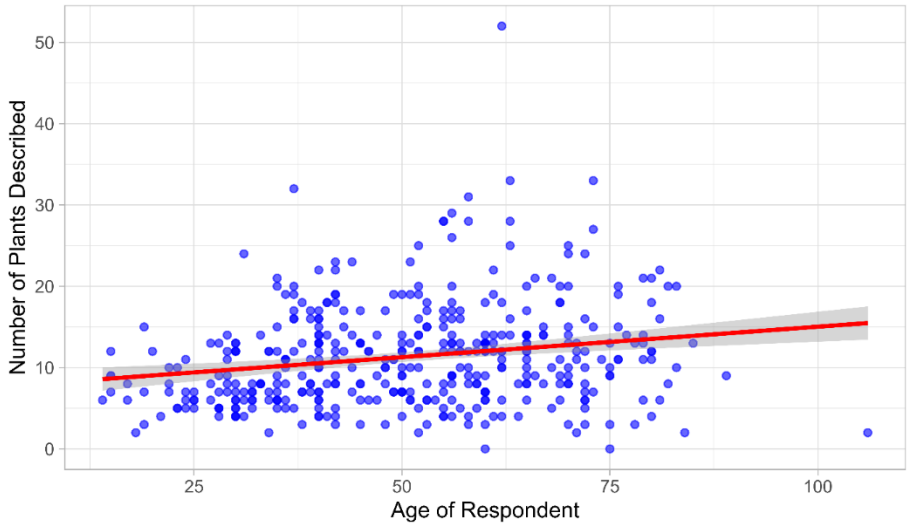

Figure 3. Linear regression between the age of the respondents and number of plants described by them

Diversity of medicinal plants

The present study has recorded 227 medicinal plant species under 94 families and 200 genera (Table 2). Among the total plant species, 110 (48.4%) were cultivated and 117 (51.6%) were found in the wild. The study has recorded higher number of medicinal plant species compared to the previous studies (Adhikari *et al.* 2019; Bhaila *et al.* 2022; Gautam and Timilsina 2022; Gautam *et al.* 2022; Karki *et al.* 2023). There are 1762 medicinal plant species recorded in Nepal till date (Kunwar *et al.* 2022). Among the total medicinal plants, this area encompasses 12.87% of medicinal plants. This highlights the rich biodiversity of medicinal plants in the area examined. The richness of medicinal plants in Nepal peaks from 1000-2500 m above sea level and starts to decline from that point (Rokaya *et al.* 2012). Moreover, the lower and higher ranges in the study area denote the ecotone regions, which may have contributed to the considerable number of species (Chaudhary and Aryal 2024). Of all families, Poaceae had the highest number of species (n=12), followed by Fabaceae (n=11), Rosaceae (n=11), Asteraceae (n=9), Lamiaceae (n=9), Solanaceae (n=8), Zingiberaceae (n=7), and Cucurbitaceae (n=6). There were 6 families with 5 species each, 3 families with 4 species each, 9 families with 3 species each, 17 families with 2 species in each, and 51 families with a single species in each (Figure 4). The highest number of species in the Poaceae family was in agreement with

the previous studies (Dangol *et al.* 2015; Teshome *et al.* 2023). The species from Poaceae family are mainly found in the wild, and comprise significant portion of medicinal herbs (Kumari & Saggoo 2015). Grasses constitute different kinds of phytochemicals and act as a source of antioxidant that contributes to therapeutic activities (Gebashe *et al.* 2020).

