Documenting the ethnobotanical plants of the Masherbrum valley along the Saltoro Glaciers, Karakorum Mountains

Muhammad Naseem, Zaheer Abbas, Ishtiaq Hussain, Muhammad Uzair, Shujaul Mulk Khan, Afiya Afzal Chughtai, Abdullah Abdullah, Alain Cuerrier

Correspondence

Muhammad Naseem[1], Zaheer Abbas[2*], Ishtiaq Hussain[1], Muhammad Uzair[2], Shujaul Mulk Khan[3], Afiya Afzal Chughtai[2], Abdullah Abdullah[4], Alain Cuerrier[5]

[1]Department of Botany, University of Baltistan, Skardu 16100, Gilgit Baltistan, Pakistan
[2]Division of Science and Technology, Department of Botany, University of Education Lahore 5400, Pakistan
[3]Department of Plant Sciences, Quaid-i-Azam University, Islamabad 45320, Pakistan
[4]Kunming Institute of Botany, Chinese Academy of Sciences, China
[5]Department of Biological Sciences, University of Montreal, Canada

*Corresponding Author: zaheeruel@gmail.com

Ethnobotany Research and Applications 35:51 (2026) - http://dx.doi.org/10.32859/era.35.51.1-234
Manuscript received: 13/06/20226- Revised manuscript received: 13/08/2026- Published: 19/08/2026

Research

Abstract

Background: The present study focused on documenting the ethnomedicinal knowledge originating from the Masherbrum valley Karakoram Range in Ghanche District, Baltistan region-Pakistan with an emphasis on the use of indigenous plant species prospective.

Methods: Questionnaire semi-structured interviews were used to gather information from 217 participants encompassing 23 localities with 82.9% of men and 17.1% women. The majority of respondents (35.5%) were over 60 years, 54.4 % were illiterate and engaged with agriculture. A total of 129 species of medicinal plants from 48 families were mentioned.

Results: Apiaceae, Lamiaceae and polygonaceae (7 each), Rosaceae (13) and Asteraceae (18) species were the most prominent families. A majority of plants were used to treat circulatory, gastrointestinal and cutaneous disorders with high informant consensus factor (ICF) values (0.970, 0.964 and 0.962, respectively. Regarding preparations, powders or used fresh stood out; for plant parts, leaves (31%), fruits (28%) and roots (19%) were preferred. Among the ten most distinctive plants, *Bistorta vivipara* (L.) Delarbre, *Nepeta longibracteata* Benth. and *Inula rhizocephala* Schrenk ex Fischer & C. A. Meyer were exclusive for medicinal uses. *Allardia tridactylites* (0.839), *Rosa webbiana* (0.774), and *Acantholimon lycopodioides* (0.705) have shown high relative frequency of citation (RFC) values denoting their cultural and medicinal importance.

Conclusions: Traditional knowledge, however, is clearly fading among younger generations with less knowledge holders for transmission. Food security and sustainable healthcare in the study area depend on preserving this biocultural legacy as well as supporting research species of interest.

Keywords: Ethnobotany, Medicinal Plants, Masherbrum Valley, Karakorum Mountain

Background

For centuries, plants have been used for medicinal purposes in all human culture worldwide (Pironon *et al.* 2024). They have been and still are fundamental in global healthcare, particularly in developing nations (Jauhari *et al.* 2024). So far, 10% percent of global vascular plants (350,000 species) are known for their therapeutic potential (Sharma *et al.* 2020). A large number of people, particularly in remote and marginal societies, practice diverse phytotherapies. In remote rural regions, over 70% of the population depends on traditional herbal remedies due to limited access to modern healthcare (Karunamoorthi *et al.* 2013). According to WHO, the utilization of medicinal plants has tremendously increased in the past two decades, but there is still a striking lack of data on medicinal plants. Comprehensive investigations describing traditional knowledge practices and tackling medicinal herb conservation are seldom seen in the literature (Dhawan, 2003). With time, though, the research on ethnobotanically valued plants is growing, particularly in the developing countries (Arul Raj *et al.* 2025). This may be attributed to the establishment of higher education institutes, involvement of non-governmental organizations, national and international scientific collaboration, and increasing interest of indigenous people to partner in a growing number of projects. These factors contribute to a better understanding of traditional medicines while engaging with local communities (Fatima *et al.* 2025).

South Asia is known to be an overpopulated developing country with a significantly high rural population reaching 63%. The marginalized rural communities living in remote hot deserts and mountain areas still practice cultural activities, including traditional medicines (Sarkar and Modak, 2023). Mountain societies are generally regarded as deprived in different aspects of life. Far from urban commodities, the outlying mountain communities live a challenging life for subsistence and sustenance (Sati, 2014). They are traditional societies and possess intimate ties with the surrounding biological diversity. Pakistan hosts a population of 241.5 million, with a prevailing rural population of 147.7 million living in diverse biomes (Rahman and Risat, 2025). Particularly, the northern and northwestern terrains of the country are typically mountainous and predominantly inhabited by rural mountain communities (Yang *et al.* 2024). These mountain ecosystems contribute to the country biological diversity, particularly in terms of its medicinal flora (Hussain *et al.* 2024b; Shinwari and Qaiser (2011). Ethnobotany is a growing field in Pakistan with an unequal number of studies stemming from different corners of the country, especially the far-flung areas of mountainous region are yet to be explored.

Regional ethnobotanical studies in those valleys are rare; with just a few published so far (Bano *et al.* 2014; Abbas *et al.* 2016; Hussain *et al.* 2024a). Biodiversity is under multiple threats, which calls for urgency of documenting and preserving the biocultural diversity within those places. Examples of threats are climate change impacts, which unfold into unpredicted weather (storms, floods), deforestation, tourism, increasing pollution and biopiracy particularly medicinal plants (Baig and Ahmed, 2007).

Indeed, the diversity and abundance of medicinal plants have been negatively affected by increasing touristic activities, overharvesting, climate change impacts, and biopiracy (Balkrishna *et al.* 2024). Hence, documenting medicinal plants has become pivotal. Moreover, literature frequently reports the rapid erosion of traditional knowledge (Aswani *et al.* 2018). The current society is in full transition, and younger generations are fleeing traditions. The aged people of area are the last custodians of plant-based therapeutic information, but very few younger men and women are interested to take up that leadership. Based on an extensive literature survey, there is a lack of prior botanical investigation in the study area.

Therefore, the present study was elaborated with the three objectives in mind: 1) to prepare an inventory of wild medicinal plants used by the local population, 2) to document the traditional knowledge of the reported plants, and 3) to explore the status of traditional knowledge.

Materials and Methods

Study area

The valley of Mashabrum is located along the foothills of Siachen and Masherbrum glaciers of the Karakorum Mountains, Baltistan region, northern Pakistan (Figure 1). It borders, Ladakh (India) to the south, Xinjiang (China) to the northeast, Siachen Glacier to the east and the Skardu valley to the west. It covers an area of 4500 Km^2 within the elevation range of 2400 to 7821m above sea level. Physiographically, it exhibits several subranges, sub-glacier systems and mountain passes. Ghondogoro, Saltoro Ali Brangsa, Kondus and Siachen are renowned glacier systems. Eight peaks are found amongst these glaciers, the highest being Masherbrum K1 (7821m). Similarly, Gondogoro La, Bilafond La, and Sia La are well-known mountain passes. The valley has three rivers (Kondos, Saltoro and Hushe) flowing from different glaciers. River Saltoro and Kondos flow from Saltoro and Kondus glaciers, respectively. River Kondos drains in river Saltoro at the village of Dumsum.

Similarly, River Hushe has a catchment area in the Gondogoro glaciers and flows downstream to join the river Saltoro at the village Haldi.

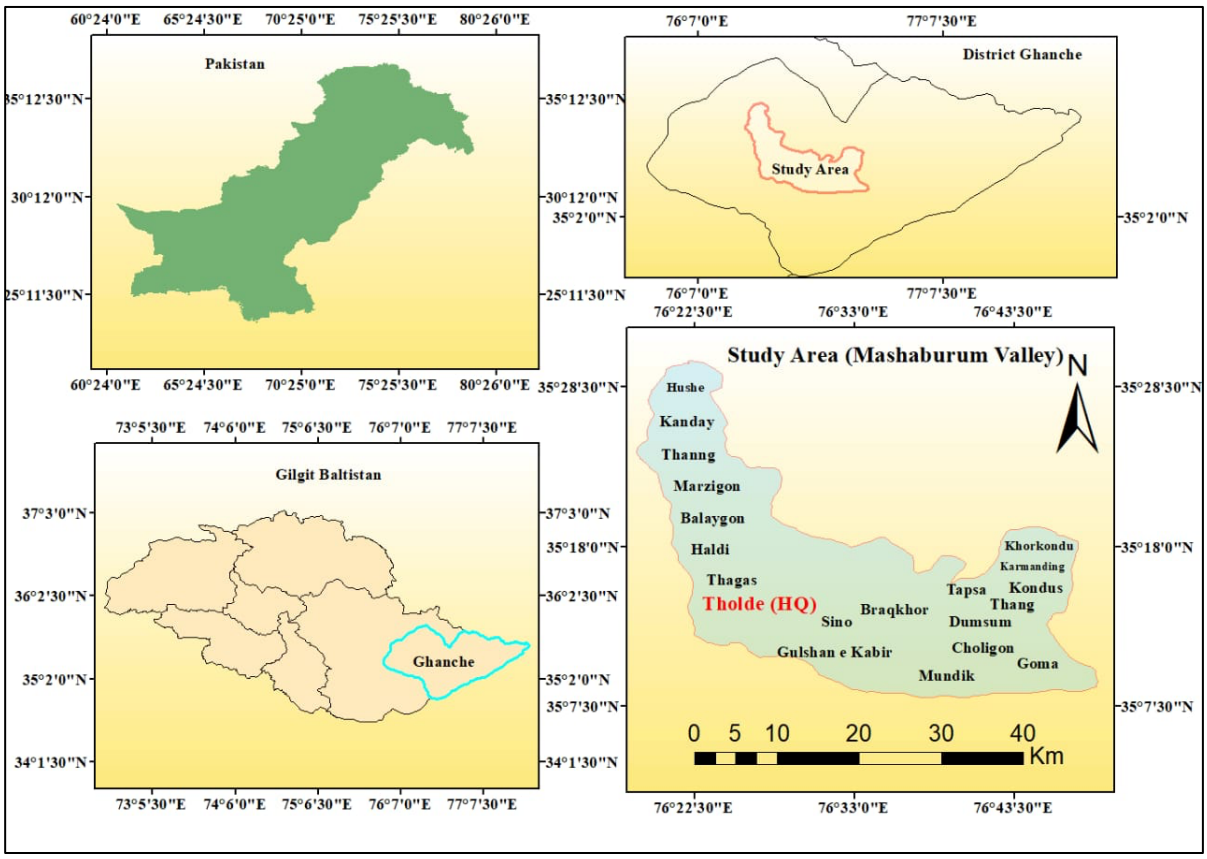

Figure 1. Map of the Masherbrum valley with showing visited villages

Climate is dryl characterized by long, cold winters where temperature drops to -20°C. The nearest meteorological station is located in Skardu. Summer is short, arid and severe, with temperatures ranging from 12°C to 25°C. Annual rainfall is less than 80 mm. However, a lot of snowfall, more than 2,000 mm, occurs yearly. The climatic condition is steep with sharp diurnal and nocturnal temperature changes. Based upon geo-ecological features, the area has been recognized as lower semi-arid deserts, middle altitude temperate zone, and high-altitude cold deserts.

