Ethnobotanical inventory and indigenous therapeutic applications of wild medicinal plants in Parishing valley, District Astore, Gilgit-Baltistan, Pakistan

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Ethnobotany Research and Applications 28:32 (2024) - http://dx.doi.org/10.32859/era28.32.1-26
Manuscript received: 20/12/2023 – Revised manuscript received: 14/02/2024 - Published: 15/02/2024

Research

Abstract

Background: This research, through an ethnobotanical survey, explores the diverse array of wild medicinal plants in Parishing Valley, District Astore, Pakistan. The study investigates traditional knowledge continuity, assesses medicinal plant familiarity, and identifies vital regional treatments.

Methods: In the field, we collected ethnobotanical data using methods included free listings, key informant interviews, and semi-structured interviews. From seven villages of Parishing Valley, 160 local informants were involved in interviews and questionnaire distribution. To gauge the importance of plant species, we applied indices, Relative Frequency Citation (RFC), Use Value (UV), Fidelity Level (FL), and Informant Consensus Factor Index (ICF).

Results: The study revealed the presence of 90 wild medicinal plant species in the region, belonging to 79 genera and 35 families, utilized for treating various ailments among Parishing Valley residents. Asteraceae emerged as the predominant family (13 species). The habit category, herbs were dominated with (72%), shrub with (16%), trees about (8%) and sub-shrub (4%) used in the study area as folk medicine, primarily utilizing leaves (34.4%) in traditional practices. Decoction (63%) was a prominent method for utilizing medicinal plants. The highest RFC reported for *Thymus linearis* was (0.8), UV for *Delphinium brunonianum* was (0.95), FL for *Thymus linearis* was (97.5%) and ICF for the Digestive system (0.91) highlighting their prevalence and significance in the region.

Conclusion: In Parishing Valley, the healing traditions of wild plants are vital for healthcare, emphasizing the importance of preserving indigenous knowledge for sustainable resource use. Further research is crucial for uncovering deeper local perspectives.

Keywords: Parishing Valley, Astore, Ethnobotany, ethnomedicine, indigenous knowledge, medicinal plants, Relative Frequency Citation

Background

In 1896, John W. Harshberger introduced the term “Ethnobotany" (Kunwar & Bussmann 2008) it is the studies of how people use plants in their daily lives, including for food, medicine, rituals, and social activities (Jan *et al.* 2020, Usman *et al.* 2022, Shah *et al*. 2023). However, ethnobotanical studies typically emphasize a primary interest in medicinal plants (Hyder *et al.* 2013). Utilizing plant species for medicinal purposes is a practice with ancient roots human civilization. (Pradhan *et al.* 2020). An estimated 35,000 to 70,000 plant species are utilized in traditional folk medicine worldwide, showcasing the diverse reliance on natural remedies. This highlights the global importance of plant-based healing in various cultural practices (Noor *et al.* 2012). Indigenous communities globally hold ancient wisdom in plant use, care, and conservation (Usman *et al*. 2022).

Medicinal plants are crucial for human health, with approximately 75% of plant-based drugs coming from indigenous plants, both on a local and global scale (Zareef *et al.* 2023). A quarter of all medicinal prescriptions are derived from plants or their synthetic counterparts (Vitalini *et al.* 2009, Arshad *et al.* 2014) The profound knowledge of indigenous communities regarding plant use not only enhances modern scientific understanding but also emerges as a pivotal force in the conservation of diverse species (Gemedo-Dalle *et al.* 2005, Leduc *et al.* 2006, Kunwar & Bussmann 2008, Pradhan *et al*. 2020). Pakistan is home to approximately 6,000 flowering plants, and among them, about 2,000 have special importance in ethnobotanical traditions (Noor *et al*. 2012).

In the early 1950s, around 84% of Pakistanis relied on traditional medicine for their health remedies and This percentage could be slightly less at present time (Goodman & Ghafoor 2011). Emphasizing a notable deficit in cataloging Pakistan's herbal diversity, a mere 400-600 out of 5,700 plants hold official recognition as medicinal (Ikramullah *et al.* 2007). With a lush biodiversity of around 25,000 plant species, constituting about 10% of the world's total, the Himalaya, Karakoram, and Hindu Kush (HKH) mountains stand as nature's treasure trove. Notably, approximately 10,000 of these plants hold significant economic or medicinal value, highlighting the crucial role these mountain ranges play in our natural heritage. In the Himalayas, traditional plant medicines are employed by about 70-80% of the locals for common ailments, with 70% of medicinal resources sourced from the wild (Bano *et al.* 2014).