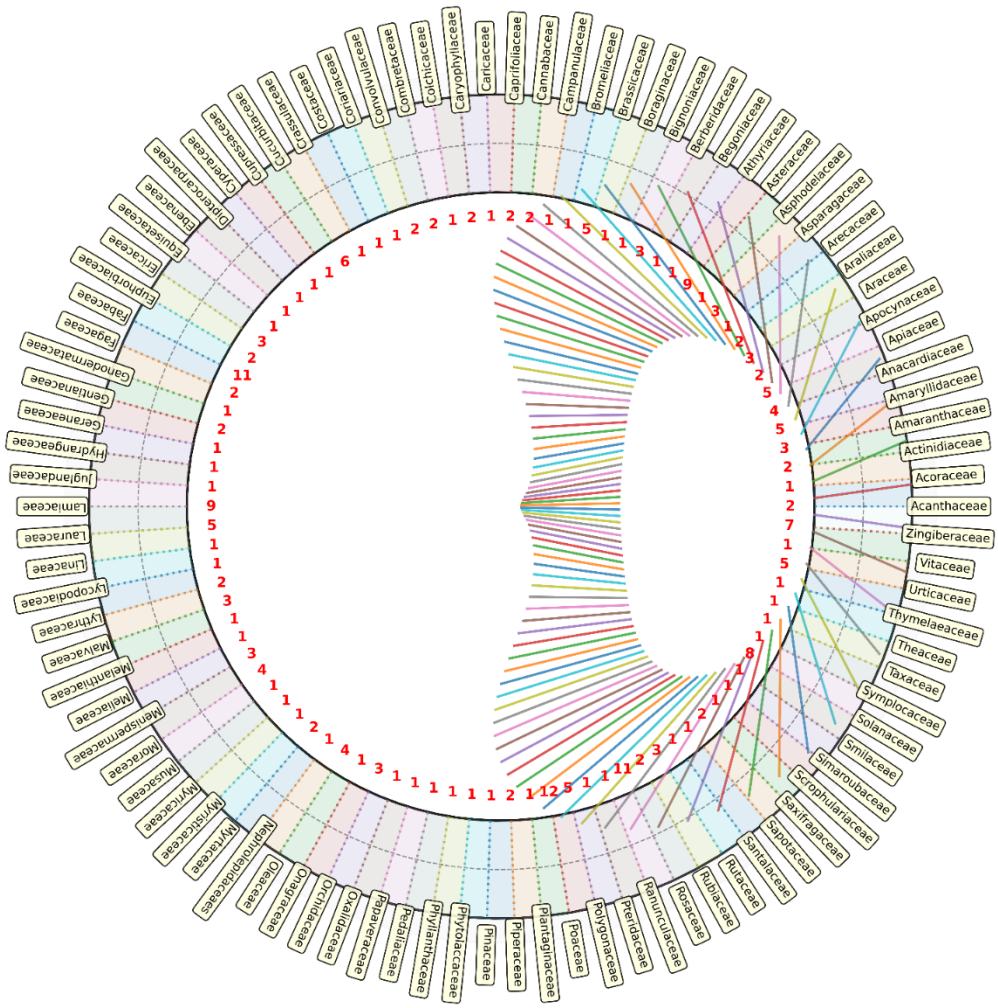

Figure 4. Peripheral circular dendrogram representing the frequency of families recorded in the study area

Habit and plant parts used

Altogether, eight habits of medicinal plants were recorded in the study. Herbs (n=103) were the most frequently observed habit, followed by shrubs (n=51), trees (n=53), climbers (n=14), ferns (n=3), lianas (n=1), vines (n=1), and fungi (n=1) (Figure 5). The prevalence of herbs in the study area has highlighted their primary source or significant role in the local medicinal practice. Herbs are easy to cultivate, store, transport, process, and prepare for medicinal use, which might be the reason for their high use (Shrestha and Dhillion 2003; Uprety *et al.* 2010; Ojha Khatri *et al.* 2021; Dulal *et al.* 2022). Moreover, herbs are the most abundant plant species in their natural habitat (Rokaya *et al.* 2010; Bhaila *et al.* 2022). The present result agrees with the previous studies (Chaudhary *et al.* 2020; Magar *et al.* 2022; Gautam *et al.* 2023; Karki *et al.* 2023). Therefore, various factors like natural habitat, easy collection, storage, and processes may have contributed to the higher frequency of herbs in the study area. Additionally, shrubs and trees were also used for a considerable number of plant species for local medicine.