According to the 2023 census, the population is 46,400. The population is distributed in 30 settlements along rivers. They all speak *Balti,* a language of the Tibeto-Burman family. They can further be classified into above 300 clans. Buddhism was the regional religion before the 7th century Islamic revolution by Arabs and Persian preachers. They practice Islam but the culture is a blend of Buddhism, Hinduism, and Islam. The subsistence generally depends upon government jobs and limited mountain farming. The melting of snow is the main water source of such high elevation valleys for irrigation and domestic purposes. The inhabitants always strive to extract possible genetic resources from the surrounding biological diversity. Due to the limited healthcare facilities, they use traditional medicine, mostly medicinal plants, in various ways to cope with the day-to-day health problems. Masherbrum valley is located in the Karakorum Mountains along the foot of Saltoro, Siachen and Gondogoro glacier systems of the Baltistan region. It is characterized by its remote location, craggy physiography and hostile continental climate. Mashabrum is populated by 46,400 Balti speaking population settled in 30 villages along rivers i.e. Hushe, Ghursay, Thagas, Sino, Kondos, and Saltoro. *Balti,* belongs to the Tibeto-Burman language spoken by Indigenous people of Baltistan. They practice a unique blend of Buddhist and Islamic culture after the religious revolution happening during the 8th century, i.e. transition of Buddhism to Islam. Several biological entities like plants, animals, lichens have shaped their culture and contributed to their survival. Generally, Baltistan is botanically unexplored despite having immense biological diversity and diverse environments. It may be linked with its remoteness, limited accessibility, and logistic challenges. Several valleys, including Mashabrum, are deprived of research facilities.

Data Collection

Ethnobotanical data were collected from the 23 villages of the study area from 2022 to 2024 (Table 1). Snowball sampling and random sampling strategies were employed. Semi-structured and focus group interviews were adopted for plant-based data collection. Individuals of different ages and occupations were interviewed (Figure 2). They included farmers, shepherds, laborers, government job holders, and traditional healers. The interviews were exclusively conducted in the Balti language, as the entire population was Balti-speaking. First, we asked about growth habit and sources of each plant mentioned, i.e., whether they are growing wild or cultivated within local fields. Information about the local name, availability, used part, drug formulation; drug form, ailments treated, and traditional applications were also recorded. Some common medicinal plants are depicted in figure 6. During the field trip, plant specimens were gathered, geographic coordinates were recorded using GPS, and plants photographies were taken. Herbarium specimens were collected and prepared according to proper techniques (Maden, 2004). The collected plant specimens were identified using standard floras, including Flora of Pakistan (www.efloras.org) and Flora of China. The nomenclature was cross-checked and verified through World Flora Online (www.worldfloraonline.org). Finally, the specimens were submitted to the UE Herbarium, Department of Botany, University of Education Dera Ghazi Khan Campus, Punjab province, Pakistan.

Table 1. Details of the 23 visited localities.

Visited localities	**Latitude (N)**	**Longitude (E)**	**Altitude (m)**
Haldi	35.24	76.42	2584
Balay gon	35.28	76.39	2636
Marzi gon	35.29	76.38	2710
Khanay	35.32	76.37	2810
Kanday	35.38	76.36	2953
Hushey	35.45	76.35	3050
Dumsum	35.20	76.59	2752
Braqkhore	35.20	76.59	2752
Gulshane Kabir	35.19	76.52	2707
Sino	35.20	76.50	2713
Tholdi	35.21	76.48	2676
Thagas	35.21	76.46	2635
Khurkundu	35.31	76.75	3434
Karmanding	35.28	76.70	2990
Choghogrong	35.27	76.68	2938
Thang	35.26	76.67	2903
Lachat	35.26	76.64	2921
Tapsa	35.25	76.62	2928
Seaht Saltoro	35.13	76.72	3172
Choligond Saltoro	35.14	76.74	3238
Ghaghuloo Saltoro	35.14	76.75	3238
Goma Saltoro	35.14	76.79	3307
Mandik Saltoro	35.14	76.68	3135

Data organization and analysis

All collected data were compiled using Microsoft Excel (2016). Ethnobotanical indices of Relative frequency of citations (RFCs), Family importance value (FIV) ¸ Informant Consensus Factor (ICF) and Preference ranking (PR) were also used to assess the data.

Relative frequency of citations (RFCs)

To evaluate the relative popularity and cultural importance of each recorded plant within communities RFCs were calculated using the following formula (Lal *et al.* 2023).

RFC = FC / N

Where FC is the number of respondents who mentioned the plant and N is the total number of respondents.

Figure 2. Views of the study area and interview process a) alpine zone with grazing herds b) view of elevated village of Kande c) interviewing shepherds d) group discussion about local medicinal plants in the lower village

Family importance value (FIV)

The popularity of a plant family in a specific community can be calculated using an ethnobotanical index. The Family Importance Value (FIV) based upon the formula from Vitalini *et al.* (2013; Hoffman and Gallaher, 2007).

$$\mathrm{FIV} = \frac{\sum \mathrm{FCs}}{\mathrm{N}} \times 100$$

Where ∑FCs is the sum of the of all the informants who cited species of a specific family and N is the number of informants in the study.

Informant Consensus Factor (ICF)

The level of agreement among informants regarding the treatment of various disease categories was assessed using the Informant Consensus Factor (ICF), following the method described by Trotter and Logan (2019) and Heinrich *et al.* (1998).

The ICF was calculated using the formula:

$$\mathrm{FIC} = \frac{\mathrm{Nur} - \mathrm{Nt}}{\mathrm{Nur} - 1}$$

Where Nur indicates the number of use reports in each disease category, while
Nt is the number of taxa used for the specific disease.

Preference ranking (PR)

To evaluate the perceived efficacy of medicinal plants in treating particular ailments, Preference Ranking (PR) was conducted using ethnomedicinal insights provided by key informants (Martin, 2010). Each informant assigned a score between 1 and 5 to the plants, with 5 indicating the highest therapeutic effectiveness and 1 representing the least. It helped in recognizing the most highly regarded species and commonly employed in local traditional healthcare systems.

Results

Informant demographics

During this study, 217 interviews were conducted, of which 82.94% were men and 17.05% women. Based on age, the majority (35.5%) were over 60 years old, followed by 20.7% between 51 and 60 years, 18.0% between 31 and 40 years, 13.8% between 41 and 50 years, and 12.0% between 20 and 30 years. Educational background varied considerably with 54.37% of participants being illiterate. The remaining had formal education including secondary (14.3%), primary (11.5%), graduation (7.4%), elementary (6.5%) and intermediate education (6.0%). For subsistence, they were laborers (36.41%), farmers (24.42%), government job holders (19.35%), shepherds (12.90%), or local healers (6.91%). Table 2 is showing the demographic details of all respondents.

Table 2. Demographic Data of respondents.

Categories	**Number**	**Gender**	
Age group (Years)			
		Male (180)	**Female (37)**
20 to 30	26	24	2
31 to 40	39	35	4
41 to 50	30	25	5
51 to 60	45	34	11
Above 60	77	62	15
Education			
Illiterate	118	83	35
Primary	25	24	0
Elementary	14	16	0
Matric	31	30	1
Intermediate	13	11	2
Graduate	16	16	0
Source of Income			
Farmers	53	19	34
Government Servant	42	42	0
Labour	79	76	3
Shepherd	28	28	0
Healer	15	15	0

Taxonomic diversity

The study yielded 129 medicinal plants belonging to 48 families and 103 genera. Asteraceae was the most represented family with 18 species followed by Rosaceae with (13 spp.), Apiaceae (7 spp.), Fabaceae (6 spp.), and Solanaceae (5 spp.) (Table 3). Similarly, *Prunus* came first with 6 species mentioned, followed by *Allium*, *Rosa*, *Solanum*, and *Morus*, all having 3 species cited (Table 5).

Table 3. Plant families versus reported medicinal plants.

Family	**No. of Species**	**Percentage**
Asteraceae	18	7.9
Rosaceae	13	5.7
Apiaceae	7	3.1
Lamiaceae	7	3.1
Polygonaceae	7	3.1
Fabaceae	6	2.6
Fabaceae	5	2.2
Solanaceae	5	2.2
Brassicaceae	4	1.8
Rannunculaceae	4	1.8
Amaryllidaceae	3	1.3
Cucurbitaceae	3	1.3
Moraceae	3	1.3
Amaranthaceae	2	0.9
Asclepiadaceae	2	0.9
Boraginaceae	2	0.9

Family	No. of Species	Percentage
Elaeagnaceae	2	0.9
Equisetaceae	2	0.9
Grossulariaceae	2	0.9
Plumbaginaceae	2	0.9
Poaceae	2	0.9
Zygophyllacaeae	2	0.9
Berberidaceae	1	0.4
Biebersteiniaceae	1	0.4
Campanulaceae	1	0.4
Capparaceae	1	0.4
Chenopodiaceae	1	0.4
Cupressaceae	1	0.4
Cuscutaceae	1	0.4
Ephedraceae	1	0.4
Gentianaceae	1	0.4
Iridaceae	1	0.4
Juglandaceae	1	0.4
Malvaceae	1	0.4
Oleaceae	1	0.4
Onagraceae	1	0.4
Orchidaceae	1	0.4
Orobanchaceae	1	0.4
Papaveraceae	1	0.4
Plantaginaceae	1	0.4
Primulaceae	1	0.4
Salicaceae	1	0.4
Tamaricaceae	1	0.4
Umbelliferae	1	0.4
Urticaceae	1	0.4
Violaceae	1	0.4
Vitaceae	1	0.4
Zingibearceae	1	0.4

Source and habit

In terms of the most common types of plant used, wild herbs were the most prevalent, accounting for 44.2% (57 species). The other categories were: cultivated herbs (35 spp.; 27.1%), cultivated trees (17 spp.; 13.2%), wild shrubs (16 spp.; 12.4%). Cultivated shrubs and wild tree species had the least representation with 3 species (2.3%), and one (0.8%), respectively (Figure 3).

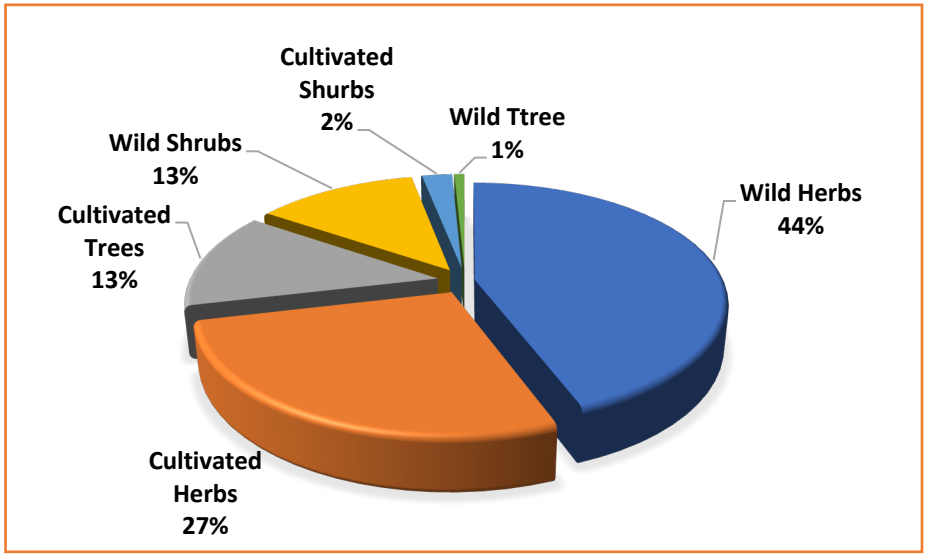

Figure 3. Categories of recorded medicinal plants based on source and growth habit.

