Research Article

Indigenous Knowledge of Medicinal Plants Used by the Tribal Communities of Hasham Valley, District Dir Lower, Khyber Pakhtunkhwa, Pakistan

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Abstract | The study was conducted to investigate the ethnobotanical information of plants used by people and the relationship of plants with the people of Hasham Valley. The field survey was conducted in 2021 to document the ethno-medicinal importance of plants, folk recipes, mode of utilization, and mode of administration of local inhabitants of Hasham Valley. Data collection includes observations, transect walks, and interviews from the local population regarding existing ethno-medicinal practices. The inhabitants of the area were interviewed during different months of 2021. The participatory and qualitative data were obtained through Questionnaires concerning the resources of the plant and its utilization. Information on plant utilization, mode of administration, demand, quality, and quantity was recorded. The current study documented a sum of 55 plant species belonging to 36 genera and 34 families. The dominant family was Rosaceae with 7 species (8.23%) followed by Poaceae with 6 species (7.05%). Lamiaceae and Asteraceae with 5 spp. each (5.88%), Solanaceae, Myrtaceae, Fabaceae, Moraceae, and Brassicaceae each have 4 species (4.70%). Apiaceae, Caryophylaceae, Amaryllidaceae, Euphorbiaceae, Rutaceae, Polygonaceae, Pinaceae, and Cupressaceae each have 2 spp. (2.35%) and the remaining 21 families have 1 spp. (1.17%) each family. Out of 55 plant species, 33 are herbs (60.58%), 15 are trees (34.11%), and 7 are shrubs (15.29%). Based on disease treated Rosaceae show dominancy followed by Poaceae, Lamiaceae, Asteraceae, Solanaceae, Myrtaceae, Fabaceae, Moraceae, Brassicaceae, Apiaceae, Caryophylaceae, Violaceae, Scrophulariaceae, Plantaginaceae, Fumariaceae, Sapindaceae, Juglandaceae, Chenopodiaceae, Oleaceae, Simaroubaceae, Cactaceae, Platanaceae, Malvaceae, Meliaceae, Papilionaceae, used for multipurposes like, Diarrhea, Dysentery, Analgesic, Antispasmodic, Carminative, Febrifyge, Cancer, Astringent, Emollient, Antiasthmatic, Anthelmintic, Tonic, Diuretic, Toothache, Stimulant and Stomachach etc. The dominant treated disease is diarrhea (11.76%) followed by tonic (9.41%), diuretic (9.41%), dysentery (8.23%), stimulant (7.05%), abdominal pain (7.05%), stomachach (5.88%), refrigerant and blood purifier (5.88%), carminative (4.70%), antiasthmatic (4.70%), astringent (4.70%), emollient (4.70%), analgesic (3.52%), antispasmodic (3.52%), cancer (3.52%), antirheumatic (3.52%), anthelmintic (3.52%), Febrifyge (2.35%), toothache (1.176%) (Table 4.8-4.26).

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Introduction

Lower Dir is located in the Malakand Division at 34°30'10.95"N latitude and 71°54'16.43"E longitude, covering a total area of 1,583 sq. km (Khan *et al*., 2018). It is bordered by Swat to the east, Bajaur to the west, Afghanistan to the northwest, Upper Dir to the north, and Malakand to the south. The district is subdivided into six Tehsils and 37 Union Councils, with a terrain characterized by hills and mountains that are part of the southern Hindu Kush range. The region's lower valleys, including Timergara, Medan, Jandool, and Chakdara, support a significant portion of the local population (Shuaib *et al*., 2019). The dominant language is Pashto, and most inhabitants belong to the Izazai and Ismail Zai tribes (Ahmad *et al*., 2021). The district experiences a temperate climate, with temperatures ranging from a minimum of 2.39°C to a maximum of 11.22°C (Muhammad *et al*., 2021). Snowfall occurs in winter, while May and June are typically the hottest months (Subhan *et al*., 2024).

Agriculture is the primary livelihood in Lower Dir, with over 85% of the population directly or indirectly dependent on it (Ali *et al*., 2017). Due to the region's remoteness, residents have historically relied on traditional knowledge of medicinal plants for healthcare. Ethnobotany, which examines the relationship between plants and human societies, plays a crucial role in preserving this indigenous knowledge (Zeb *et al*., 2022; Ullah *et al*., 2024a). Despite advancements in synthetic medicine, medicinal plants remain widely used for treating various ailments, especially in rural areas where modern healthcare facilities are limited (Ali *et al*., 2022).

Although ethnobotanical studies have been conducted extensively in Pakistan, there is a lack of comprehensive documentation specific to Lower Dir (Hassan *et al*., 2014). Given its unique geographical location, diverse flora, and rich cultural heritage, this region holds untapped potential for discovering novel medicinal plant applications (Shuaib *et al*., 2016; Ullah and Shakir, 2023). Previous studies have focused on broader ethnobotanical surveys across Khyber Pakhtunkhwa; however, few have explored the specific medicinal plant knowledge of Lower Dir's indigenous communities (Ajaib *et al*., 2021; Ullah *et al*., 2023). This study aims to fill this gap by documenting and analyzing the traditional medicinal plant usage in the region, thus contributing to the preservation of local ethnobotanical knowledge and supporting sustainable resource management (Samreen *et al*., 2021).

Ethnobotanical studies are crucial in identifying plant-based treatments for diseases such as cancer, infections, and autoimmune disorders (Hayat *et al*., 2023). Approximately 80% of the world's population relies on traditional medicine for primary healthcare (Sher and Hussain, 2009). The increasing demand for herbal medicines necessitates further exploration of local plant species and their potential applications in modern medicine (Sher *et al*., 2012; Ullah, 2017).

There are various methods of cultivation and extraction used by the local people the increase the yield of medicinal plants and their derived medications (Sahar and Ali, 2024). The area is correlated with the production of disease-resistant plants, which are made vital for the production of medicinal plants (Irshad *et al*., 2016). Factuality showed that synthetic and chemically produced medicines have the potential to cause side effects on the body, therefore, people prefer the naturally obtained constituents due to fewer lateral effects (Bibi *et al*., 2022). Owing to the usage of therapeutic plants by the local Hakeem and due to the efficiency of curing the disease, pharmaceutical

companies are emerging to obtain certain active potential from the plant, to convert them into modern fields (Din *et al*., 2024).

Adjacent to our studied area, previously a study had been conducted from Sheringal Valley, district Upper Dir, and documented 62 medicinal plants belonging to 34 families (Akhtar *et al*., 2016). The number of medicinal plants decreased due to the high marketing rate, unwanted uses, and also dependency on medicinal plants. But despite that, the district of Lower Dir has a rich diversity of medicinal plants (Ibrar *et al*., 2015; Sajid *et al*., 2023). By documenting traditional knowledge in Lower Dir, this study aims to provide a foundation for future research in pharmacology, ecology, and conservation, ensuring that valuable ethnobotanical knowledge is preserved for generations to come (Haq *et al*., 2023).

Materials and Methods

The present research work was carried out by a field survey of the area of Hasham Munda Dir Lower Khyber Pakhtunkhwa. The following methods were used during research work.