The medicinal plants in the study were used for 16 different parts. The most used plant parts in the study area were leaf (n = 54), followed by fruit (n =48), root (n = 35), whole plant (n = 31), bark (n = 24), seed (n = 19), bulb and shoot (n = 10 each), rhizome (n = 9), flower (n = 8), branch and latex (n = 5 each), stem (n = 4), and twig, fiber, and resin (1 species each) (Figure 6). These variation insights into both traditional knowledge and specific therapeutic activities associated with different plant parts. The leaf was observed as the most commonly used plant part in the study area. Leaf is the site for photosynthesis and acts as an area to store secondary metabolites that may have contributed to medicinal character (Thoma *et al.* 2020). Moreover, leaves are easily accessible plant parts compared to roots, fruits, flowers, and other plant parts (Mallik *et al.* 2020; Magar *et al.* 2022). The present result was supported by the previous studies (Gautam *et al.* 2023). The root and whole plant

were also used in considerable numbers. However, unsustainable harvesting of roots and whole plants may pose a great threat in their utilization and conservation. Underground harvesting is more unsustainable compared to aerial parts (Sharma & Kala 2018). Therefore, it is crucial to prioritize the time of collection, harvesting method, seasonal collection, and types of habitat while gathering medicinal plants.

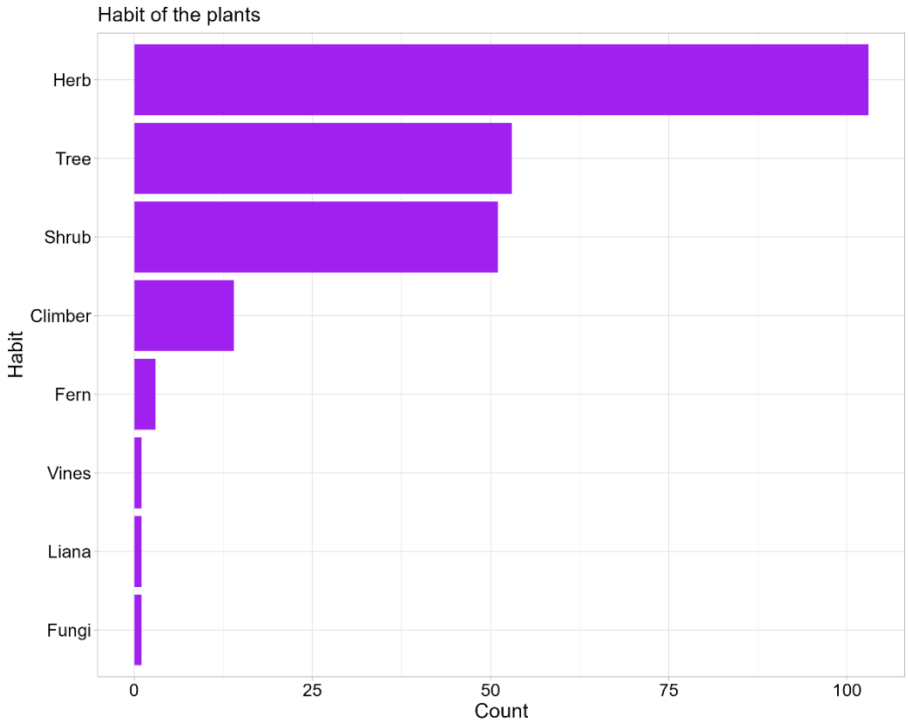

Figure 5. Bar graph representing the frequency of medicinal plant habits recorded in the study area

The interrelationship between the plant parts and habit of the plant has been visualized with the help of a chord diagram (Figure 7). Herbs had the most connections with different plant parts, describing their versatile uses and resources. Shrub also had good interrelationships with different plant parts in sighting its frequent use. However, trees were limited to barks, flowers, leaves, seeds, and fruits. This may be due to the reason that other plant parts of trees are not easily accessible. Ferns, fungi, and lianas had constrictive and limited use of their plant parts.