Used parts and diseases treated

Various parts of medicinal plants were utilized in traditional healing practices, as visualized in Figure 4, reflecting a broad spectrum of ethnobotanical knowledge. Flowers represented the most prominent part used from 35 species (27.1%), then followed seeds (27 spp. 20.9%), and leaves (25 spp. 19.4%). The use of aerial parts was reported for 17 species (13.2%), while 17 species (13.2%) were used for their roots. Similarly, the subterranean structures, i.e. bulbs, corms, and rhizomes, were used in 6 species (4.7%) each. Bark was the least utilized part and cited only for 2 species (1.6%). In several cases, combinations of plant parts such as flower and seeds, leaves and seeds, or roots and flowers were also observed.

Drug formulation and administration

Various traditional methods were employed in the preparation and administration of medicinal plant remedies in the study area. Among the formulation methods, decoction was the most used with 39 species (30.2%), followed by powder form in 30 species (23.3%). Also, plant parts were frequently used in fresh condition within 28 species (21.7%), or in cooked form for 20 species (15.5%). Infusion was the least commonly used preparation with 12 species (9.3%) mentioned.

In terms of drug administration routes, the oral route was overwhelmingly dominant, accounting for 92 species (71.3%), indicating a strong preference for internal consumption in traditional healing. Topical application was used in 31 species (24.0%), while both oral and topical methods were employed for six species (4.7%), reflecting the flexibility and complexity of local ethnomedicinal practices.

Miscellaneous uses

In addition to their medicinal uses, the recorded plants were also used for a variety of miscellaneous purposes, like fodder, fuel, and beverages (Figure 4). Many plants were used for fodder, i.e., 70 species (71.43%), contributing to livestock feeding in the region. Food (culinary, beverages, etc.) was another important use, with 55 species (56.12%) being consumed as part of the local diet. Fuel consumption was also a key use, with 32 species (32.65%) providing material for firewood and energy needs. Beverages were prepared from 26 different species (26.53%), highlighting their role in traditional drinks as tea. Other plants were valued for their utility as bio fertilizers (21 spp., 21.43%), while a smaller proportion was used for tools and fragrances, with five species (5.10%) each. Thatching and roofing materials were made from 3 species (3.06%) each. Those diverse uses underscore how much plants play a central role in supporting the local community's subsistence.

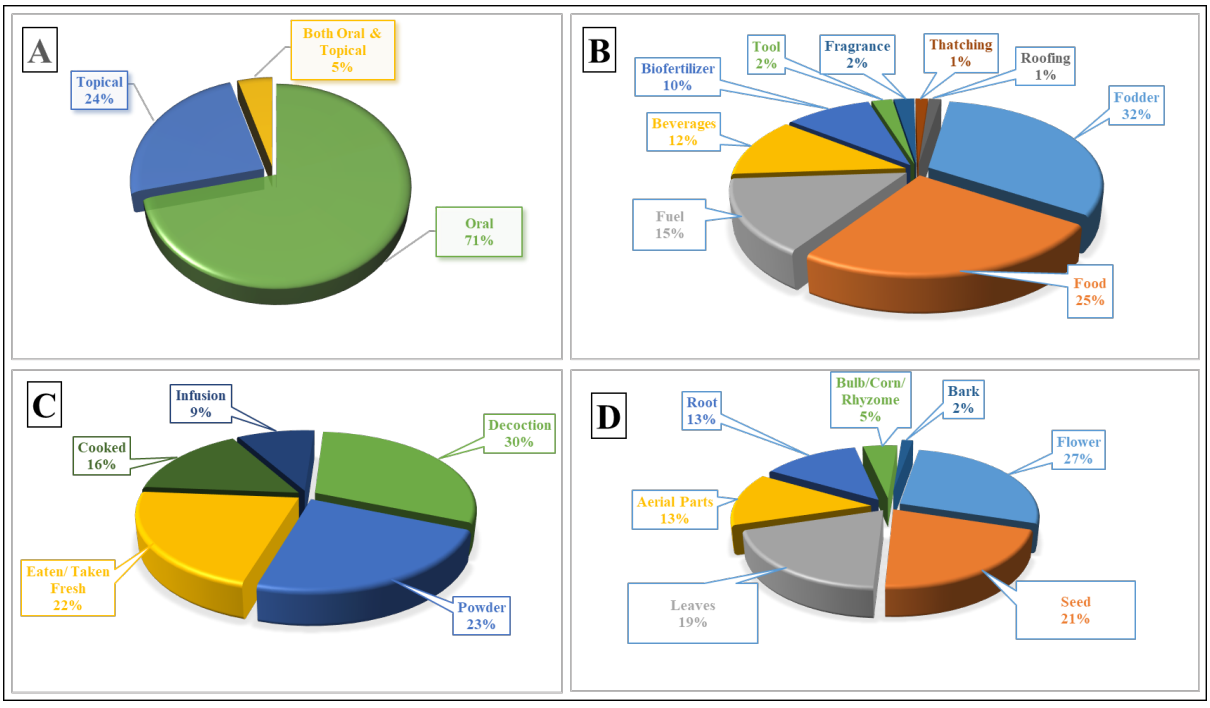

Figure 4. (A) Modes of drug administration; (B) Miscellaneous uses; (C) Modes of drug formulation; (D) Plant parts used for different diseases.

Medicinal plants and pathological categories

Plants for therapeutic potential were cited for the treatment of 197 diseases. A large proportion of plants were reported for gastrointestinal disorders (40 spp., 31.25%), followed by circulatory problems (25 spp., 19.53%), skin problems (21 spp., 16.41%), and hepatic problems (14 spp., 10.94%). Thirteen plants (10.15%).) were discussed for general health, encompassing such problems as body aches, common cold, flu, fever, etc. There were 10 species reported (7.81%) for respiratory, nervous, hormonal imbalance, and urinary disorders. Likewise, for dental and reproductive problems (8 spp., 6.25%), skeletal problems (6 spp. 4.68%), and ophthalmic disorders (2 spp., 1, 56%) were the least mentioned (Figure 5).

Relative frequency citations (RFCs)

The medicinal plants reported by the people of the valley have varying Relative Frequency of Citations (RFCs) values (Table 5), reflecting their significance in traditional medicine. For instance, *Allardia tridactylites* from the Asteraceae family had the highest RFC of 0.839, indicating its high frequent use among the local population. Other commonly cited plants include *Delphinium brononianum* (RFC: 0.811), *Rosa webbiana* (0.774), and *Tanacetum falconeri* (0.756), which are also widely used for medicinal purposes. Several plants with relatively high RFCs, such as *Acantholimon lycopodioides* (0.705) and *Seriphidium brevifolium* (0.700), are reported treating a variety of ailments. On the lower end of the spectrum, plants like *Tagetes patula* and *Lactuca oleracea* (both with an RFC of 0.009) have a much lower citation frequency, suggesting that they are less commonly used in traditional medicine. The wide range of RFC values highlights their varying degrees of importance in the local therapeutic practices.

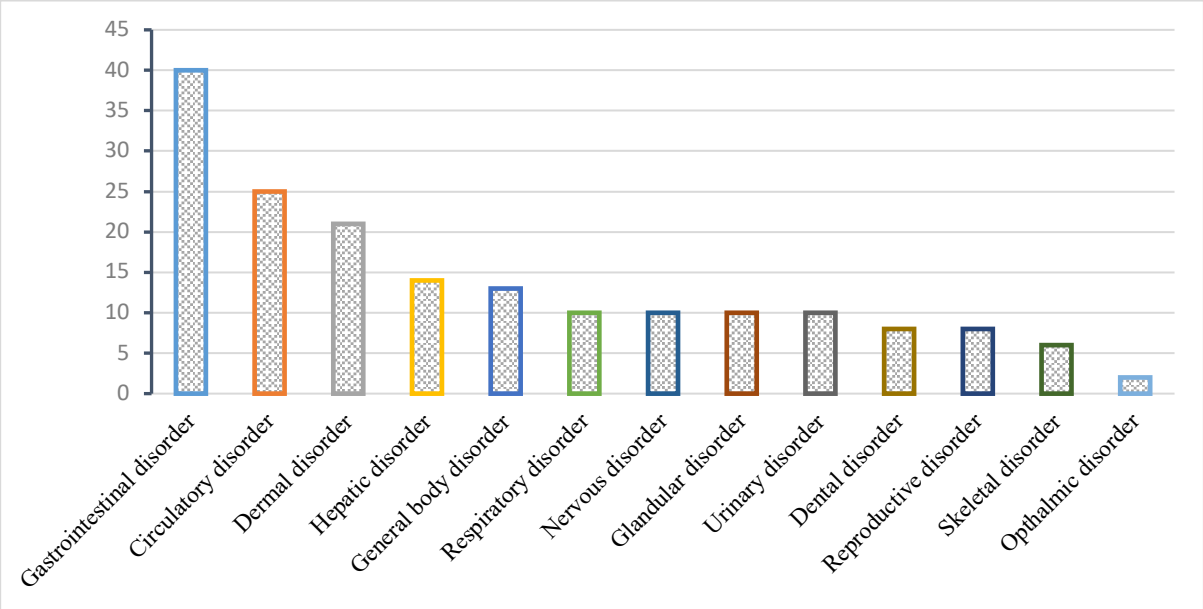

Figure 5. Number of reported plants for specific system disorders.

Informant consensus factor (ICF)

The Informant Consensus Factor (ICF) analysis was conducted to determine the level of agreement among informants regarding the use of medicinal plants for treating specific categories of diseases. Table 3 is showing the high consensus amongst informants for all types of problems. Indeed, results revealed that respiratory disorders achieved the highest ICF value (0.98), indicating a strong consensus among informants on the effectiveness of plant-based remedies for respiratory conditions. This was followed closely by gastrointestinal disorders (0.97) and a group of disorders (dermal, circulatory, dental, skeletal, and hepatic) sharing the same high ICF values of 0.96, suggesting significant agreement in traditional knowledge for these ailments. Urinary disorders (0.94) and a cluster of conditions including reproductive, nervous, ophthalmic, and general body disorders (each with 0.93) also showed substantial consensus. The lowest ICF was recorded for glandular disorders (0.90), which still reflect a relatively high level of informant agreement (Table 4).

Table 4. ICF values of for different disease categories.