Data collection

The traditional knowledge of medicinal plants has been transferred orally from generation to generation by the people of the district of Lower Dir, Khyber Pakhtunkhwa, Pakistan, therefore, the area was enriched with traditional knowledge. The present study was based on the traditional knowledge of therapeutic plant species of the area. The presented study was conducted from 2021 to 2022, and the areas were investigated based on the localities, viz. Munda, Gusam, Musabad, Dando shah, Guder valley and Rhaimabad. All the informants were randomly interviewed with the help of a questionnaire, and the data were analyzed based on statistical indices. During data collection, the preference was mostly given to older people, Hakeem, women, and farmers because they had diverse knowledge (Khanum *et al*., 2024; Ullah *et al*., 2023). The plants were collected, and the photographs were captured at the sites of their natural habitat, then preserved in the dried form on the herbarium sheets and identified with the help of plant taxonomists and also with the Flora of Pakistan. For future reference, the accession numbers were allotted to each specimen and shifted to the herbarium of the Ghazi Umara Khan Degree College, Samarbagh Dir Lower, Khyber Pakhtunkhwa, Pakistan.

Quantitative data analysis

The collected data were statistically analyzed using various indices, using the informants of the residential area and previous citations. The indices showed homogeneity of data and their particular usage for a particular disease.

Use value (UV)

UV classifies the virtual significance of each medicinal taxa with the help of informants' reporting frequencies. UV was calculated by using the formula (Gairola *et al*. 2013; Savikin *et al*. 2013).

$$UV = \sum Ui/N$$

Where Ui is the entire sum of use reports of each therapeutic taxa; N indicates the sum of informants cited for a specific therapeutic plant.

Fidelity level (FL)

FL index was used for calculating the percentage of the informants of a particular therapeutic taxon for a specific disease. FL was determined by using the formula of (Wali *et al*., 2021; Ullah *et al*., 2021a).

$$FL = Np/N \times 100$$

Where Np is the entire sum of all informants quoting the specific species for a particular disorder, and N is the quantity of cited plants for any ailments (Leto *et al*., 2013).

Relative frequency of citations (RFCs)

RPL value is indexed to point to the resident importance of each taxon based on the informants and previous citation. The value was determined with the formula of (Vitalini *et al*., 2013; Ullah *et al*., 2021b).

$$RFC = Fc/N$$

"RFC" indicates the number of informants who cited the use of each medicinal plant. "N" represents the number of medicinal plants in the given area.

Rank order priority (ROP)

ROP is indexed from the origination FL and RPL values and approaching the ranking of the therapeutic plant. The frequencies resulted from using the formula below (Vitalini *et al*., 2013).

$$ROP = FL \times RPL$$

Relative popularity level (RPL)

RPL indexed the ratio among the ailments which treated by a specific therapeutic plant, and with the sum of all the frequencies of informants. Relative popularity level resulted in values between the '1' and '0' with a complete popularity level, and the zero value indicated no ailments which treated by plants (Kadir *et al*., 2012).

Informant's consensus factor (ICF)

The informant consensus factor was used to determine the consensus, and the number of informants reported the plants for various ailments. ICF was calculated with the suggested formula (Khan *et al*., 2021).

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

Where "Nur" refers to the total number of use reports for each ailment category and "Nt" indicates the number of taxa which used in that category. The ICF index results the frequency range from zero to one.

The high frequency indicates the well-adapted classes of taxa that cure a specific category of ailments, and low frequency close to zero indicates disagreement of informants over the taxon use for specific ailment category (Gazzaneo *et al*., 2005).

Jaccard index (JI)

A comparison of published literature with our findings was conducted to examine the correlation between the data from published literature and the present study. For the comparison of data, JI frequency was indexed using the following formula (González-Tejero *et al*., 2008; Ullah *et al*., 2019).

$$JI = c \times 100 / (a + b - c)$$

In the formula, "a" represents the number of taxa in the area (A) with the same use and also with different use, while "b" represents the number of taxa in area (B) with the same use and also with different use. However, the "c" is indicating the commonness of a taxon in both areas in (A) and (B), with the same use and with different uses.

Results

In the present research work, we carried out the Ethnobotanical study of Hasham Valley Dir Lower Khyber Pakhtunkhwa Khwa Pakistan. We collected 55 species of medicinal plants belonging to different families. The best represented used families in terms of the number of species were Lamiaceae (four species) and Polygonaceae (three species), while Amaranthaceae, Apiaceae, Ranunculaceae, Rhamaceae, Rosaceae, Rutaceae, and Solanaceae were represented with two species each, and other families with one species each. We collect valuable information on Ethnobotanical plants from the local people because there is a rich diversity in the area, and they are utilized by the local inhabitants as a source of herbal and ethnomedicinal uses. In the case of medicinal plants were used singly or in mixtures by local inhabitants (Siraj *et al*., 2018). Interviews were conducted in Different villages, and plants were collected, dried, preserved, and pasted on standard herbarium sheets, and relevant information was documented in a field notebook. Relevant information was taken from various tribes, viz. Gujjar, Tajik Mast hail, etc. Aged people were interviewed, especially former Teachers, and Hakeems. The results of the present study would be useful in providing baseline information to coming researchers limited work has been done in the research area. The data was recorded using an open structured questionnaire. The results consist of 55 species that belong to different families. People used plants for such purposes as construction, vegetables, fuel, and fodder purposes while medicinal uses for skin disease, Blood Pressure, Respiratory Tract Infection, Urinary Tract Infection, and heart disease, etc.

Demographic features of informants

A total of 38 participants were interviewed, and the contributing informants had ages ranging from 38 to 68 years old. Amongst them, 25 were men (63.89%) and 13 (36.11%) were women participants (Table 1). In 13 women the 7 (19.44%) were housewives, while 2 (5.55%) were Midwives, and 6 women (11.11%) were pregnant. According to qualification, a maximum number 19 (52.77%) informants were illiterate, while 6 (16.66%) had primary education. The 8 informants (22.22%) had Matric and the 3 informants (8.33%) had a higher secondary qualification. Major occupations of the 13 informants (36.11%) were hakeems, and 14 (38.88%) were farmers, while 7 informants (19.44%), as mentioned above, were housewives and 2 informants (5.55%) were job holders. The survey also had informants from ethnic groups, of which 23 informants (58.33%) were cow

grazers and 15 informants (41.66%) were goat grazers interviewed (Table 1). A similar way of methodology was previously assessed by (Gedif and Hahn, 2003; Giday *et al.*, 2009) (Table 1).