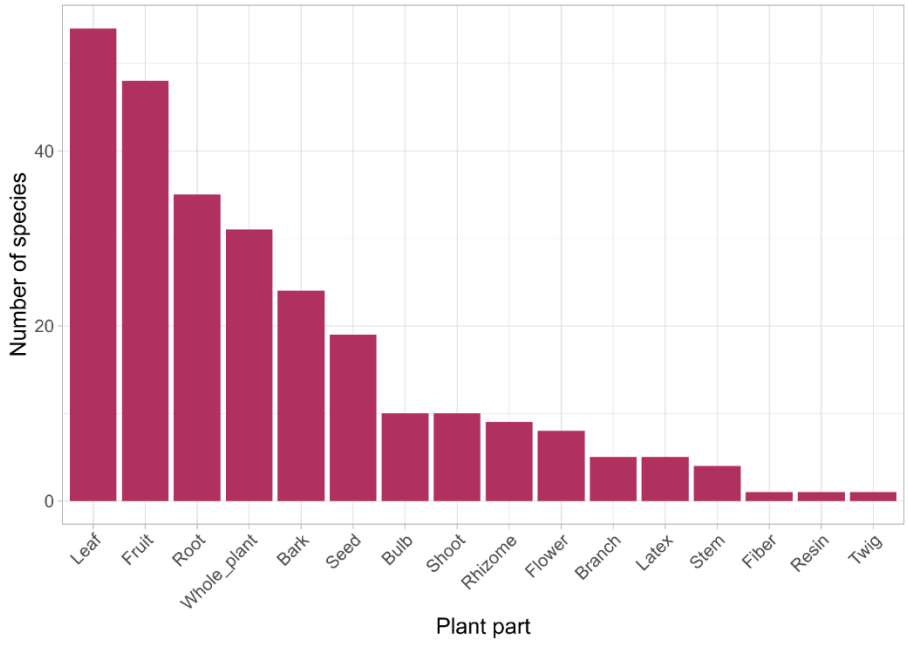

Figure 6. Bar graph representing the frequency of plant parts used for the medicinal use