Disease category	No of species (Nt)	use citation (Nur)	Nur- Nt	Nur -1	ICF
Gastrointestinal disorder	40	1322	1282	1321	0.970
Circulatory disorder	25	626	601	625	0.962
Dermal disorder	21	559	538	558	0.964

Hepatic disorder	14	312	298	311	0.958
General body disorder	13	166	153	165	0.927
Respiratory disorder	10	518	508	517	0.983
Nervous disorder	10	129	119	128	0.930
Glandular disorder	10	91	81	90	0.900
Urinary disorder	10	151	141	150	0.940
Dental disorder	8	183	175	182	0.962
Reproductive disorder	8	108	100	107	0.935
Skeletal disorder	6	125	119	124	0.960
Ophthalmic disorder	2	15	13	14	0.929

Preference ranking (PR)

The disorders that are treated by using multiple medicinal plants (MMPs) were ranked by 10 key informants. Different PR scores were given to medicinal plants for treating stomach pain. PR showed that *Fagopyrum tataricum*, *Vicia faba, and Artemisia absinthium* are the most preferred plants for the treatment of stomach pain. Similarly, higher scores for abdominal pain were given for *Allardia tridactyiltes* followed by *Bunium persicum* and *Foeniculum vulgare.* For hepatitis, *Hippophe rhamnoides* came first and then *Brassica rapa* and *Berberis speudoumbellata. Rosa webbiana* was most effective for blood poisoning followed by *Lactuca tatarica* and *Taraxacum officinale*. High PR for boil remedy was shown for *Bistorta vivipara, Viola canescens* and *Heracleum pinnatum*. For cough cure, *Plurospermum candoleii* and *Urtica dioca* stood out.

Table 5. Typical medicinal plants of Mashabrum valley.

Name of plant	Family	Local name	Disease treated
Bistorta vivipara (L.) Delarbre	Polygonaceae	Booma	Boils
Cynanchum acutum L.	Asclepiadaceae	Oma harswa	Rignworm
Dictyolimon macrorrhabdos (Boiss.) Rech.f.	Pumbaginaceae	Shafos	GI disorders
Inula rhizocephala Schrenk	Asteraceae	Chaingo	Migraine
Lactuca tatrica (L.) C.A.Mey.	Asteraceae	Khoskiab	Blood poisoning
Malcolmia cabulica (Boiss.) Hook.f. & Thomson	Brassicaceae	Khaltas	Diabetes mellitus
Menthiola flavida Boiss.	Brassicaceae	Sarsing Harswa	Urinary disorders
Nepeta longibracteata Benth	Lamiaceae	Azomik	Digestive problems
Primula warshenewskiana B. Fedtsch.	Primulaceae	Gangzema	Abdominal pain
Vincetoxicum canescens (Willd.) Decne.	Asclepiadaceae	Dray sniarma	Ring worm

Family importance value (FIV)

Family importance value is showing the importance of families within the study area for medicinal purposes in this study. The ten most important families were Asteraceae (3.81), Rosaceae (1.94), Polygonaceae (1.37), Apiaceae (1.10), Ranunculaceae (1.07), Lamiaceae (0.95), Plumbaginaceae (0.80), Urticaceae (0.64), Fabaceae (0.61), and Zygophyllaceae (0.48).

Discussion

This study illustrates the folk wisdom associated with the medicinal flora of the Mashabrum valley, Karakorum Mountains Northern Pakistan. In this valley, people live simple and traditional lives. Different plants and animals organisms play a role in shaping the rituals, health system, and food system. Particularly, plants are source of traditional medicines, food, beverages, fragrances, fodder, biofertilizers, firewood, construction materials, fencing, roofing, and agricultural tools. In this study, a total of 129 medicinal plants were mentioned stemming from the studied area. It is the highest report in term of medicinal plants from any valley of the region (Abbas *et al.* 2017; Bano, Ahmad, Hadda, *et al.* 2014; Hussain *et al.* 2011). For instance, locals from all valleys in the region use a substantial number of medicinal plants showing the extensive knowledge revealed in our study. In terms of ethnobotanical usages, Asteraceae had the highest number of species mentioned, followed by Rosaceae, Apiaceae, Lamiaceae, Polygonaceae, and Fabaceae. Abbas *et al.* (2020) found comprehensive folk usage of 63 plant species, most of which belonged to the Asteraceae and Fabaceae families, of which 43 percent targeted various illnesses. The Asteraceae family harbours the highest number of medicinal species (Qaiser *et al.* 2025). Indeed, with the Asteraceae, the Polygonaceae, Saxifragaceae, and Rosaceae have been observed to dominate the 153 species that have been identified after extensive field research in the Naltar Valley and 24 of these have emerged as ethnobotanically significant for regional medicinal uses as well as some commercial uses (Sheikh *et al.* 2002). Elsewhere, Asteraceae and Polygonaceae were

found having more species for medicinal uses (Konovalov, 2014). The richness of medicinal plants in our study area indicates that the inhabitants hold valuable ethnobotanical information and rely mostly on plants to treat a wide variety of disorders due to the lack of modern health facilities as well with coping with poverty.

The inhabitants of the current study area used different parts of plants for medicinal purposes, such as roots, leaves, seeds and branches, similar to previous findings (Hussain *et al.* 2022; Ullah *et al.* 2019). Namukobe *et al.* (2011) and Khan *et al.* (2011) also mentioned that leaves were the most common part used for medicinal purposes. Sanz-Biset and Cañigueral (2013) in their study, have also shown that leaves were used more often. In addition, they pinpointed that the ratio of wild plants is higher than cultivated ones in their ethnomedicinal study. As expected, older informants shared more ethnobotanical information than younger people, but the number of male informants was higher than that of females. Similar findings are also reported in previous works (Abbas *et al.* 2016; Bano *et al.* 2014). The presence of male informants in the study was simply due to their availability, while most females do not talk with strangers due to cultural obligations. The RFCs vary from 0.84 to 0.01, showing how plants may vary in uses. *Allardia tridactylites* showed the highest RFC value (0.84) followed by *Delphinium brononianum* (0.81), *Rosa webbiana* (0.77), and *Tanacetum falconeri* (0.76). *Codonopsis calematidea*, *Tagates patula*, and *Lactuca oleracea* have the lowest RFC value of 0.01. Among all species with the highest RFC, *Allardia tridactylites* was used to cure abdominal pain and *Delphinium brononianum* was used to treat pneumonia and breathing problems described by Abbas *et al.* (2022) for the similar use. *Allardia tridactylites* is also used against food poisoning and phytochemical investigation revealed that this plant is a valuable source for the development of multiple formulations that are effective in targeting major biological enzymes (Abbas *et al.* 2022). *Delphinium brunonianum* is used to treat fever, headache, stomachache, and cough in Nepal and phytochemistry revealed that it has stronger antibacterial properties than ampicillin and gentamicin. Present study found that *Rosa webbiana* is used as a blood purifier and *Tanacetum falconeri* is used for the treatment of eczema, dandruff and abdominal pain while *Urtica dioica* is used for pneumonia in the study. Abbas *et al.* (2021) found that *Urtica dioica* is used for jaundice, and Ali (2023) *Rosa webbiana* is used to improve digestion. *Tanacetum falconeri* is effective for lowering blood pressure and *Rosa webbiana* is effective for treating skin inflammation (Hussain *et al.* 2011b). *Tanacetum falconeri* is also used for blood poisoning, *Dactylorhiza hatagirea* has been mentioned for impotency and *Hyoscyamus niger* is effective for toothache (Singh, 2013), which resonates with our findings. *Capparis spinosa*, *Elaeagnus angustifoli* and *Oxyria digyna* are used for the treatment of joint pain, cough and hepatitis, respectively, which is also reported in previous studies (Hussain *et al.* 2024). The high RFC indicates high consensus of use of reported medicinal plants and the plants having low RFCs are not well known to the local community and are not frequently used, either because they are uncommon or because other plants are used instead or the rare ones. Those differences may be due to sociocultural differences as well amongst locales, which could limit the ethnobotanical knowledge transfer between regions.

The Asteraceae family showed the highest FIV value of 3.81 followed by Rosaceae (1.94) and Polygonaceae (1.37). Mir *et al.* (2021) and Haq *et al.* (2025) have also reported Asteraceae as the most important family in terms of its medicinal aspect. Based on FIV, Asteraceae is the dominant family followed by Fabaceae, Polygonaceae, and Rosaceae in Naltar Gilgit Baltistan.

Most of the medicinal plants are used for the treatment of gastrointestinal diseases, which relates previous findings Bahmani *et al.* (2014) and Tangjitman *et al.* (2015) the MPs are used to treat, besides gastrointestinal, respiratory, reproductive, dermatological, and urinogenital disorders. The highest ICF value (0.98) went to respiratory disorders, followed by gastrointestinal disorders with an ICF value of 0.97. Batool *et al.* (2025) also found the highest ICF to be for respiratory disorders while Kayani *et al.* (2024) found eye diseases and respiratory disorders with the highest ICF in all Pakistan. Gastrointestinal diseases and respiratory disorders were reported with higher ICF in Gilgit-Baltistan. Pakistan. Respiratory disorders were reported with high ICF in Baluchistan, Pakistan (Tareen *et al.* 2016). The higher the ICF value shows a higher level of agreement between informants for using medicinal plants to cure a specific disease category. The smoke due to burning dung and wood for cooking in high altitude areas may result in higher respiratory diseases (Norboo *et al.* 1991).

Preference ranking in the study area indicates that *Allardia tridactylites* is most effective for abdominal pain, *Morus nigra* for cough, *Hippophae rhamnoides* for hepatitis, *Fagopyrum tataricum* for stomach pain, *Bistorta vivpara* for treatment of boils, and *Rosa webbiana* is the best remedy for blood poisoning. Hussain *et al.* (2011) and (Abdullah *et al.* 2023) reported similar uses for *Fagopyrum tataricum* for stomach pain, *Hippophae rhamnoides* for diabetes and *Rosa webbiana* to treat of jaundice. *Morus alba* is used for cough; it is effective for sore throat and *Rosa webbiana* is used as a stomachic (Bussmann *et al.* 2025). *Morus alba* and *Morus nigra* have been reported in the literature to be used as laxatives *Hippophae rhamnoides* is effective against jaundice, effective for diabetes and used as an energy booster (Haq *et al.* 2025). *Bistorta vivpara* is known as an antioxidant, and other phenolic compounds, exhibit antitumor and anti-inflammatory activities housing quercetin which

protects tissues from injuries due to oxidative stress (Javid *et al.* 2024). Being astringent, it has been recorded for the treatment of diarrhoea. The root has shown antimicrobial activities. *Fagopyrum tataricum* was mentioned for antitumor, antidiabetic, antibacterial, anti-inflammatory and hepatoprotective properties, while used for the treatment of stomach pain in Chinese medicine and exhibits strong antioxidant effects due to the presence of rutin, quercetin and other polyphenols (Zou *et al.* 2023). The species has been used as construction materials, for fencing, roofing, making different tools as well as for beverages.

The medicinal flora originating from our interviews and focus groups generated 129 species of 103 genera belonging to 48 families. Herbs and wild species were dominantly used for medicinal purposes as compared to the shrubs, trees and cultivated species, which were utilized for *Allardia tridactylites, Delphinium brononianum, Rosa webbiana,* and *Tanacetum falconeri* showed the highest RFC values of 0.84, 0.81, 0.77, and 0.76, respectively. Asteraceae had the highest FIV (3.81) followed by Rosaceae (1.94), and Polygonaceae (1.37). Respiratory and gastrointestinal disorders show the highest ICF value of 0.98 and 0.97, respectively. This finding may point to recurring health problems in those valleys for which interviewees must be sharing knowledge and, perhaps, discussing the best plants to be used. *Allardia tridactylites* was found to be the best medicinal plant for abdominal pain, *Morus nigra* for cough, *Hippophae rhamnoides* for hepatitis, *Fagopyrum* esculentum for stomach pain, *Bistorta vivpara* for the treatment of Boils, and *Rosa webbiana* for blood poisoning according to the preference ranking values. Those plants and the flora of the region are of great importance to local communities for medicinal purposes but also for food and many other uses. Therefore, a common concern amongst communities was underlined which is the lack of knowledge about possible threats to the local flora and, even more problematic, the absence of protective measures (Tang and Gavin, 2016). Therefore, it is recommended to thoroughly investigate threats to medicinal flora and take conservation measures in order to protect the valuable flora in the area. Furthermore, it was suggested to properly market economically significant plants for improvement of the economy of local residents, following sustainable development measures. Phytochemical and pharmacological analyses may lead to the discovery of new drugs based upon the medicinal flora of the Masherbrum valley. Such development should be done within the socio-economic interest of the local people.