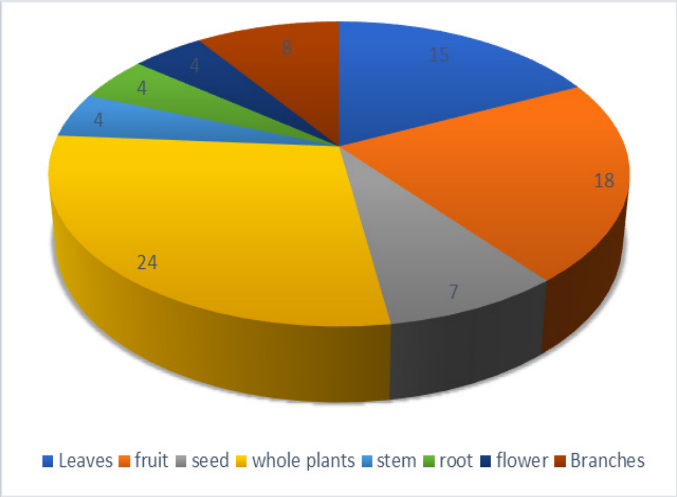

Figure 1: *Representation of ethnobotanical plant parts used.*

Table 1: *Demographic features of the informants of the district Lower Dir, Pakistan.*

Informants	Demographic information	Total	Percentage
Gender	Men	25	63.88%
	Women	13	36.11%
Categories	Traditional healers	19	52.77%
	Indigenous people	11	30.55%
	Pregnant women	4	11.11%
	Midwives	2	5.55%
Age groups	36-45	8	22.22%
	47-55	16	44.44%
	57-65	7	19.44%
	67 and above	5	13.88%
Educational qualification	Illiterate	23	52.77%
	Primary	6	16.66%
	Metric	7	22.22%
	Secondary	4	8.33%
Occupation	Hakeems	12	36.11%
	Farmers	13	38.88%
	Housewives	6	19.44%
	Job holders	3	5.55%
Religion	Muslim	37	97.22%
	Sikh	1	2.77%
Ethnic group	Cows' grazer	22	58.33%
	Goats' grazer	16	41.66%

Whole plants a significant portion, accounting for 24%, is used showed in Figure 1. This indicates that in ethnomedicine, there is a preference for using the entire plant, likely due to the belief in holistic healing properties or the synergistic effects of different plant components. Leaves, with a utilization rate of 15%, play a prominent role in ethnomedicinal practices. They are often used for their therapeutic properties, which may include anti-inflammatory, antimicrobial, or analgesic effects. Fruits contribute to ethnomedicinal practices with an 8% usage rate. They may be utilized for their nutritional value, as well as for treating various ailments due to their rich content of vitamins, minerals, and phytochemicals. Seeds are utilized at a rate of 7% in ethnomedicine. They are often valued for their medicinal properties, which may include promoting digestion, enhancing immunity, or alleviating specific health conditions. Branches, with an 8% usage rate, may be used in ethnomedicine for their medicinal properties, such as anti-inflammatory or analgesic effects. They might also be used for preparing decoctions or poultices. Stems, Roots, and Flowers: While stems, roots, and flowers each have a utilization rate of 4%, they still play a role in ethnomedicinal practices. These plant parts may be used for treating specific ailments or as ingredients in traditional remedies, often based on cultural beliefs and indigenous knowledge showed in Table 3 and 7.

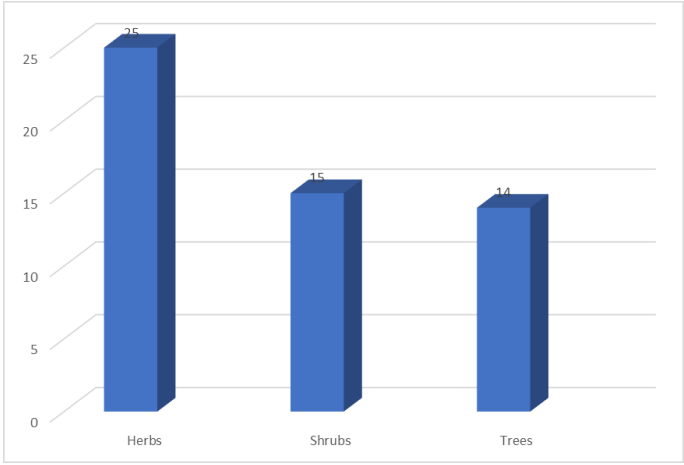

Figure 2: *Medicinal plants life form of the study area.*

Herbs cover 25% of the research area, herbs are the most prevalent plant type. Herbs typically refer to non-woody plants with green and tender stems, and they often play a significant role in various fields such as traditional medicine, culinary uses, and landscaping. Shrubs account for 15% of the research area. Woody stems characterize shrubs and are shorter in height compared to trees. They are commonly used in landscaping, providing ornamental value, habitat for wildlife, and sometimes medicinal or

aromatic properties. Trees cover 14% of the research area. Trees are woody plants with a single main stem or trunk, typically characterized by their height and canopy structure. They are integral to ecosystems, providing oxygen, habitat for wildlife, shade, and various resources such as timber, fruits, and medicinal compounds showed in Figure 2.

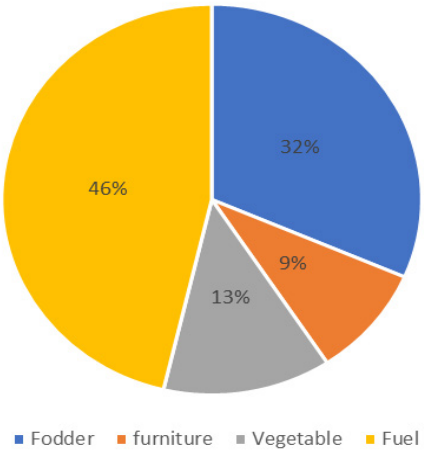

Figure 3: *Plant and their use categories.*

Fodder (32%), Plants utilized for fodder represent a significant portion of the usage, indicating their importance in feeding livestock and supporting agricultural activities. These plants are likely selected for their nutritional value, palatability, and suitability for animal consumption. Furniture (9%), While a smaller percentage, plants used for furniture still play a role in providing raw materials for crafting wood-based products. These plants are likely selected for their wood quality, durability, and aesthetic appeal, contributing to the furniture industry. Vegetables (13%), Plants used for vegetables represent another significant portion, suggesting their importance in providing nutritious food for human consumption. These plants include various vegetables cultivated for their edible parts, such as leaves, stems, roots, or fruits, and they contribute to dietary diversity and food security. Fuel (46%), Plants used for fuel constitute a substantial portion, indicating their role in providing energy for cooking, heating, and other purposes. These plants are likely selected for their combustible properties, availability, and sustainability as renewable sources of energy showed in Figure 3.

Use value (UV)

The use value was used to recognize the plants that were widely used amongst indigenous communities for various ailments. In the present study use value (UV) of ethnomedicinal plants species ranged from (0.85) to (0.001); the highest value reported were of *Punica granatum* and *Vitis vinifera* each (0.85), followed by *Ammi visnaga* (0.8), *Berberis vulgaris* (0.75), *Citrus aurantium* (0.76), *Prunus armeniaca* and *Rosa indica* each (0.6), *Berberis calliobotrys* (0.55), *Rosa webbiana* (0.56), *Plantago major* (0.40), *Papaver somniferum* (0.20), *Plectranthus rugosus* (0.33), Citrus *medica* and *Pistacia integerrima* each (0.25). The species with the lowest values were *Querus incana* (0.001), *Rheum austral* (0.003), *Digitalis purpurea* (0.01), *Morchella esculenta* (0.02), *Ajuga bracteosa*, *Eucalyptus globulus,* and *Lepidium sativum,* each with (0.03) (Table 2 and Figure 5). Figure 4 showed the texon, families and total genera of the Hasham valley.