Gilgit-Baltistan is rich in traditional medicine because of its diverse ethnicities and historical ties to different civilizations (Caroe & Biddulph 1972). The region thrives in biodiversity, greatly influenced by its linkages with neighboring Chinese regions. This vibrant area is home to approximately 300 species of medicinal and aromatic plants (Khan *et al*. 2011, Bano *et al.* 2014, Wali *et al.* 2022) and is a prime hub for exporting medicinal plants sustainably, fostering income for local communities by establishing effective partnerships with end-users. From the British era to the present, Astore Valley has consistently stood as the premier exporter of medicinal plants in the Gilgit-Baltistan and considered as hub of medicinal plants (Shinwari & Gilani 2003, Noor *et al*. 2014).

The Deosai plateau in Astore and Sikardu has documented 342 plant species from 36 families and 142 genera in the Flora of Pakistan. However, the systematic documentation of the medicinal uses of these species is absent in the literature. The plateau's extraordinary biodiversity is influenced by factors like its topography, strategic location at the junction of three major mountain ranges (Himalaya, Karakoram, and Hindu Kush), and the local adaptation of its plant and animal species (Bano *et al.* 2014). Medicinal plants in Gilgit-Baltistan face significant threats, primarily from extensive grazing, uprooting, soil-slope erosion, natural disasters, and climate change. These factors collectively jeopardize the well-being of these valuable plant species in the region. (Arshad Ali Shedayi 2012, Arshad *et al*. 2014). Unique ethnobotanical studies play a critical role in the exploration and conservation of traditional knowledge. They serve as an essential measure to stop the irreversible loss of invaluable folklore (Kunwar & Bussmann 2008).

This is the first study conducted in an unexplored area where no previous research has been undertaken. In terms of healthcare, the region faces significant challenges, as only two dispensaries serve the seven villages. Due to the limited health facilities, the local population turns to medicinal plants as a primary source for treating various ailments.

The aim of the study is to document the traditional knowledge associated with medicinal plants and how they are used for various ailments in this area. The research seeks to uncover and record the indigenous wisdom surrounding the healing properties of plants in this untapped area, contributing valuable insights to the understanding of traditional medicinal practices.

Main objectives of the study area were:

1. The first objective is to systematically catalog the diverse wild medicinal plants in the Parishing valley, documenting their local names, habitats, and distribution for conservation and research purposes.
2. To understand and document the traditional therapeutic uses of these plants within the indigenous communities of the area.

Materials and Methods

Study area

The research area "Parishing valley" lies between latitudes 35° 24.00' N and 75° 01.00' E longitude and the altitude between 2000m to 5000m. A mere 9 kilometers away from the zero-point of District Astore, it is conveniently located for easy access. The valley comprises of seven captivating villages: Khangrol, Shaypay, Ramkhah, Mushkay, Theeing Paeen, Theeing Bala, and Gutumsar. The famous attractive tourism point is Allah Wala Lake located at Gutumsar. Study area depicted in (Figure 1).