The findings of the current investigation in the Mashabrum valley were compared with the past investigations in neighboring regions of Gilgit Baltistan. It reveals that 4 species were newly reported as traditional medicinal plants in GB to the best of our knowledge. According to Abbas *et al.* (2022) 125 species have already been reported from different areas of Gilgit Baltistan. Of the 125 species already reported, 32 were used differently in Mashabrum valley compared to other regions of Gilgit Baltistan. Plants with newly reported medicinal uses are *Bistorta vivipara, Lactuca tatarica, Menthiola flavida and Vincetoxicum canescens.* The villages of Skardu and Astore around Desoai National parks DNP also had significant similarities with the current area in use of medicinal flora.

Conclusion

In conclusion, Masherbrum valley is endowed with an amazing ethnobotanical knowledge of which almost 129 medicinal plants have been reported to treat different human diseases. The variety of medicinal plants and modes of therapy are key components for the wellbeing of local people, especially in a place where access to modern medicine is limited. This traditional knowledge, which has been developed through centuries, is confronted with a slow but continuous erosion as younger generations do not have much interest in the traditional forms of therapy since modern synthetic medications is gradually becoming more popular and accessible. This knowledge must be documented and protected, being a source of sustainable healthcare. Moreover, phytochemical screening of these medicinal plants may offer new useful compounds, positively impact present-day medicine while help the local economy.

Declarations

List of abbreviations: RFC - Relative Frequency of Citation; FIV - Family Importance Value; ICF - Informant Consensus Factor; PR - Preference Ranking; FC - Frequency of Citation; N - Total number of informants; Nur - Number of use reports; Nt - Number of taxa; WHO - World Health Organization; GPS - Global Positioning System

Ethics approval and consent to participate: The study followed ethical guidelines for research on traditional knowledge. Prior informed consent was obtained from all participants before conducting interviews, and confidentiality of the information was ensured throughout the study.

Consent for publication: They agreed having their image published.

Availability of data and materials: Not applicable

Competing interests: Not applicable

Funding: Not applicable

Author contributions: All authors contributed to the study conception and design. M.N. conducted the study as a student, performed material preparation and data collection, and drafted the initial manuscript. Z.A. served as co-supervisor, contributing to study design, statistical analysis, data interpretation, manuscript drafting and plant specimens' identification. I.H. acted as supervisor, plant identification, providing guidance throughout the study. M.U. assisted with statistical analysis, data interpretation, graphics and manuscript preparation. S.M.K. edited the manuscript for clarity and consistency. A.A.C assisted in manuscript preparation, data organization and graphics. and A.C. provided critical revisions and final approval of the manuscript. All authors reviewed and approved the final version of the manuscript. All authors read and approved the final manuscript.

Acknowledgements

The authors are grateful to all the individuals who participated in the interviews and shared their valuable knowledge. We also sincerely thank those who assisted with the data collection and fieldwork, whose support and cooperation were essential for the successful completion of this study.

Literature cited

Abbas Z, Bussmann R W, Khan SM, Abbasi AM. 2022. A review of current trends and future directions in the medical ethnobotany of Gilgit-Baltistan (Northern Pakistan). Ethnobotany Research and Applications 24:1-16.

Abbas Z, Khan SM, Alam J, Abideen Z, Ullah Z. 2020. Plant communities and anthropo-natural threats in the Shigar valley, (Central Karakorum) Baltistan-Pakistan. Pakistan Journal of Botany 52(3): 987-994.

Abbas Z, Khan S.M, Alam J, Khan SW, Abbasi AM. 2017. Medicinal plants used by inhabitants of the Shigar Valley, Baltistan region of Karakorum range-Pakistan. Journal of ethnobiology and ethnomedicine 13(1): 53.

Abbas Z, Khan SM, Abbasi AM, Pieroni A, Ullah Z, Iqbal M, Ahmad Z. 2016. Ethnobotany of the Balti community, Tormik Valley, Karakorum range, Baltistan, Pakistan. Journal of Ethnobiology and Ethnomedicine 12: 1-16.

Abbas Z, Kousar S, Aziz MA, Pieroni A, Aldosari AA, Bussmann RW, Raza G, Abbasi AM. 2021. Comparative assessment of medicinal plant utilization among Balti and Shina communities in the periphery of Deosai National Park, Pakistan. Biology 10(5):434-442.

Abdullah Khan, Khan MA, Adhikari A. 2023. Radical scavenging, anti-inflammatory, and hepatoprotective activities of pentacyclic triterpene isolated from *Rosa webbiana*. Current Drug Targets 24(16): 1282-1291.

Ahmad M, Sultana S, Fazl-i-Hadi S, Ben HT, Rashid S, Zafar M, Khan MA, Khan M PZ, Yaseen G. 2014. An ethnobotanical study of medicinal plants in high mountainous region of Chail valley (District Swat-Pakistan). Journal of Ethnobiology and Ethnomedicine 10(1): 36.

Ali S. 2023. A study on different plant species of the Rosaceae family and their ethnobotanical uses among the local communities at Swat district, Pakistan. Ethnobotany Research and Applications 25: 1-16.

Arul MSR, Kalaskar M, Gurav S, Ayyanar M. 2025. Folk medicine as a source of therapeutically important drugs: evidence from ethnobotanical investigations. Pharmacognosy and Phytochemistry: Principles, Techniques, and Clinical Applications 43-66.

Aswani S, Lemahieu A, Sauer WH. 2018. Global trends of local ecological knowledge and future implications. PloS One 13(4): e0195440.

Bahmani M, Zargaran A, Rafieian-Kopaei M. 2014. Identification of medicinal plants of Urmia for treatment of gastrointestinal disorders. Revista Brasileira de Farmacognosia 24(4):468-480.

Baig MB, Ahmed M. 2007. Biodiversity in Pakistan: status challenges and strategies for its conservation. International Journal of Biology and Biotechnology 4(4):283-292.

Balkrishna A, Yadav P, Yadav P, Saini A, Kumar B, Singh N, Sharma D, Arya VP. 2024. Factors affecting biodiversity and conservation of medicinal plants. In: Nandave M, Joshi R, Upadhyay J. (eds.) Ethnopharmacology and OMICS Advances in Medicinal Plants Volume *1:* Uncovering Diversity and Ethnopharmacological Aspects Springer, Delhi,India, Pp. 1-16.

Bano A, Ahmad M, Hadda TB, Saboor A, Sultana S, Zafar M, Khan MPZ, Arshad M, Ashraf MA 2014. Quantitative ethnomedicinal study of plants used in the Skardu valley at high altitude of Karakoram-Himalayan range, Pakistan. Journal of Ethnobiology and Ethnomedicine 10(1): 43.

Bano A, Ahmad M, Zafar M, Sultana S, Rashid S, Khan MA. 2014. Ethnomedicinal knowledge of the most commonly used plants from Deosai Plateau, Western Himalayas, Gilgit Baltistan, Pakistan. Journal of ethnopharmacology 155(2): 1046-1052.

Batool R, Nazar A, Adnan M, Khursheed Z, Mohsin F, Hussain W. 2025. Cross culture comparison in ethno-pharmacological uses of plants between two geographical regions of Northwest Pakistan. Ethnobotany Research and Applications 30: 1-21.

Bussmann RW, Paniagua-Zambrana NY, Khutsishvili M, Kikvidze Z, Khojimatov O K, Müller L, Batsatsashvili K, Sikharulidze S, Tchelidze D, Mehdiyeva NP 2025. *Morus alba* L. *Morus nigra* L. Moraceae. In Bussmann RW, Narel Y, Zambrana P, Kikvidze Z. (eds.). Ethnobotany of the Caucasus. Springer, Switzerland, Pp. 3747-3772.

Dhawan B. 2003. WHO monographs on selected medicinal plants. Indian Journal of Medical research 118:97-98.

Fatima F, Ali S, Raza H, Siddiqi FA, Ali S. 2025. Empowering climate action through policy analysis and education in Gilgit-Baltistan: a comprehensive mixed method analysis. Frontiers in Climate 7:1527694.

Haq SM, Waheed M, Jameel MA, Walas Ł, Khan MN, Siddiqui MH, Alamri S, Abuyahya AE, Bussmann RW. 2025. Alien flora of the Kingdom of Saudi Arabia: taxonomic composition, phylogenetic patterns, and invasion status. Biological Invasions: 27(11): 1-18.

Heinrich M, Ankli A, Frei B, Weimann C, Sticher O. 1998. Medicinal plants in Mexico: Healers' consensus and cultural importance. Social Science and Medicine 47: 1859-1871.

Hoffman B, Gallaher T. 2007. Importance indices in ethnobotany. Ethnobotany Research and Applications 5: 201-218.

Hussain B, Abbas Z, Alam J, Harun N, Khan S M, Ahmad Z, Han H, Yoo S, Raposo A. 2024. Cross-cultural ethnobotany of the Baltis and Shinas in the Kharmang district, Trans-Himalaya India-Pakistan border. Heliyon 10(7).

Hussain I, Bano A, Ullah F. 2011. Traditional drug therapies from various medicinal plants of central Karakoram national park, Gilgit-Baltistan Pakistan. Pakistan Journal of Botany 43: 79-84.

Hussain S, Hussain W, Nawaz A, Badshah L, Ali A, Ullah S, Ali M, Hussain H, Bussmann RW. 2022. Quantitative ethnomedicinal study of indigenous knowledge on medicinal plants used by the tribal communities of Central Kurram, Khyber Pakhtunkhwa, Pakistan. Ethnobotany Research and Applications: 23: 1-31.

Hussain I, Ansari L, Ahmad W, Butt NI., Rafiq N. 2024b. Socio-Economic Impact of Ethnobotanical Appraisal of Traded Medicinal Plants on Local Communities of District Astore (Gilgit Baltistan). Journal of Asian Development Studies 13: 1306-1322.

Jauhari S, Jauhari R, Rupanagunta GP, Nandave M, Upadhyay J, Joshi R. 2024. Insights on the Integration of Ethnopharmacology and Omics in Medicinal Plant Research. In: Nandave M, Joshi R, Upadhyay J. (eds.). Ethnopharmacology and OMICS Advances in Medicinal Plants Volume *1:* Uncovering Diversity and Ethnopharmacological Aspects Springer, Delhi, India, Pp. 501-514.

Javid H, Qadir UR, Magray JA, Wani BA, Nawchoo IA, Gulzar S. 2024. Variability in morphology, phytochemicals and antioxidant activity in *Bistorta amplexicaulis* (D. Don) Greene populations under variable habitats and altitudes. Natural Product Research 38(4): 563-580.

Karunamoorthi K, Jegajeevanram K, Vijayalakshmi J, Mengistie E. 2013. Traditional medicinal plants: a source of phytotherapeutic modality in resource-constrained health care settings. Journal of Evidence-Based Complementary and Alternative Medicine 18: 67-74.