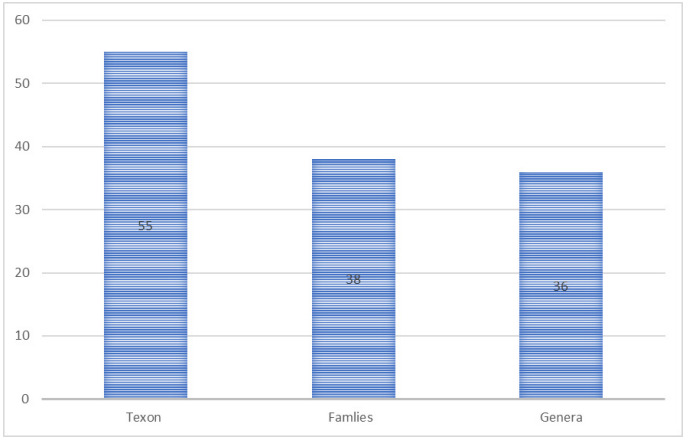

Figure 4: *Number of Taxa, genera, and families in Lower Dir, Pakistan.*

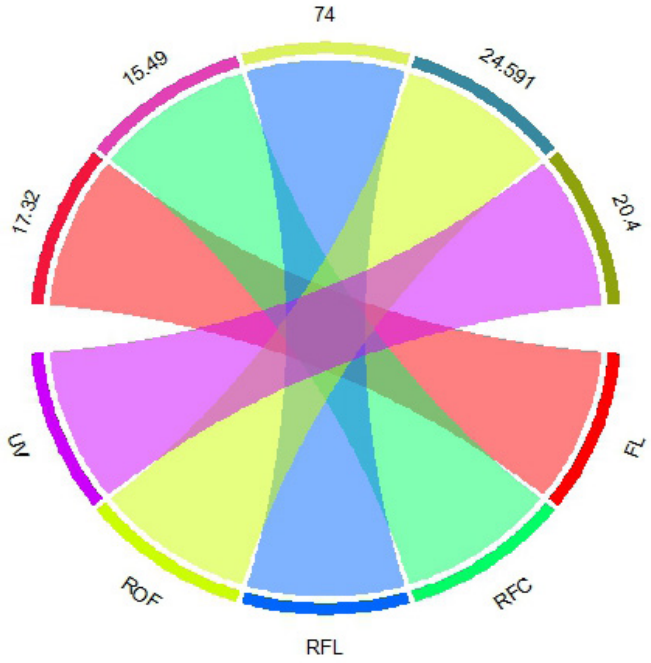

Figure 5: showed *use value, fidelity level, rank order priority, relative frequency citation, relative popularity level, informant consensus factor, and Jaccard index Lower Dir, Pakistan.*

Table 2: *Medicinal plants used by the tribal communities of Hasham Valley, District Dir Lower, Khyber Pakhtunkhwa, Pakistan.*

S. No	Botanical name	Local plant	Family	Habit	Locality	Parts used	Medicinal uses	FL	ROF	RFC	RFL	UV
1	*Euphorbia heloiscopia*	Mand-daro	Euphor-biaceae	H	Samar Bagh	leaves and roots	widely used by countries to treat different disease conditions, such as ascites, edema, Tuberculosis, Scabies, and lung cancer.	0.1	0.5	0.25	1.5	0.5
2	Calotropis procerea	Spulmay	Asclepi-adaceae	Shrub	Tatar	Latex and Root	effective in treating skin, digestive, respiratory, circulatory, and neurological and was used to treat fever and diarrhea.	0.05	0.5	0.15	1.5	0.3
3	Cori-andrum sativum	Dania	Apiace-ae	Herb	Tatar	Leaves, Fruit	for digestion problems, including upset stomach, loss of appetite, hernia, nausea, diarrhea, bowel spasm, and intestinal gas. It is also used to treat measles, hemorrhoids, toothaches, as well as infections which is caused by bacteria and fungus.	0.2	0.22	0.35	1.3	0.7
4	Brassica campestris	Sharrsh-am	Brassi-caceae	Shrub	Badin	Leaves and Seed	The amount is boiled thoroughly, slightly cooled, and applied to a place with rheumatic pain.	0.33	0.9	0.01	1.2	0.09
5	Zizyphus Jujube	Berra	Rham-naceae	Tree	Samar Bagh	Stems, fruits branches and leaves	It is used for improving muscular strength and weight, for preventing liver and bladder disease and stress ulcers, and as a sedative.	0.11	0.17	0.37	1.21	0.9
6	Sajaretia Brongnt-hea	Maman-rra	Rham-naceae	Tree	Sarlarra	Whole plant	Asthma, urinary, anemia, skin, and pain, disease.	0.04	0.96	0.19	1.6	0.35
7	Zanth-oxylum armatum	Dam-bara	Ruta-ceae	Tree	Samar Bagh	Seeds, bark, and fruit	It is used to treat Asthma, Bronchitis, Cholera, fever, Rheumatism, and skin disease. The fruit and seeds are employed as an aromatic tonic in fever, as well as respiratory and digestive diseases.	0.4	0.4	0.46	1.5	0.1
8	*Ricinus communis*	Aranda	Euphor-biaceae	Shrub	Tatar	Seed and Leaves	Communes have been widely used in traditional medicine, such as abdominal disorders, arthritis, backache, muscle pain, and also for insomnia.	0.7	0.13	0.23	1.2	0.03
9	Oxalis corniculata	Tarukey	Oxali-daceae	Herb	Khazana	Entire Plant	It is used in the treatment of influenza, fever, urinary tract infection, enteritis, diarrhea, traumatic injuries, sprain, and poisonous and also used for snake bites. An infusion can be used as a wash to rid children of hookworms. The plant is used as an antiscorbutic in the treatment of scurvy.	0.06	0.62	0.5	1.5	0.14

Table continues on next page.....

S. No	Botanical name	Local plant	Family	Habit	Locality	Parts used	Medicinal uses	FL	ROF	RFC	RFL	UV
10	Platanus oriantalis	Chinar	Plantan-aceae	Tree	Lekorr Kambat	Leaves and Bark.	The fresh leaves are bruised and the eye in the treatment of ophthalmic. A decoction is used to treat dysentery, and a cream made from the leaves is used to heal wounds and chilblains. Antipyretic, analgesic, anti-inflammatory, and urinary disease.	0.85	0.50	0.9	1.07	0.2
11	Mentha arvensis	Pudina	La-miaceae	Shrub	Hasham	Entire Plant	A tea made from the leaves has traditionally been used in the treatment of fever, headache, digestive disorder, and various minor ailments skin, abdominal pain, and to relieve stomach acidity.	0.7	0.50	0.85	1.7	0.4
12	Micromer-ia biflora	Kashm-aly	La-miaceae	Herb	Baroda	Vegetative parts	The plant is rubbed and the aroma inhaled to treat nosebleeds. To treat the wound. The juice of the plant is taken internally and also inhaled in the treatment of sinusitis, antioxidant analgesic, arthritis, and also used for skin and antipyretic disease.	0.8	0.3	0.45	1.08	0.1
13	Mentha longifolia	Venally	La-miaceae	Herb	Khazana	Entire Plant	It is mainly used for respiratory ailments, but many other uses have also been recorded. It is mostly coughs, colds, stomach problems, asthma, indigestion, and headache.	0.11	0.45	0.49	1.11	0.8
14	Acacia modesta	Palousa	Mi-mosace-ae	Tree	Ali sher	Entire Plant	It has been used to treat leprosy, wounds, dysentery, venereal disease, cough, body weakness, and also used for bacterial infection.	0.2	0.12	0.2	1.12	0.1
15	Deutura innoxia	Batura	Solan-aceae	Shrub	Chamar-taly	Entire Plant	All parts of the plant are anodyne, antispasmodic, and narcotic. It has been used in the past as a painkiller and also in the treatment of insanity.	0.25	0.70	0.03	1.14	0.6
16	Ajuga bracteosa	Gooti	La-miaceae	Herb	Kambat	Entire Plant	It is credited with astringent, febrifugal, stimulant, aperient, tonic, diuretic, and depurative properties and is used for the treatment of gout and rheumatism, antioxidant, antipyretic, and for chest disease.	0.35	0.21	0.03	1.16	0.1
17	Dodonaea viscosa	Ghwar-rasky	Sapin-daceae	Shrub	sadrbarkay	Bark and leaves	It is a traditional medicine worldwide, administered orally or as a poultice to treat a great variety of ailments. Stem or leaf infusions are used to treat sore throats, Antimicrobial, wound Healing, and antioxidant.	0.2	0.70	0.03	1.22	0.9