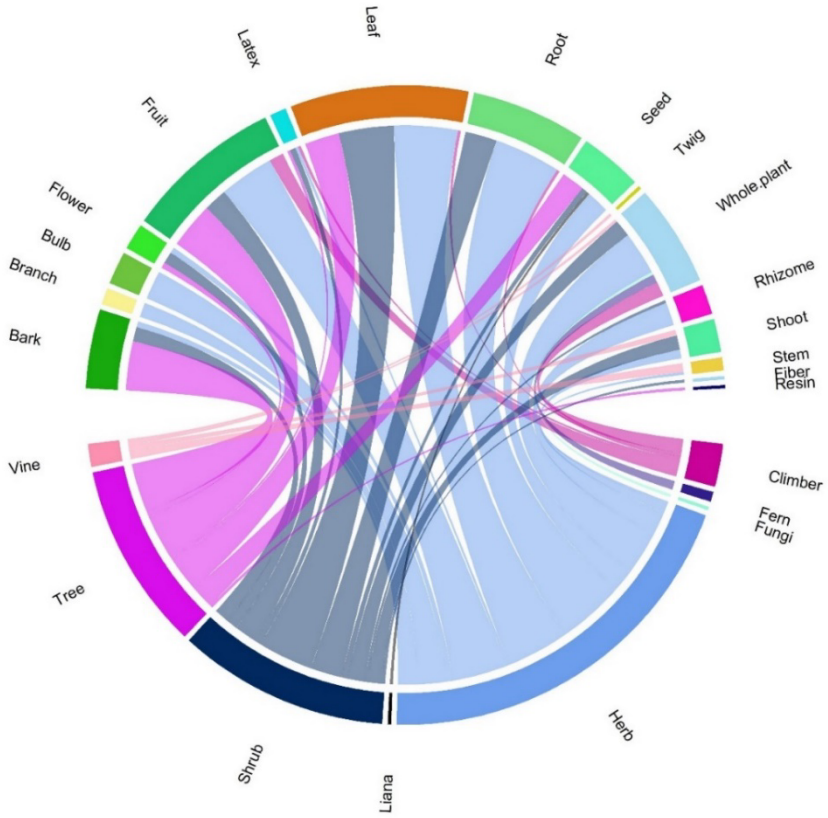

Figure 7. Chord diagram representing the relationship between the plant parts and habit of the plant

Mode of applications

The present study has recorded 17 modes of application of medicinal plants. Decoction was the most commonly used (n = 76) mode of preparation, followed by paste (n = 62), raw (n = 45), cooked (n = 40), juice (n = 40), powder (n = 38), topical (n = 12), soaked (n = 6), steamed, smoke, inhalation, and fired (n = 3 each), tea (n = 2) and pickle, roasted, and oil for one species each (Figure 8). The chord diagram has revealed a diverse spectrum of preparation and applications of medicinal plant use. The variety of preparations has provided insights into the specific use and preparation for each species for particular therapeutic purposes, which also reflects the practice of cultural diversity in the study area. According to the respondents, water was the primary solvent used in the preparation of most medicinal plants. A decoction involves boiling plant ingredients in water to extract the biological compounds (Kamatenesi *et al.* 2011). It is most useful in extracting water-soluble compounds that have medicinal value. However, some compounds may be degraded due to longer boiling time (Moshi *et al.* 2010). This result agreed with the previous studies (Benarba *et al.* 2015; Menale *et al.* 2016; Savić *et al.* 2019; Adhikari *et al.* 2019; Belhouala & Benarba 2021).

Informant Consensus Factor (ICF) and Fidelity Level (FL)

In the present study the distinct ailments were found under 16 categories that included 92 different ailments. The ICF value for ailment categories ranged from 0.50 to 0.93. The varied range of ICF values in the study indicated a moderate to high consensus among the informants. The highest value (close to 1) indicates the higher agreement of the locals on the use of plants to treat some particular ailments (Singh *et al.* 2012; Dulal *et al.* 2022). The diversity in ICF values in the study may be due to the diversity in cultural and ecological context of the studied region. It may have highlighted the use of plants to address different health issues in various ways by the local inhabitants of the study area. The highest ICF value was observed for gynecological disorders (0.93), followed by skeletomuscular disorders, and dermatological issues and cuts (Table 3). Eight ailment categories obtained ICF value with more than 0.80. This high level of consensus for gynecological disorder is likely indicative of the importance of such ailments in the local context, possibly due to their high prevalence or cultural significance. Dulal *et al.* (2022) had reported the highest ICF value for fever, followed by respiratory and skeletomuscular pain. They had reported the use of *Aegle marmelos, Azadirachta indica, Artemisia vulgaris, Justicia adhatoda, Cirsium*

wallichi, and *Mentha arvensis* for fever and *Acorus calamus, Cinnamomum tamala, Curcuma domestica, Mentha piperita, Ocimum tenuiflorum, Ammomum subulatum, Phyllanthus emblica* for respiratory disorder. Similarly, Ambu *et al.* (2020) had also reported the highest ICF value for fever, followed by gastrointestinal disorders, and skeletomuscular disorders. Uprety *et al.* (2010) had reported a high ICF values for ophthalmological, dental, and renal issues in Rasuwa district, central Nepal. These differences in species with high ICF values between the present investigation and previous literature may be possibly due to differences in the ethnicity of the population concerned. Pangeni *et al.* (2020) had reported the highest ICF value for gastrointestinal disorders followed by, fever and skeletomuscular disorders. Regarding gastrointestinal, fever, and skeletomuscular disorder*, Centella asiatica, Cissampelos pariera*, and *Bergenia ciliata* received the highest relative frequency citation index value. The use of ICF provides the level of consensus that has been already in practice by previous literature (Singh *et al.* 2012; Dulal *et al.* 2022; Gautam *et al.* 2023; Jarić *et al.* 2024).