Kayani S, Ahmad M, Gillani SW, Manzoor M, Rehman FU, Jabeen S, Butt MA, Babar CM, Shah SAH. 2024. Ethnomedicinal appraisal of the medicinal flora among the sub-alpine and alpine indigenous communities of Palas Valley Kohistan, Northern Pakistan. Ethnobotany Research and Applications 28: 1-29.

Khan B, Abdukadir A, Qureshi R, Mustafa G. 2011. Medicinal uses of plants by the inhabitants of Khunjerab National Park, Gilgit, Pakistan. Pakistan Journal of Botany 43(5):2301-2310.

Konovalov D. 2014. Polyacetylene compounds of plants of the Asteraceae family. Pharmaceutical Chemistry Journal 48(9): 613-631.

Lal M, Chandraker SK, Shukla R. 2023. Quantitative ethnobotanical study of therapeutic plants of Amarkantak hills in Achanakmar-Amarkantak Biosphere Reserve, Central India. Acta Ecologica Sinica 43: 139-153.

Martin G. J. 2010. Ethnobotany: a methods manual. Routledge.

Maden K. 2004. Plant collection and herbarium techniques. Our Nature 2: 53-57.

Mir AY, Yaqoob U, Hassan M, Bashir F, Zanit SB, Haq SM, Bussmann RW. 2021. Ethnopharmacology and phenology of high-altitude medicinal plants in Kashmir, Northern Himalaya. Ethnobotany Research and Applications 22: 1-15.

Namukobe J, Kasenene JM, Kiremire BT, Byamukama R, Kamatenesi-Mugisha M, Krief S, Dumontet V, Kabasa JD. 2011. Traditional plants used for medicinal purposes by local communities around the Northern sector of Kibale National Park, Uganda. Journal of Ethnopharmacology: 136(1):236-245.

Norboo, T., Yahya, M., Bruce, N., Heady, J., & Ball, K. (1991). Domestic pollution and respiratory illness in a Himalayan village. International Journal of Epidemiology, 20(3), 749-757.

Pironon S, Ondo I, Diazgranados M, Allkin R, Baquero A, Cámara-Leret R, Canteiro C, Dennehy-Carr Z, Govaerts R, Hargreaves S. 2024. The global distribution of plants used by humans. Science 383(6680): 293-297.

Qaiser M, Perveen A, Alam J, Ali H, Abid R. 2025. Asteraceae in Pakistan and Kashmir with special emphasis on distribution pattern and endemism. Genetic Resources and Crop Evolution 72(6): 6951-6980.

Rahman KM, Risat MIK. 2025. Crossing Borders: The Nexus of Migration, Economic Forces, and Political Realities in South Asia. In: Ullah AKM. (eds.) Handbook of Migration, International Relations and Security in Asia. Springer, Singapore, Pp. 1-18).

Sanz-Biset J, Cañigueral S. 2013. Plants as medicinal stressors, the case of depurative practices in Chazuta valley (Peruvian Amazonia). Journal of Ethnopharmacology 145(1): 67-76.

Sarkar M, Modak BK. 2023. Indigenous knowledge and strategic approaches to combat drought: a study from the Western Rarh Region (Bankura and Purulia Districts) in West Bengal. In: Panda GK, Chatterjee U, Bandyopadhyay N, Setiawati MD, Banerjee, D. (eds.). Indigenous Knowledge and Disaster Risk Reduction: Insight Towards Perception, Response, Adaptation and Sustainability. Springer, Cham, Germany, Pp. 153-185.

Sati VP. 2014. Towards sustainable livelihoods and ecosystems in mountain regions. Springer.

Sharma P., Manchanda, R., Goswami, R., & Chawla, S. (2020). Biodiversity and therapeutic potential of medicinal plants. *Environmental Concerns and Sustainable Development: Volume 2*: Biodiversity, Soil and Waste Management, 27-44.

Sheikh K, Ahmad T, Khan MA. 2002. Use, exploitation and prospects for conservation: people and plant biodiversity of Naltar Valley, northwestern Karakorums, Pakistan. Biodiversity and Conservation 11(4): 715-742.

Shinwari Z K, Qaiser M. 2011. Efforts on conservation and sustainable use of medicinal plants of Pakistan. Pakistan Journal of Botany 43(1): 5-10.

Tang R, Gavin MC. 2016. A classification of threats to traditional ecological knowledge and conservation responses. Conservation and society 14(1): 57-70.

Tangjitman K. Wongsawad C, Kamwong K, Sukkho T, Trisonthi C. 2015. Ethnomedicinal plants used for digestive system disorders by the Karen of northern Thailand. Journal of Ethnobiology and Ethnomedicine 11(1): 27.

Tareen NM, Rehman M, Shinwari ZK, Bibi T. 2016. Ethnomedicinal utilization of wild edible vegetables in district Harnai of Balochistan Province-Pakistan. Pakistan Journal of Botany 48(3):1159-1171.

Trotter RT, Logan MH. 2019. Informant consensus: a new approach for identifying potentially effective medicinal plants. In: Etkin NL. (Eds.). Plants and indigenous medicine and diet. Routledge, UK, Pp. 91-112.

Ullah M, Mehmood S, Ali M, Bussmann RW, Aldosari A, Khan RA, Ullah R, Hussain W, Shah MAR. 2019. An ethnopharmacological study of plants used for treatment of diabetes in the Southern and Tribal regions of Khyber Pakhtunkhwa province, Pakistan. Ethnobotany Research and Applications 18:1-20.

Vitalini S, Iriti M, Puricelli C, Ciuchi D, Segale A, Fico G. 2013. Traditional knowledge on medicinal and food plants used in Val San Giacomo (Sondrio, Italy)—An alpine ethnobotanical study. Journal of Ethnopharmacology 145:517-529.

Yang E, Yao Q, Long B, An N. Liu Y. 2024. Progress in the research of features and characteristics of mountainous rural settlements: distribution, issues, and trends. Sustainability 16(11): 4410.

Zou L, Wu D, Ren G, Hu Y, Peng L, Zhao J, Garcia-Perez P, Carpena M, Prieto MA Cao H. 2023. Bioactive compounds, health benefits, and industrial applications of Tartary buckwheat (*Fagopyrum tataricum*). Critical Reviews in Food Science and Nutrition 63(5):657-673.

Table 6. Taxonomic and ethnobotanical description of documented plants.

Scientific name/Family/Voucher number	Local name	Source/ Habit	Part(s) used	Disease treated	Drug formulation & Administration	RFCs	Misc.
Beta vulgaris L./Amaranthaceae/MEP01	Chuqandar	C/H	Root	Anemia	eat fresh root/ Oral	0.065	Fd, Fr,
Chenopodium album L. /Amaranthaceae/MEP02	Peenu	W/H	Leaves	Abdominal Pain, Diarrhea	decoction is taken or used in soup/oral	0.078	Fr
Chenopodium glaucum L. /Amaranthaceae/MEP03	Khama	W/H	Leaves	Diabetes mellitus	cooked and eat as vegetable /oral	0.032	Fd, Fr
Allium przewalskianum Regel /Amaryllidaceae/MEP04	Chong Kio	W/H	Bulb	Boils	Grinded bulb is applied on boils/oral	0.083	Fd
Allium cepa L. /Amaryllidaceae/MEP05	Song	C/H	Bulb	Eye Pain / Boils	Cooked in apricot oil to eat for pain in eyes. applied on boils/oral	0.046	Fd, Fr
Allium sativum L. /Amaryllidaceae/MEP06	Zhoqpa	C/H	Corm	Hypertension	mixed in food or eat fresh/oral	0.065	Fd, Fr
Bunium spp./Apiaceae/MEP07	serposhutu	C/H	Seed	abdominal pain	Decoction or powder is taken / Oral	0.055	Fd, Fr
Bunium persicum (Boiss.) B.Fedtsch./Apiaceae/MEP08	Naqposhutu	C/H	Seed	Abdominal Pain / Indigestion	Decoction is taken or powder is eaten/ Oral	0.189	Bv
Carum carvi L./Apiaceae /MEP09	Zeera/Kro Sniat	W/H	Seed	Chilling disorder/ Indigestion	Mixed in food to warm the body and to improve digestion / Oral	0.240	Fd
Coriandrum sativum L. /Apiaceae/MEP10	Osu	C/H	Seed/ Leaves	Abdominal Pain/ Dairrhoea	eaten or decoction is taken / Oral	0.051	Fd, Fr
Daucus carota L./Apiaceae /MEP11	Wulafu	C/H	Root	Enhance Eye Vision	eaten fresh root or mixed in food / Oral	0.046	Fd, Fr, Bv
Foeniculum vulgare Mill./Apiaceae/MEP12	Badian	C/H	Seed	Abdominal Pain / Fever	Seeds are mixed in tea. / Oral	0.392	Fd, Bv
Heracleum pinnatum C.B. Clarke/Apiaceae/MEP13	Ghang	W/H	Root	Wound or Boils	grinded powder is applied on affected part/topical	0.129	Nil
Plurospermum candoleii Benth. ex C.B. Clarke/Apiaceae /MEP14	Shamdun	W/H	Leaves/ Seed	Abdominal Pain,Breathing Problem/Cough	Decoction or powder is used for abdominal disorders. Seed is mixed in green tea to treat breathing problem. /oral	0.461	Bv
Vincetoxicum canescens (Willd.) Decne./Apocyanaceae/MEP15	Dray Sniarma	W/H	Fruit/ Leaves	Ring worm	powder applied on effected part/ Topical	0.014	Nil
Cynanchum acutum L. /Apocynaceae/MEP16	Oma Harswa	W/H	Aerial Parts	Ringworm	The milky latex apply on infected area.	0.032	Fr
Allardia tridactylites (Kar. and Kir.) Sch.Bip./ Asteraceae/MEP17	Tarqan/ Qarqam	W/H	Leaves/ Flower	Abdominal Pain	Decoction of flower is taken three times in a day. /Topical	0.839	Bv