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S. No	Botanical name	Local plant	Family	Habit	Locality	Parts used	Medicinal uses	FL	ROF	RFC	RFL	UV
18	Allium cepa	Peyaz	Liliaceae	Herb	munda	Leaves juice	Products containing onion are used to treat scars; they also relieve itching secondary to allergy. In homeopathy, Allium cepa is used for rhinorrhea and fever. Onions are believed to be effective in diabetes.	0.25	0.30	0.03	1.13	0.5
19	Debregeasia saneb	Karwarra	Urticaceae	Shrub	Sharrkorr	Fruits and leaves	They are used for Abdominal pain, blood purification	0.6	0.34	0.03	1.19	0.05
20	Fumaria indica	Shatara	Fumariaceae	Herb	Baloda	Entire plant	It is used in the Unani system of medicine, which is used for Skin, urinary disease, cough, and coughing.	0.13	0.31	0.03	1.18	0.7
21	Citrus medica	Limbo	Rutaceae	Shrub	Kambat	Fruit	Fruits and fuel	0.53	0.90	0.70	1.36	0.1
22	Verbascum Thapsus	Khurdug	Schrophulariaceae	Herb	Rahim Abad	Flower and leaves	It has been found in roadside, meadows, and pasture land, which has been used to treat pulmonary problems, inflammatory disease, asthma, and spasmodic coughing.	0.4	0.45	0.30	1.28	0.5
23	Olea ferruginea	Khona	Oleaceae	Tree	Khazana	Leaves, bark and fruits	The leaves of the plant are used for upper Respiratory Tract infection. Also used for Toothache and skeletal disorders.	0.4	0.56	0.03	1.45	0.55
24	Quercus incana	Serray	Fagaceae	Tree	Baloda	Leaves bark, and seed	Galls are produced on the tree and are strongly astringent and can be used in the treatment of hemorrhage, chronic diarrhea, dysentery, and for indigestion. Seeds are used in the treatment of diarrhea and for menorrhagia.	0.9	0.23	0.20	1.47	0.75
25	convolvulus arvensis	Perwathy	Convolvulaceae	Herb	Chamartaly	Whole plant	The plant is used to treat dandruff in different hair shampoos, as a purgative, and also used for dysentery. A cold tea made from the leaves is a laxative for diabetics.	0.15	0.4	0.05	1.18	0.06
26	Pinus roxburghii	Nakhtar	Pinaceae	Tree	Munda	Resin	intestinal antiseptic, antioxidant, and also used for back pain.	0.21	0.15	0.06	1.34	0.05
27	Myrtus coumminus	Manrro	Myrtaceae	Shrub	Sharrkorr	Aerial parts and leaves	This plant is used for the treatment of several diseases like gastric ulcers, diarrhea, dysentery, cancer, and deep sinuses.	0.39	0.59	0.55	1.28	0.13
28	Cedrus deodara	Diyar	Panaceae	Tree	Khazana	Whole plant	The heartwood is carminative, diaphoretic, and diuretic. A decoction of the wood is used in the treatment of fever, flatulence, and pulmonary and urinary disorders. It is also used as an antidote to snakebites.	0.55	0.45	0.26	1.87	0.1
29	Monotheca buxifolia	Gwargora	Sapotaceae	Tree	Sharrkorr	Stem branches and fruits	Used as a hematinic, laxative, antipyretic, and in the treatment of gastro-urinary disorders.	0.6	0.9	0.48	1.33	0.4

Table continues on next page.....

S. No	Botanical name	Local plant	Family	Habit	Locality	Parts used	Medicinal uses	FL	ROF	RFC	RFL	UV
30	Ficus carica	Inzar	Moraceae	Tree	Samar Bagh	Latex and fruits	It has fruit, and fruit has many medicinal benefits, such as digestive disorders, Hemorrhoids, and anti-cancer etc. Roots and leaves of the plant are used in gastrointestinal (colic, indigestion, loss of appetite).	0.03	0.53	0.40	1.82	0.3
31	Nerium oleander	Ganderi	Apocynaceae	Shrub	Ali sher	Bark and roots	It has potent cardiotonic activity, abortion, and diabetes. Skin problems occur when applied to the skin.	0.2	0.5	0.09	1.48	0.9
32	*Indigofera articifolia*	Ghwareja	Papilionaceae	Shrub	Kambat	Seed leaves and root	They are used as painkillers for toothache, gastric pain, respiratory disease, diarrhea, and for wound healing.	0.7	0.40	0.41	1.30	0.2
33	*Amaranthus viridis*	Chorli/ chalwai	Armanthaceae	Herb	Badin	Whole plant	used for the treatment of fever, pain, asthma, and diabetes, and is also used for urinary and liver disorders.	0.2	0.35	0.15	1.38	0.6
34	Allium sativum	Ougah	Amaryllidaceae	Herb	Kambat	Whole plant	applied on nails and ground with teeth to decrease High blood pressure. It is also used to treat several ailments, including fever, diabetes, intestinal worms, and colic.	0.8	0.35	0.5	1.39	0.7
35	Cynodon dactylon	Kabal	Poaceae	Herb	Badin	Whole plant	The roots of Cynodon dactylon will be boiled, and then they're used for diarrhea. In the Homeopathic field, it's used to treat all types of bleeding and troubles.	0.09	0.35	0.10	1.37	0.2
36	Berberis lycium	Kwary	Berberidaceae	Shrub	Sharrkorr	Rhizome and Fruit	The roots of this plant are ground and after the grinding, it is used for mouth sores, also it is used for liver disease and nasal bleeding, male and female sexual disorders, and typhoid.	0.1	0.1	0.17	1.32	0.04
37	Juglans regia	Ghooz	Juglandaceae	Tree	BinShahi	Bark, Fruit, and leaves	This plant is used for Diarrhea, stomach, asthma, thyroid, and cancer, and also for endocrine diseases such as diabetes mellitus.	0.3	0.48	0.22	1.34	0.25
38	Ocimum bacilicum	Kashmaly	Lamiaceae	Herb	Samar Bagh	Complete Plant	It is an antioxidant and antibacterial. apply to the postulated place of the body.	0.6	0.48	0.22	1.40	0.10
39	Solanum nigrum	Karmacho	Solanaceae	Herb	Baloda	Complete Plant	Considered to be anti-tumorigenic, anti-oxidant, anti-inflammatory, Diuretic and antipyretic.	0.1	0.48	0.22	1.34	0.76
40	*Triticum aestivum*	Ghanam	Poaceae	Herb	Barchunay	Seed	Used for Anti-oxidant, wound swelling, colitis, Kidney malfunction, and Anti-Bacterial, as well as for hypoglycemia.	0.1	0.4	0.06	1.37	0.7
41	Momordica charantia	Karela	Cucurbitaceae	Shrub	Badin	Fruit	Fruit is bitter and acts as an anthelmintic in the stomach and is also used for sugar disease.	0.12	0.58	0.70	1.84	0.4

Table continues on next page.....