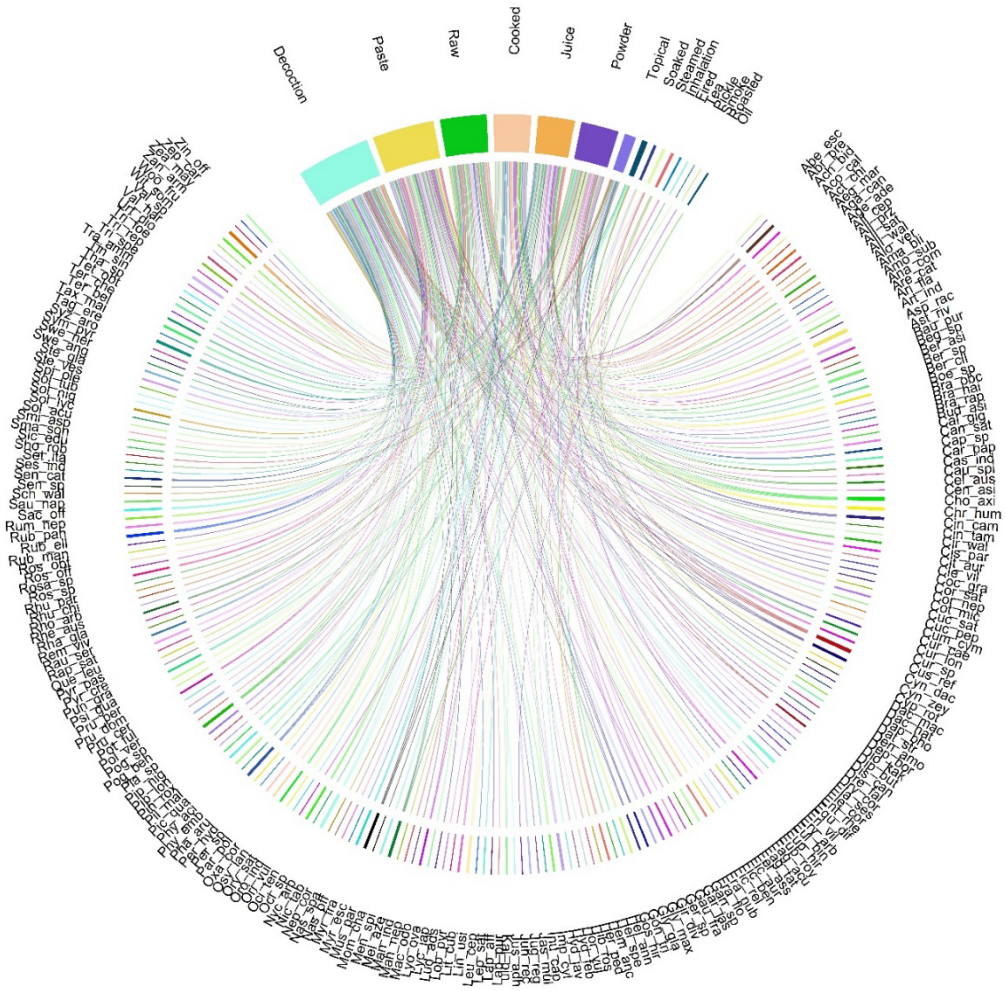

Figure 8. A chord diagram representing the interrelationship between the mode of preparation and medicinal plant species