Tanacetum falconeri Hook.f./ Asteraceae/MEP18	Hilteeri	W/H	Flower	Eczema/Abdominal Pain/Dandruff/Chest Pain	Bath with flower decoction for Eczema. Whole plant powder is mixed with oil and applied on hairs to remove dandruff. Decoction of flower is taken for abdominal pain and chest pain. / Topical	0.756	Nil
Artemisia absinthium L. /Asteraceae/MEP19	Khampa	W/H	Flower	Stomach Pain/ Blood Pressure	Grind the flower and Powder is taken /oral	0.415	Fr
Seriphidium brevifolium (Wall. ex DC.) Ling & Y.R.Ling /Asteraceae/MEP20	Khobursay/Naqzbur	W/S	Leaves	Abdominal Pain/Nausea/ Abdominal Worms/Diabetes Mellitus	powder of leaves is taken/oral	0.700	Fr, Bf, Fl. Rf
Erigeron flaccidus (Bunge) Botsch./Asteraceae/MEP21	Brangas Mindoq/Spangzima	W/H	Flower	Headache	flower is used to make tea/oral	0.092	Nil
Taraxacum officinale (L.) Weber ex F.H.Wigg/Asteraceae/MEP22	Basandah	W/H	Leaves	Blood Poisoning	used as vegetable / oral	0.221	Fd, Fr
Inula rhizocephala Schrenk/Asteraceae /MEP23	chaingo	W/H	Root	Migraine	Decoction is taken/oral	0.021	Nil
Tagetes patula L. /Asteraceae/MEP24	Rgyalpo	C/H	Root	Boils	Root is eaten or decoction is taken / oral	0.009	Fr
Erigeron spp./Asteraceae /MEP25	Shalu	W/H	Flower/ Aerial Parts	Arthritis/Pain Killer/Swelling	powder mixed in apricot oil and massage on the effected part/topical	0.147	Nil
Echinopes cornigerus DC. /Asteraceae/MEP26	Charchong	W/H	Root	Urinary disorders	decoction is taken / oral	0.055	Fr
Echinopes echinatus Roxb./Asteraceae/MEP27	Bongsar	W/H	Plant	Bleeding from Cuts	powder is applied on affected part/ oral	0.018	Fr
Ajania fruticulosa (Ledeb.) Poljakov./Asteraceae/MEP28	Ryongmo	W/S	Flower/ Leaves	Hypertension/Diabetes Mellitus/Abdominal Worm	decoction of flower is used for hypertension and diabetes mellitus while abdominal worm can be removed by eating powder of leaves/ oral	0.101	Fr, Fl
Lactuca tatarica (L.) C.A.Mey. /Asteraceae/MEP29	Khoskiab	W/H	Leaves	Blood Poisoning/ Swelling	Cooked as vegetable/powder applied on swollen part/oral	0.332	Fr
Lactuca oleracea M.Gómez /Asteraceae/MEP30	Salad	C/H	Leaves	Blood Cleaner/ Obesity	eaten fresh leaves / Topical	0.009	Fd, Fr
Helianthus annuus L. /Asteraceae//MEP31	Sningmazguru	C/H	Seed	Low Egg Production	given as food to increase egg production/ oral	0.018	Fd, Fr
Saussurea obvallata (DC.) Edgew./MEP32	Skini Mindoq	W/H	Root/ flower	Fever/boils	Root paste is applied on effected part. Flower is used to treat fever/ oral/topical	0.028	Nill
Allardia tomentosa Decne. /MEP33	Tarqan saltoro	W/H	Leaves /Flower	Abdominal pain	Decoction is taken three times daily / oral	0.023	Bv

Biebersteinia odora Royle./Biebersteniaceae/MEP34	Khoros	W/H	Leaves/ Flower	Worms on Sore/ Arthritis	powder or extract is applied on effected part/ Flower is mixed in green tea for arthritis/oral/topical	0.244	Fg
Berberis pseudumbellata R.Parker/Berberidaceae/MEP35	Shukurum	W/S	Root	Hepatitis	Decoction is taken / oral	0.447	Fl
Arnebia guttata Bunge/Boraginaceae/MEP36	Marsi	W/H	Root	Blood Cleaning/ Anemia	Decoction is taken/grinded bark is taken with milk/oral	0.189	Fr
Onosma hispida Wall. ex G. Don/Boraginaceae/MEP37	Skang Mar	W/H	Leaves	Labour Pain /Arthritis	eat as vegetable/ oral	0.088	Fd, Fr
Brassica rapa L. /Brassicaceae/MEP38	Karfo Molo	C/H	Bulb	Hepatitis	cooked and eat/ oral	0.097	Fd, Fr
Menthiola flavida Boiss./Brassicaceae/MEP39	Sarsing Harswa	W/H	Seed/ Leaves	Urinary Disorder/ Burning and Obstruction Of Urine	decoction is taken/oral	0.028	Nil
Malcolmia cabulica /Brassicaceae (Boiss.) Hook.f. & Thomson /Brassicaceae/MEP40	Khaltas	W/H	Leaves	Diabetes mellitus	cooked and eat as vegetable/oral	0.037	Fd, Fr
Brassica oleracea L./Brassicaceae/MEP41	Ban Gobi	C/H	Leaves	Stomach disorder	cooked and eat as vegetable /oral	0.083	Fd, Fr
Codonopsis calematidea (Schrenk) C.B.Clarke/Caryophyllaceae /MEP42	Ghang(Saltoro)	W/H	Root	Boil / Sores	Root is grinded and powder is applied on effected part /topical	0.009	Nil
Capparis spinosa L. /Capparidaceae/MEP43	Krawa	W/S	Seed/ Flower	Arthritis/Breath problem, Chill/Migraine	Seed oil is applied and massage on effected part.Flower is useful for breathing problem and migraine/topical	0.309	Fd, Fr
Cucurbita maxima Duchesne./Cucurbitaceae/MEP44	Wand	C/H	Fruit	stomach pain/ General weakness	cooked and eat /oral	0.083	Fd, Fr
Cucumis melo L./Cucurbitaceae/MEP45	Ghone	C/H	Fruit	Anemia/General weakness	Eaten fresh /oral	0.083	Fd, Fr,
Citrullus vulgaris Schrad./Cucurbitaceae/MEP46	Bowar	C/H	Fruit	Dry throat/Anemia	Eaten fresh /oral	0.037	Fd, Fr
Juniperus excelsa Willd. /Cupressaceae/MEP47	Shuppa /Shukpa	W/T	Leaves/ Seed	Hepatitis B/Kidney Pain	leaves soaked water is taken or decoction is taken for hepatitis/seed is eaten for renal pain //oral	0.143	Fr, Fl, Tl
Cuscuta reflexa Roxb. /Cuscutaceae /MEP48	Ghbulthaq	W/H	Aerial Parts	After birth difficulty	Give as food to remove placenta especially for animals. /oral	0.166	Fd
Elaeagnus aungustifolia L. /Elaeagnaceae/MEP49	Sarsing	C/T	Fruit/ Bark	Cough	eat or decoction is taken/oral	0.051	Fd, Fr, Bf, Fl, Fg
Hippophae rhamnoides L. /Elaeagnaceae/MEP50	Soq	W/S	Fruit	Hepatitis/Bp/Diabetes Mellitus	eaten fresh or dried fruit /oral	0.392	Fl, Fn, Rf

Ephedra gerardiana Wall. ex Stapf /Ephedraceae/MEP51	Say	W/S	Aerial Parts	toothache/vaginal loosening	Grinded aerial part to make a paste and applied on effected tooth/ Aerial parts are soaked in water and then vagina is washed or dip in that water /oral.	0.129	Fr, Bf, Fl
Equisetum ramosissimum Desf. /Equisetaceae/MEP52	Shuptu	W/H	Aerial Parts	Stomach Pain,Sore,Boil	grind with *Medicago minima* and powder is taken with water /oral	0.032	Fr
Equisetum arvense L. /Equisetaceae/MEP53	Mikchammo	W/H	Aerial Parts	Hepatitis	powder is taken with water /oral	0.018	Fr,
Astragalus cariensis Boiss. /Fabaceae/MEP54	Chaingo	W/H	Leaves	Migraine	dried leaves are mixed with cinnamon and apricot oil and grind. The paste is applied on forehead/topical	0.046	Nill
Trifolium repens L. Fabaceae/MEP55	Gul E Nasireen	W/H	Flower	Blood Pressure	eaten flower /oral	0.065	Nil
Vicia faba L. Fabaceae/MEP56	Naqstran	C/H	Seed	Stomach Pain/Hepatitis	cooked and eat or decoction is also used for hepatitis /oral	0.226	Fd, Fr
Pisum sativum L. Fabaceae/MEP57	Stranma	C/H	Seed	Weakness	cooked as food /oral	0.171	Fd, Fr
Sophora alopecuroides L./ Fabaceae/MEP58	Khakhol	W/S	Leaves	Hepatitis	powder mixed in butter (Dalda) and massage on forehead/topical	0.083	Nil
Phaseolus vulgaris L./ Fabaceae/MEP59	Mamantho	C/H	Seed	Stomach Problems/Kidney Problems/ General Weakness	seeds are cooked and eat /oral	0.046	Fd, Fr
Medicago sativa L./ Fabaceae/MEP60	Buksuk	C/H	Seed	Diabetes mellitus	seed and cardamom are mixed to make tea(qahwa) /oral	0.023	Fr
Trigonella feonum graecum L./ Fabaceae/MEP61	Shamilik	C/H	Leaves	Dizziness	Decoction is taken /oral	0.051	Fd
Cicer microphyllum Benth./ Fabaceae/MEP62	Payu Harswa/Sari	W/H	Leaves/ Seed	Salt Deficiency, /Low Blood Pressure	eaten fresh leaves or seed /oral	0.028	Fr
Colutea paulsenii Freyn / Fabaceae/MEP63	Brama	W/S	Seed	Sexual Weakness/ Excess Salivation	Seeds are eaten /oral	0.032	Fl, Th
Astragalus psilocentrose / Fisch./MEP64	Sotrut	W/S	Root	Tooth Ache	the inner wood is used as miswak /topical	0.083	Nil
Medicago minima (L.) Bartal/ Fabaceae/MEP65	Gul E Nasreen Kundos	W/H	Aerial Parts	Stomach Pain/ Sore or Blisters in Oral Cavity and Other Parts of Food Pipe	grind the aerial parts by mixing with *Equisetum ramossisma* plant to make a powder which is taken with water /oral	0.023	Nil
Swertia cordata (G.Don) Wall.ex C.B.Clarke/Gentianaceae /MEP466	Tikta	W/H	Aerial Parts	Stomach Disorder, Urinary disorder, Acidity, Blood poisoning	powder is taken with water /oral	0.323	Nil

Ribes himalense Royle ex Decne./Glossulriaceae/MEP67	Shatung	W/S	Seed	Weakness/Cancer	decoction is taken /oral	0.097	Fl
Ribes orientale Desf./Glossulriaceae/MEP68	Askuta	W/S	Stem	Ring worm	wood is heated to extract oil which is applied on effected part/topical	0.115	Fl, Th
Crocus sativa L./Iridaceae/MEP69	Kurkum	C/T	Flower	Throat Pain	decoction of flower is taken/also mixed in tea /oral	0.051	Bv
Juglans regia L./Juglandaceae/MEP70	Starga	C/T	Root	Tooth Ache and Bleeding Gums	bark is used as miswak /topical	0.226	Fd, Fr, Bf, Fl
Dracocephalum moldavica L./Lamiaceae/MEP71	Samik	C/H	Leaves	Heat Stroke	power of leaves is mixed in yoghurt /oral	0.065	Fd, Fr,
Mentha royleana Wall. ex Benth./Lamiaceae/MEP72	Foling	W/H	Leaves	Stomach Disorder/ Hypertension	Leaves are mixed in tea or food /oral	0.415	Fd, Bv
Pervuskia arbotanoides Karel./Lamiaceae/MEP73	Faring Bursay	W/S	Aerial Parts	Worms on Wounds	powder is applied on affected part /topical	0.046	Fr, Bf, Fl. Rf
Thymus linearis Benth./Lamiaceae/MEP74	Tumburu	C/H	Leaves/ Whole Plant	Cough/Face Swelling	Mixed in tea. /oral	0.143	Fd, Fr
Nepeta longibracteata Benth/Lamiaceae/MEP75	Azomik	W/H	Leaves	Strength, Indigestion,Loss Of Appetite	decoction or eaten /oral	0.138	Fd, Bv
Ocimum basilicum L./Lamiaceae/MEP76	Kali Mar	W/H	Leaves	Abdominal Pain	decoction is taken /oral	0.111	Nill
Mentha arvensis L.Lamiaceae/MEP77	Podina	C/H	Leaves	Abdominal Pain/ Diarrhoea	decoction is taken. Also mixed in tea /oral	0.037	Fd, Fr,
*Malva spp./*Malvaceae/MEP78	Chochoi Luna	W/H	Leaves	Boils	grinded and applied on affected part /topical	0.014	Nil
Morus nigra L./Moraceae /MEP79	Naqpo Osay	C/T	Fruit	Cough	Fruit is eaten/ khanda is a traditional jam of fruit that is also effective. /oral	0.152	Fd, Fr, Bf, Bv, Fl, Tl
Morus alba L./Moraceae /MEP80	Karfo Osay	C/T	Fruit	Abdomianl Pain	decoction is taken /oral	0.124	Fd, Fr, Bf, Bv, Fl, Tl
Morus laevigata (Bureau) Wall. Ex Brandis/Moraceae/MEP81	Khacholi Osay	C/T	Fruit	Blood Cleaning	fruit is eaten /oral	0.092	Fd, Fr, Bf, Bv, Fl, Tl
Jasminum grandiflorum L./Oleaceae/MEP82	Chambeeli	C/S	Leaves	Toothache	Grinded leaves placed on effected tooth/topical	0.041	Fr, Fg
Epilobium latifolium L./Onagraceae/MEP83	Chamdul	W/H	Flower	Abdominal Pain/Idleness	decoction is taken three times/ Flower is mixed is green tea to remove idleness /oral	0.350	Bv
Dactylorhiza hatagirea (D.Don) Soó/Orchidaceae/MEP84	Panja/Chomki Mindoq	W/H	Root	Sexual Weakness	Dried root is boiled in water until the formation of a jelly like paste.one tea spoon paste is taken before sex time. /oral	0.189	Nil