S. No	Botanical name	Local plant	Family	Habit	Locality	Parts used	Medicinal uses	FL	ROF	RFC	RFL	UV
42	*Fragaria vesca*	Groos	Rosaceae	Herb	Badin	Fruit	The roots are astringent and diuretic. And also used for diarrhea and chronic dysentery.	0.14	0.19	0.5	1.53	0.04
43	Viola odorata	Benafsha	Violaceae	Herb	Badin	Whole plant	It is used for insomnia, coughing, antipyretic, common cold, and headache, and also used for decreasing serum glutamic acid phosphatase (SGPT).	0.11	0.75	0.04	1.12	0.05
44	Geranium macrorrhizum	Sra zela	Geraniaceae	Herb	Badin	Whole plant	The source of Zdravetz oil is useful for baths in cases of nervous disorders, high blood pressure, rheumatism, and inflammations of the skin. It is a very good fixative in fragrances and is also used as a fixative in perfumery	0.13	0.8	0.02	1.14	0.6
45	Rubus occidentalis	Karwarra	Rosaceae	Herb	Badin	Fruit	The fruit has also been used for indigestion and rheumatism, and liver disease.	0.01	0.8	0.14	1.2	0.01
46	Populus alba	Speen supedad	Salicaceae	Tree	Tatar	Whole plant	It is used for arthritis, lower back pain, Urinary tract infection, digestive and liver disorders, anorexia, and also to reduce fevers and relieve the pain of menstrual cramps. Externally, the bark is used to treat chilblains, hemorrhoids, infected wounds, and sprains.	0.15	0.25	0.33	1.29	0.7
47	Rubus ellipticus	Bganna	Rosaceae	Shrub	Sharrkorr	Fruit	It is an antidiuretic, and its juices can also be used to treat coughing, fevers, colic, and sore throat.	0.12	0.3	0.13	1.15	0.09
48	Diervilla lonicera	Kathn	Caprifoliaceae	Shrub	Sharrkorr	Whole plant	It is an anti-diuretic; the bark is laxative and has ophthalmic uses.	0.8	0.3	0.11	1.17	0.3
49	Morus alba	Tooth	Moraceae	Tree	Samarbagh	Bark and fruit	Fruit is refrigerant in fever and used as a remedy for sore Throat, dyspepsia The bark is purgative.	0.14	0.61	0.32	1.88	0.6
50	Helianthus annuus	Nawar parast	Asteraceae	Herb	Barchunay	Seed	It is used for coughing, cold, and heart disease. Oil is used for Heart patients, not an increase cholesterol in the walls.	0.50	0.41	0.32	1.38	0.5
51	*Aloe vera*	Aspodelaceae	Kamal Panra	Herb	Sharrkorr	Gum	Gum is used for cellulitis, diabetes.	0.40	0.221	0.32	1.48	0.6
52	*Artemisia cina*	Asteraceae	Kirmala	Herb	Munda	Leaves	Leaves decoction is used as an anthelmintic for children.	0.27	0.1	0.06	1.12	0.25
53	*Artemisia kurramensis*	Asteraceae	Kirulnaan	Herb	Shalkanday	Leaves	Decoction leaves used as an anthelmintic	0.5	0.3	0.9	1.33	0.01
54	*Berberis nervosa* Roof	Berberidaceae	Kashml	Shrub	Hasham	Stem & root	Powders were used for stomach and mouth infections.	0.08	0.2	0.05	1.44	0.9
55	*Cannabis sativa* L.	Cannabaceae	Bang	Herb	Gusam	Leaves, flowers	Seeds used as anodyne and analgesic.	0.07	0.9	0.8	1.25	0.4

Fidelity level (FL)

The fidelity level of ethnomedicinal plants were ranged from (0.85) to (0.01), amongst them highest fidelity level were of *Allium cepa* (0.85), followed by *Allium sativum* (0.70), *Punica granatum* (0.68), *Papaver somniferum* and *Sonchus asper* each with (0.66), *Justica adhatoda* (0.65), *Morus alba* (0.62), *Mentha royleana* (0.61), *Morchella esculenta* (0.59), *Mentha piperita* (0.57), *Cannabis sativa* (0.55), *Pinus roxburghii* (0.54), *Berberis lycium* and *Solanum surattense* each with (0.53), *Micromeria perviflora* (0.51), and *Datura alba* with (0.5). Species with the lowest fidelity level (FL) were *Cucurbita maxima*, and *Ricinus communis,* each with (0.01), *Alnus nitida*, *Artemisia kuranensis*, *Carthamus oxycantha,* and *Chenopodium album,* each with (0.2) (Table 2 and Figure 5).

Rank order priority (ROP)

Rank order priority is the original index from the FL and RPL indices. ROP values ranged from 0.96 to 0.1. Highest value was recorded in *Acanthus ilicifolius* (0.96), followed by *Berberis lycium* (0.90), *Colchicum luteum* (0.75) *Artemisia cina* (0.7), *Datura innoxia* (0.61), *Brassica campestris* (0.59), *Mentha piperita* (0.68), while the lowest value was recorded in *Delphinium nordhagenii*, *Fumaria indica*, *Ferula asafoetida* each with (0.1), *Diospyros lotus* (0.2), *Verbena officinalis* (0.3), *Micromeria biflora* (0.4), *Lantana camara* (0.5), *Lagenaria siceraria* (0.7), *Eruca sativa* (0.8), *Dodonaea viscosa* and *Ephedra gerardiana* each with (0.9) (Table 2 and Figure 5).

Relative frequency citation (RFC)

Relative frequency citation represents the local importance of each species in the study area. It ranged from (0.15) to (0.90). The highest RFC value were recorded in *Allium cepa* with (0.9), followed by *Papaver somniferum* (0.86), *Foeniculum vulgare* and *Allium sativum* each with (0.85), *Mentha piperita* (0.8), *Coriandrum sativum* and *Berberis lycium* each with (0.7), *Juglans regia* and *Morus alba* each with (0.6), *Rosa indica* (0.56), *Brassica campestris* (0.55), *Aloe vera* (0.5), and *Ammi visnaga* with (0.49), while the lowest value was recorded for *Pinus wallichiana* with (0.31), *Cannabis sativa* (0.26), *Acacia modesta* 0.25), *Ajuga bracteosa* and *Solanum nigrum* each with (0.23), *Nerium oleander* and *Otostegia limbata* each with (0.21), and *Chenopodium album* with (0.15) (Table 2 and Figure 5).