The highest FL value for each ailment category is listed in Table 4. The highest FL value was observed for *Ageratina adenophora* for dermatological issues and cuts, followed *by Osyris lanceolata* and *Urtica dioica* for skeletomuscular disorders, *Taxus mairei* for cancer, and *Cuscuta reflexa* and *Berberis asiatica* for hepatic disorders. A higher FL value for each species in particular ailment category represents the higher prioritized species by the locals in particular ailment category. The preferred plant species, i.e., those with the highest FL value, may be considered as potential medicinal plants of higher healing potential for specific ailments and can be used for bioprospecting of important chemicals of pharmaceutical importance. The high use of these species may be due to the easy availability, extensive knowledge of their medication application within the community, and widespread distribution (Gautam *et al.* 2023). However, plants with a lower FL value should not be neglected. The lower value may represent the lack of knowledge regarding the use of such species (Srithi *et*

al. 2009). In comparison to the previous literature (Malla *et al.* 2015), the highest FL value was reported for *Paris polyphylla* to treat gastrointestinal disorders, followed by *Bergenia ciliata* to treat urogenital disorders. Moreover, Ambu *et al.* (2020) had reported the highest FL value for *Calotropis gigantea* regarding dermatological disorders, followed by *Drymaria cordata* against fever, and *Mangifera indica* for gastrointestinal disorders. The variation in FL value for different species and ailments across studies may reflect the diversity in traditional knowledge, practices, and preferences regarding plant-based medicines. Readily availability and accessibility of plants could also attribute to this factor. The FL value or higher preference for species to treat particular ailments may vary within a single district or similar geographical area due to differences in traditional practices and cultural beliefs. The results obtained from the present study and those of Ambu *et al.* (2020) further support this statement.

Table 3. Informant consensus factor of the different ailments category

Ailments category	Nt	Nur	ICF = (Nur-Nt)/(Nur-1)
Gynecological disorders	15	203	0.93
Skeletomuscular disorders	57	594	0.91
Dermatological issues and cuts	67	570	0.88
Fever and headache	56	452	0.88
Respiratory disorders	40	247	0.84
Miscellaneous	61	369	0.84
Otorhinolaryngologic disorders	45	231	0.81
Gastro intestinal disorders	82	409	0.80
Hepatic disorders	40	182	0.78
Urogenital disorders	24	107	0.78
Tonic and immune power	21	91	0.78
Antipoisonous and bites	4	12	0.73
Anticancer	11	33	0.69
Oral and dental disorders	28	78	0.65
Opthalmological disorders	18	35	0.50
Cardio vascular disorder	3	5	0.50

Table 4. Fidelity level of the ailments category for highest ranked species

Ailments	Name of plants used	Ip	Iu	FL
Anticancer	*Taxus mairei* (Lemee & H.Lév.) S.Y.Hu	23	24	95.83
Antipoisonous and bites	*Zanthoxylum armatum* DC.	5	72	6.94
Cardio vascular disorders	*Allium cepa* L.	1	3	33.33
	Allium sativum L.	1	8	12.50
Dermatological issues and cuts	*Ageratina adenophora* (Spreng.) R.M.King & H.Rob.	164	167	98.20
	Aloe vera (L.) Burm.f.	119	142	83.80
Fever and headache	*Picrasma quassioides* (D.Don) Benn.	117	232	50.43
	Swertia angustifolia Buch.-Ham. ex D.Don	87	106	82.08
Gastro intestinal disorders	*Bergenia ciliata* (Haw.) Sternb.	65	204	31.86
	Astilbe rivularis Buch.-Ham.	55	180	30.56
Gynecological disorders	*Bergenia ciliata* (Haw.) Sternb.	94	204	46.08
	Astilbe rivularis Buch.-Ham.	89	180	49.44
Hepatic disorders	*Cuscuta reflexa* Roxb.	54	57	94.74
	Berberis asiatica Roxb. ex DC.	23	31	74.19
Miscellaneous	*Urtica dioica* L.	67	237	28.27