Euphrasia multiflora Pennell /Orobanchaceae/MEP85	Putifari Harswa	W/H	Aerial Parts	Stomach Pain/Headache	used in tea/oral	0.032	Nil
Papaver somniferum L./Papaveraceae/MEP86	Bajo Mindoq	C/H	Seed	Insomnia	seeds are given before sleeping/oral	0.143	Nil
Triticum aestivum L. /Poaceae/MEP87	Wheat/Kru	C/H	Seed	Ring worm	Hot rod is placed on seed to get oily extract and then the extract is applied on effected part /topical	0.115	Fd, Fr, Bf,
Hordeum vulgare L. /Poaceae/MEP88	Nas	C/H	Seed	Hepatitis	seed are soaked in water then water is given to patient /oral	0.065	Fd, Fr, Bf,
Fagopyrum tataricum (L.) Gaertn. /Polygonaceae/MEP89	Naq Bro	C/H	Seed	Stoamch Disorder	Flour is mixed in boiling water to make a traditional dish called Zan. The flour is also used to make bread. The bread or Zan is taken to treat stomach disorders. /oral	0.410	Fd, Fr
Bistorta vivipara (L.) Delarbre /Polygonaceae/MEP90	Booma/ Roobu	W/H	Root	Boils	Root is eaten or grinded powder of root is applied on boil./topical/oral	0.613	Nil
Rheum webbianum Royle. /Polygonaceae/MEP91	Krata Khawul	W/H	Leaves /Stem	Urinary Disorder, Kidney Stones,Hepatitis	Decoction of leaves is taken for urinary disorders and kidney stones while juice of stem is taken for hepatitis /oral	0.074	Nil
Rumex crispus L. /Polygonaceae/MEP92	Sa Shing/ Harsa Shing	W/H	Bark	Hepatitis	bark is burn on scalp/topical	0.032	Fl
Oxyria digyna Hill. /Polygonaceae/MEP93	Skiorbo	W/H	Root	Blood Cleaner/ Reduce Warm	Root is taken in little amount for blood cleaning while leaves are used to cool down /oral	0.088	Nil
Fagopyrum esculentum Moench/Polygonaceae/MEP94	Giwasi Bro	C/H	Seed	Stomach problems/Blood Pressure	Flour is mixed in boiling water to make a traditional dish called marzan. The flour is also used to make bread. The bread or marzan is taken /oral	0.069	Fd, Fr
Rheum tibeticum Maxim. ex Hook.f./Polygonaceae/MEP95	Krata/Shoma	W/H	Shoot	Hepatitis	juice is taken /oral	0.083	Nil
Plantago depressa Willd./Plantaginaceae/MEP96	Bohna/Brohna/Bong Sha	W/H	Leaves	Sore/Boil/Nausea	grinded and applied on affected part/seed with milk for Nausea. /topical/oral	0.300	Fr
Acantholimon lycopodioides (Girard) Boiss./Plumbaginaceae/MEP97	Longsay	W/S	Flower	Water Intoxication/Oil Intoxication	Decoction of flower is taken /oral	0.705	Bv
Dictyolimon macrorrhabdos (Boiss.) Rech.f./Plumbaginaceae/MEP98	Shafos	W/H	Leaves/ Root	Gastric problems/Obesity/Boil	mixed in tea/decoction of leaves is used is is for obesity/powder is applied on boils/oral/topical	0.092	Nil
Primula warshenewskiana B. Fedtsch./Primulaceae/MEP99	Gangzema	W/H	Flower	Abdominal Pain/	decoction is taken three times /oral	0.092	Nil

Delphinium brononianum Royle/Ranunculaceae/MEP100	Makhoting	W/H	Flower/ Root	Asthma And Other Breathing Problems/ Pneumonia	The decoction of flower is taken two to three times in a day. /oral	0.811	Bv
Aquilegia fragrans Benth./Ranunculaceae/MEP101	Kukuk	W/H	Flower	Abdominal Pain	decoction of flower is used to treat abdominal pain /oral	0.055	Fr
Clematis orientalis L./Ranunculaceae/MEP102	Shashnia	W/S	Stem	Pimple/Boil	acidic liquid of stem is applied on effected part /topical	0.032	Fr. Th
Aconitum rotundifolium Kar. Et Kir./Ranunculaceae/MEP103	Konan	W/H	Root	Urinary disorders/Heart Pain/Stomach Pain	decoction is taken /oral	0.171	Nil
Prunus armeniaca L./Rosaceae/MEP104	Choli	C/T	Fruit	Constipation/ Digestive Disorder	Decoction is taken /oral	0.364	Fd, Fr, Bf, Bv, Fl, Tl
Rosa webbiana Wall. ex Royle /Rosaceae/ME105	Sia	W/S	Root/ Stem Bark	Blood Poisoning, Chest Pain, Arthritis	Used to make tea. /oral	0.774	Bv, Fl, Fn
Cydonia oblonga Mill./Rosaceae/MEP106	Chatol	C/T	Leaves	Stomach Pain	decoction of leaves is taken /oral	0.055	Fd, Fr, Bf, Fl, Fg
Rosa indica L./Rosaceae/MEP107	Gulab	C/S	Flower	Smell from Body	decoction is taken /oral	0.037	Bv, Fg
Rosa brunonii Lindl./Rosaceae/MEP108	Sia Sarfo	C/S	Flower	Stomach and Heart Pain	decoction is taken /oral	0.055	Bv, Fl
Prunus domestica L./Rosaceae/MEP109	Aalo Bukhara	C/T	Fruit	Anemia/Hepatitis	fresh fruit for anemia and dry fruit for hepatitis /oral	0.055	Fd, Fr, Bf, Bv, Fl,
Malus pumila Mill./Rosaceae/MEP110	Kushu	C/T	Fruit	Blood Cleaner/ Stomach Disorder	eaten fruit /oral	0.088	Fd, Fr, Bf, Bv, Fl
Prunus avium L./Rosaceae/MEP111	Glass	C/T	Fruit	Anemia	fruit is eaten /oral	0.014	Fd, Fr, Bf, Bv, Fl
Prunus amygdalus Stokes/Rosaceae/MEP112	Badam	C/T	Seed	Memory Problems	seeds are eaten /oral	0.115	Fd, Fr, Bf, Bv, Fl
Prunus persica (L.) Stokes/Rosaceae/MEP113	Takushu	C/T	Seed	Ringworm	Partially cooked on fire and then rub on stone to get paste that is applied on effected part /topical	0.138	Fd, Fr, Bf, Fl
Fragaria ananassa (Duchesne ex Weston) Duchesne ex Rozier/Rosaceae/MEP114	Straw Berry	C/H	Fruit	Hepatitis	fruit is eaten /oral	0.106	Fd, Bv
Prunus spp./Rosaceae/MEP115	Rgundalu	C/T	Fruit	Hepatitis	Fresh fruit is used /oral	0.088	Fd, Fr, Bf, Bv, Fl
Pyrus communis L./Rosaceae/MEP116	Neyori	C/T	Fruit	uterus disorder	Fresh fruit are used /oral	0.046	Fd, Fr, Bf, Fl
Salix alba L./Salicaceae/MEP109	Kal Chang	C/H	Branches	Tooth Cleaner	used as miswak /topical	0.143	Fr, Bf, Fl

Solanum nigrum L./Solanaceae/MEP117	Kinmoghi Chooli/Sa Choli	W/H	Fruit	Toothache	the fruit is burned and smoke is directed through a vessel towards effected tooth /topical	0.101	Fr
Hyoscyamus niger L./Solanaceae/MEP118	Sosman	C/H	Seed	Toothache	seed is burned and smoke is directed in mouth /topical	0.101	Nil
Capsicum annuum L./Solanaceae/MEP119	Sniarma	C/T	Fruit	Headache/ Cold	mixed in soup to warm the body /oral	0.028	Fd, Fr, Fl
Solanum tuberosum L./Solanaceae/MEP120	Alu	C/H	Tuber	Constipation	cooked and eat /oral	0.069	Fd, Fr
Solanum lycopersicom L./Solanaceae/MEP121	Tamatar	C/H	Fruit	Blood Poisoning	Fresh fruit are eaten or mixed in dishes /oral	0.028	Fd, Fr
Myricaria germanica (L.) Desv./Tamaricaceae/MEP122	Ongbo	W/S	Leaves	Boils and Sore	powder of grinded leaves is applied on affected part /topical	0.023	Fl
Urtica dioica L./Urticaceae/MEP123	Zosot	W/H	Leaves/ Root	Pneumonia /Throat Pain/Flu	Mixed in tea or used in traditional soup. /oral	0.641	Nil
Viola canescens Wall.ex Roxb./Violaceae/MEP124	Skora Mindoq	W/H	Root/ Flower	Boil / Sores	Grinded root is applied on boils, and sores/flower is eaten to enhance vision /topical/oral	0.124	Nil
Vitis vinifera L./Vitaceae/MEP125	Rgun	C/T	Fruit	Hepatitis/ General Weakness	fruit is eaten /oral	0.111	Fd, Fr, Bf, Bv, Fl
Peganum harmala L./MEP127	Isman	W/H	Flower/ Seed	Renal Stone/ Flu	The powder of dry flower is eaten that develop thirst and enforced to drink plenty of water that results removal of renal stone. Smoke of burning seed is inhaled to relieve flu. /oral	0.235	Fg
Tribulus terrestris L./Zygophyllaceae/MEP128	Cocoloq	W/H	Seed	Urinary Disorders/Kidney Stones	Decoction is taken or powder is eaten. /oral	0.249	Nil
Zingiber officinale Roscoe/ Zingiberaceae/MEP129	Chazga	C/H	Rhizome	Hypertension	mixed in food or eat fresh /oral	0.060	Fd, Fr

Key: Md; medicinal, Fd; food, Fr; fodder, Bf; biofertilizer, Bv; beverages, Fe; fuel, Tb; timber, Tl; tool, Th; thatching, Fn; fencing,

Rf; roofing, Fg; Fragrance, and Ps; poisonous