Table 3: *Plants used for fuel purposes.*

S.	Local name	Botanical name	Family
1	Mandarro	*Euphorbia heloiscopia* L	Euphorbiaceae
2	Spulami	*Calotropis procerea* L	Asclepidiaceae
3	Berra	*Ziziphus jujube* Mill	Rhamnaceae
4	Aranda	*Ricinus communes* L	Euphorbiaceae
5	Baikand	*Justicia adhatoda* L	Acanthaceae
6	Batura	*Deutura innoxia* Mill	Solanaceae
7	Gooti	*Ajuga bracteosa* wall exbth	Lamiaceae
8	Ghwarrasky	*Dodonaea vicose* L	Sapindaceae
9	Karwarra	*Debregeasia saneb* F	Urticaceae
10	Shatara	*Fummaria indica* Hausskn	Fumariaceae
11	Limbo	*Citrus medica* L	Rutaceae
12	Khurdug	*Verbascum thapsus* L	Schrophulariaceae
13	Khona	*Olea ferruginea* Royle	Oleaceae
14	Serray	*Quercus ineama* Roxb	Fagaceae
15	Nakhtar	*Pinus roxberji serg*	Pinaceae
16	Diyar	*Cedrus deodara*	Pinaceae
17	Inzar	*Ficus cerica* (L)	Moraceae
18	Chorli	*Amaranthus viridus L.*	Armanthaceae
19	Ghwareja	*Indigofera articulate gouan* L	Papilionaceae
20	Ganderi	*Nerium oleander*	Apocynaceae
21	Perwathy	*convolvulus arvensis.*	Convulvulaceae
22	Kwary	*Berberis lyceum* L	Berberidaceae
23	Ghooz	*Juglans regia* Linn	Juglandaceae
24	Speen supedad	*Populus alba* L	Salicaceae
25	Kathn	*Diervilla lonicera*	Caprifoliaceae

Table 4: *Plants used as fodder.*

S.	Local name	Botanical name	Family
1	Dania	*Coriandrium sativum L.*	Apiaceae
2	Dambra	*Zanthoxylum armatum* DC	Rutaceae
3	Aranda	*Ricinus communes* L	Euphorbiaceae
4	Berra	*Ziziphus jujube* Mill	Rhamnaceae
5	Chinar	*Platanus oriantalis* L	Plantanaceae
6	Podina	*Mentha arvensis* L.	Lamiaceae
7	Tarukey	*Oxalis carniculata L.*	Oxalidaceae
8	Kashmaly	*Ocimum basilicum L.*	Lamiaceae
9	Momanra	*Sajaretia brongnthea*	Rhamanaceae
10	Palousa	*Acacia modesta*	Mimosaceae
11	Gooti	*Ajuga bracteosa* wall exbth	Lamiaceae
12	Karwarra	*Debregeasia saneb* F	Urticaceae
13	Shatara	*Fummaria indica* Hausskn	Fumariaceae
14	Serray	*Quercus ineama* Roxb	Fagaceae
15	Ghwareja	*Indigofera articulate gouan* L	Papilionaceae
16	Kach macho	*Solanum nigrum* Auct	Solanaceae

Relative popularity level (RPL)

The highest RPL value were observed in *Punica granatum* with (1.91), and *Papaver somniferum* (1.9), followed by *Datura innoxia* (1.88), *Cannabis sativa* (1.87), *Coriandrum sativum* (1.84), *Foeniculum vulgare* (1.79), *Ephedra gerardiana* (1.77), *Pinus wallichiana* (1.76), *Justicia adhatoda* (1.74), and *Solanum surattense* with (1.59), whereas the lowest value was recorded in *Oxalis corniculata* with (1.1), followed by *Pyrus pashia* (1.09), *Rheum australe* (1.04), *Cucurbita maxima* (1.2), and *Otostegia limbata* with (1.0) (Table 2 and Figure 5).

Table 5: *Plants used as furniture.*

S.	Local name	Botanical name	Family
1	Ghooz	*Juglans regia* Linn	Juglandaceae
2	Diyar	*Cedrus deodara*	Pinaceae
3	Chinar	*Platanus oriantalis* L	Plantanaceae
4	Palousa	*Acacia modesta*	Mimosaceae
5	Speen supedad	*Populus alba* L	Salicaceae

Table 6: *Plants used as vegetables.*

S.	Local name	Botanical name	Family
1	Chorli	*Amaranthus viridis* L.	Armanthaceae
2	Ougah	*Allium sativum* L	Amaryllidaceae
3	Peyaz	*Allium cepa* L.	Liliaceae.
4	Venally	*Mentha longifolia* L.	Lamiaceae
5	Sharrsham	*Brassica campestris* L.	Brassicaceae
6	Karela	*Momordica charantia* Linn.	Cucurbitaceae
7	Bhindi	*Abeolescue esculents*	Malvaceae

Table 7: *Informant consensus factor of medicinal plants of the district Lower Dir, Pakistan.*

S.	Disease list	Number of uses reports	Number of use plants	ICF value
1	Abdominal pain	62	3	0.97
2	Respiratory disorder	70	20	0.85
3	Body cooling	78	6	0.93
4	Cough	18	17	0.90
5	Diabetes	14	5	0.42
6	Carminative	30	9	0.77
7	Hepatitis	10	7	0.33
8	Intestinal worms	71	1	1
9	Malaria, Fewer	22	9	0.69
10	Urine infection	123	10	0.94
11	Skin infection	12	6	0.44
12	Pain	62	14	0.77
13	Wound	111	7	0.95

Informant consensus factor (ICF)

The "ICF" index was categorized for the 13 disorders based on their informants' reports. The highest ICF value were observed for abdominal pain with (0.97), followed by wound healing (0.95), urine infection (0.94), body cooling (0.93), respiratory disorders (0.85), Pain and carminative (0.77), malarial fever (0.69), skin infections (0.44), diabetes (0.42), and intestinal worms with (1.0) (Table 2 and Figure 5).

Jaccard index (JI)

Comparison of the present findings with the previously published articles from different adjacent areas of Khyber Pakhtunkhwa, Pakistan, was done. JI ranged from 42.4 to 6.72, The highest JI value was 42.4 from tehsil Khaal, Lower Dir, Pakistan, followed by 40 from tehsil Adenzai, Lower Dir, Pakistan, followed by 37.5 from Samar Bagh valley, Lower Dir, Pakistan (Irfan *et al.*, 2018), followed by 30.2 from Northern Pakistan (Butt *et al.*, 2015), 16.5 from North Waziristan (Rehman *et al.*, 2023), 11.73 from Gujranwala, Pakistan (Rahman, 2013), (9.94) from Lakki Marwat, Pakistan (Ullah *et al.*, 2014), 8.87 from Golen valley Chitral, Pakistan (Jan *et al.*, 2021), (8.29) from Sarban hills, Abbottabed, Pakistan (Ijaz *et al.*, 2017), and 6.72 from Swat, Pakistan (Akhter *et al.*, 2016) (Table 8 and Figure 5).

In the present study, 147 medicinal plant taxa belonging of 55 genera and 36 families were reported from the district of Lower Dir, Khyber Pakhtunkhwa, Pakistan. Out of 34 families, Lamiaceae were recorded as the dominant family with 8 taxa, as previously reported from Lower Dir, 46 medicinal plants belonged to 43 genera and 29 families were reported (Ahmad *et al.*, 2021). The findings of the current study showed similarities with the work of Imtiaz *et al.* (2011) based on habit-wise and family dominance from the tehsil Kabal, district Swat, Khyber Pakhtunkhwa, Pakistan. Lamiaceae was the dominant family with 11 species, while habit-wise herbs were dominant with 76 taxa, followed by trees with 40 species, and shrubs were 17 taxa.