	Picrasma quassioides (D.Don) Benn.	40	232	17.24
Oral and dental disorders	*Solanum aculeatissimum* Jacq.	15	16	93.75
	Syzygium aromaticum (L.) Merr. & L.M.Perry	9	10	90.00
Otorhinolaryngologic disorders	*Acorus calamus* L.	47	81	58.02
	Chrysojasminum humile (L.) Banfi	43	137	31.39
Respiratory disorders	*Curcuma longa* L.	35	72	48.61
	Artemisia indica Willd.	31	141	21.99
Skeletomuscular disorders	*Urtica dioica* L.	143	237	60.34
	Osyris lanceolata Hochst. & Steud.	138	142	97.18
Tonic and immune power	*Bergenia ciliata* (Haw.) Sternb.	37	204	18.14
	Astilbe rivularis Buch.-Ham.	31	180	17.22
Urogenital disorders	*Cirsium wallichii* DC.	57	156	36.54
	Centella asiatica (L.) Urb.	19	52	36.54
Opthalmological disorder	*Cynoglossum zeylanicum* (Vahl) Thunb. ex. Lehm.	7	19	36.84

Sustainable harvest and use of plant resources

The medicinal plants reported from the study area had a variety of uses for health benefits and medical care. Such plant diversity should be conserved and used sustainably to ensure its availability for future generations. Unsustainable harvesting, overexploitation, deforestation, habitat destruction, and grazing are major factors contributing to the decline in medicinal plant populations in the current situation (Bhattarai *et al.* 2006; Kunwar & Bussmann 2008). It is crucial to consider which parts to harvest and in what quantities. Unsustainable harvesting of roots and rhizomes can threaten the population of species. Therefore, harvesting these parts should be strictly minimized. However, not all species are affected by harvesting pressures in the same way (Van Andel & Havinga 2008). Species may be affected by the factors such as their distribution range, plant habitat, and habitat specificity. Given the significant diversity of medicinal plants, their conservation is integral to the overall conservation of plant biodiversity. Therefore, conservation strategies and initiatives for medicinal plants at both national and local levels should be designed and implemented rigorously.

Conclusion

The present study has documented 227 medicinal plant species used by the local inhabitants of Bethanchowk Rural Municipality for their primary health care. The plant species such as *Ageratina adenophora, Cuscuta reflexa, Urtica dioica,* and *Aloe vera* were the most reported species to treat specific ailments. The locals had used medicinal plants in a variety of applications, and decoction was used frequently among them. Herbs were the most used medicinal plants, and leaves were used in the highest frequency among the plant parts. There was no significant difference in the knowledge of medicinal plants possessed and the number of plants described by the genders, and the age of respondents was not a strong predictor for plants described. Therefore, such traditional knowledge must be documented that could inspire the younger generation to follow the traditional medicinal practice. Such studies may contribute to the Nobel drug discovery in the medical field.

Declarations

List of abbreviations: KATH - National Herbarium and Plant Laboratories, DPR - Department of Plant Resources, ICF - Informant Consensus Factor, FL - Fidelity Level, C - Cultivated, W - Wild

Ethics approval and consent to participate: The development of the study followed the ethical and legal guidelines for the development of research on traditional knowledge.

Consent for publication: All participants gave oral prior informed consent when provided with the questionnaire form to gather ethnomedicinal knowledge.

Availability of data and materials: Not applicable

Competing interests: The authors declare to have no any conflict of interest

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Author contributions: NNM, SC and DPG conceptualized, designed the study; NNM, SN and SC collected and analyze data; NNM, SC, SLS, WZ and DPG revised the manuscript; NNM and SC prepared first draft and NNM, SC, DPG and WZ finalize the manuscript.

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