The approach based on the disease, our results was supported by Haq *et al.* (2011) as similar kinds of ailments were documented, such as respiratory disorders, abdominal pain, wound healing, diabetes, and diarrhea.

Table 8: *Analogy of our given knowledge with previously published articles.*

Reported area	Total no of taxa	Species with the same uses	Species with different uses	Species common in both areas (C)	% of taxa with the same uses	% of taxa with different uses	JI	Citation
North Waziristan, Pakistan	56	8	18	26	14.2	32.1	16.57	(Rahman *et al.*, 2023)
Gujranwala, Pakistan	71	16	7	23	22.5	9.85	11.73	(Rahman, 2013)
Lakki Marwat, Pakistan	62	7	12	19	11.2	19.3	9.94	(Ullah *et al.*, 2014)
Sarban Hills, Abbottabad, Pakistan	74	6	11	17	8.10	14.8	8.29	(Ijaz *et al.*, 2015)
Swat, Pakistan	106	9	7	16	8.49	6.60	6.72	(Akhter *et al.*, 2016)
Golen valley, Chitral, Pakistan	36	5	10	15	13.8	27.7	8.87	(Jan *et al.*, 2017)
Northern, Pakistan	62	2	3	5	3.22	4.83	30.2	(Butt *et al.*, 2015)
Samar Bagh valley, Lower Dir, Pakistan	65	27	13	40	41.5	20.0	37.5	(Irfan *et al.*, 2018)
Khaal, Lower Dir, Pakistan	65	41	19	60	63.0	29.2	42.4	(Ullah *et al.*, 2022)

Discussion

The district Lower Dir has a huge diversity of medicinal plants, as previously from adjacent areas various studies had been documented, *viz.* (Iqbal and Hamayun, 2004) from Malam Jabba, district Swat, Pakistan, documented 187 plant taxa, in which 97 were medicinal plants. Adjacent to the area from another location in the Garbal valley district, Swat, Pakistan, (Hamayun, 2005) documented 176 plant species of which 133 taxa belonged to the medicinal category. Based on the same pattern of exploration and collection, recently the same supported work had been done by (Rehman *et al.*, 2023), and documented 56 plant taxa used for respiratory disorders. In assessment the herbaceous life form of medicinal plants was dominant with (60%), followed by shrubs (24.6%), and trees with (14%), similarly (Giday *et al.*, 2003) documented the herbs were the most leading habit in the medicinal flora, and also resulted the practitioner healers and hakims prevalently use the herbs against diseases due to their easy availability and active constituents. Mostly, the people of Pakistan are dependent on the medicinal plant due to poverty, and mostly the *Berberis lyceum* and the infusion of the *Mentha arvensis* were commonly used in the area, but these species need a specific recipe for proper curing (Umair *et al.*, 2019).

According to Tariq *et al.* (2015) the statistical analysis in ethnomedicinal studies helped in finding the new emerging medicinal plants, in current study based on use value emerging plants species in study area were *Punica granatum* and *Vitis vinifera* (0.85) recoded, while the analysis based on the relative frequency citation (0.9) the resulted value indicated the well adopted uses based on previous citation. Previously, from Mastung valley, Baluchistan, Pakistan ICF value was recorded for respiratory disorders 0.49. In our study ICF value was recorded for respiratory disorder 0.97 (Bibi *et al.*, 2014). In the current study, the highest similarity value was recorded (42.4) with tehsil Adenzai, Lower Dir, Pakistan (Table 2). Previously, from tehsil Wari, Upper Dir, Pakistan, the highest Jaccard Index was (29.8) recorded, hence our index claimed that the area was enriched with medicinal plants.

The current study performed various statistical analyses for the first time. Previously certain study carried out in the same area by (Malik *et al.*, 2018) of tehsil Laalqilla, district Lower Dir, Pakistan documented the diverse traditional knowledge of 50 taxa with 47 genera and 34 families, the Dicotyledonous were dominant with (98%) that showed the area has well adaptation in trees (Hussain *et al.*, 2022). These plants were used for various ailments, as in adjacent areas, the same study was carried out by (Ullah *et al.*, 2025) on local communities of tehsil Adenzai, Lower Dir, Pakistan documented 60 therapeutic plants with 57 genera and 39 families. The 58 taxa were Angiosperm, amongst them 54 taxa were Dicotyledonous and 4 taxa were Monocotyledonous, and the Gymnosperm with 30 taxa. The local communities of the Lower Dir were mostly dependent on the therapeutic plants and preparing the various remedies for using them as antipyretics and also for hypertension disorders. A total 46 plant species with 43 genera and 29 families, amongst them Lamiaceae was reported as dominant family with high percentage of 7 species with (15.21%),

habit wise herbs with (63.05%) and shrubs (30.43%), and tree were with (6.52%) (Asif *et al*., 2025; Ullah, 2018) also documented similar studies from Talash valley, Lower Dir, Pakistan. The study aimed to collect information regarding therapeutic plants and their ethnopharmacological studies. The dependency of local inhabitants still relied on the ethnomedicinal plants of Chinghai valley, district Buner, Pakistan, indicating that the chief source of the local people was medicinal plants (Ullah *et al*., 2024a).

Conclusion

The current medicinal survey was carried out on medicinal plants of Village Hasham, Khyber Pakhtunkhwa. A total of 55 plant species were collected from March to September along with their local name, botanical name, family, habit, part used, method of use, and medicinal use. The herbaceous cover was dominated by 25% of species, followed by trees with 15% of species, and then by shrubs with 14% of species. We concluded that the studied area is rich floristically with medicinal plants and is important medicinally and economically. Unfortunately, due to awareness, some medicinally and economically important plants like Pinus species have high market value, which are being cut at an alarming rate. Because of utilization, over-collection, over-exploitation, habitat degradation, overharvesting, deforestation, population explosion, overgrazing, and deforestation area is under high biotic pressure.

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Novelty Statement

This study provides the first comprehensive ethnobotanical documentation of medicinal plants in Lower Dir, Khyber Pakhtunkhwa, Pakistan, highlighting the indigenous knowledge of local communities. Unlike previous ethnobotanical studies conducted in other regions, this research explores the rich medicinal plant diversity in a relatively understudied mountainous region, where traditional plant-based remedies remain a primary source of healthcare. The study not only identifies 55 medicinal plant taxa but also examines their diverse therapeutic applications, offering valuable insights into species conservation, sustainable utilization, and pharmacological potential. The findings contribute significantly to the preservation of indigenous knowledge, facilitating future research in phytochemistry, drug discovery, and conservation biology.

Author's Contribution

Shakir Ullah: Wrote the original draft of the manuscript.
Muhammad Saeed: Did the statistical analysis.
Ghani Subhan and Mohammad Sohail: Revised and edited the article.
Sajid Ali, Izhar Khan and Lubna Shakir: Collected data, did analysis, wrote the manuscript.

Ethics statement
Before the survey, we obtained oral informed consent from each participant.

Consent for publications
Not applicable.

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