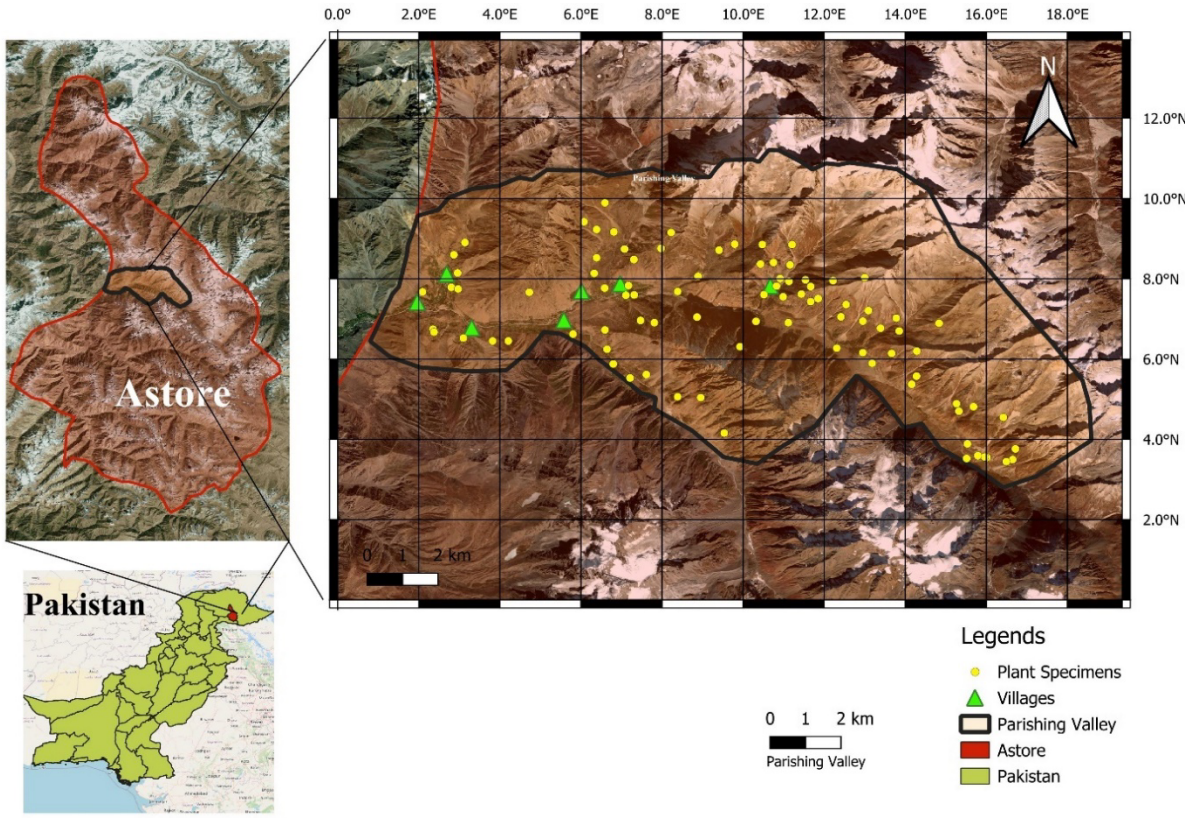

Figure 1. Study area, green triangles indicated villages and yellow dots represented for sample collected.

In lower areas such as Khangrol, agriculture, including crop cultivation, starts around mid-March, whereas in higher altitudes like Gutumsar, it begins in May. Harvesting occurs from August to late September. From April to the end of September, the region, particularly Allah Wala Lake, is lush green and attracts tourists with its stunning views. However, heavy snowfall typically blankets the area from October to February, although last year saw no snow until February, possibly due to climate change. As a result, people rely on stored food supplies during the winter months. The research area remains exceptionally pristine, with residents primarily dependent on agriculture and natural resources, including the keeping of animals such as goats, cattle, cows, and yaks.

The Parishing Valley, with its mountainous terrain and snowy peaks, offers a richly diverse environment. The biodiversity in these mountains is shaped by factors like sunlight, rainfall, soil, wind, and living organisms. The complexity of the alpine landscape encourages quick evolution, especially among the plants and animals that call it home (Barry & Price 1981). Studies conducted in alpine regions reveal significant variation within species, such as in flowering schedules, even across small geographical areas. The alpine mountains' varying altitudes boost biodiversity at all levels (Korner 1995).

Field surveys and data collection

Field surveys were arranged between April 2022 to November 2023. On the field visit, we meticulously collect plant specimens from various locations within the study area. Photographs were properly taken during field. The collected specimens were properly pressed, dried, and mounted on standard herbarium sheets. For the identification, scientific naming and categorizing plant species based on physiognomic characteristics (Barkley *et al.* 2004) we used the Flora of Pakistan (Ali & Qaiser 1986) and other available literature, cross-referencing with the herbarium at Karakoram International University Gilgit (KIU), Pakistan. All information pertaining to plant specimens was recorded on labels affixed to the herbarium sheets. Specimens are kept at KIU herbarium department of Plant sciences for future research. The pictorial view from data collection to identification depicted in (Figure 2)

Collection of ethnobotanical data:

Ethnomedicinal information was documented using open and semi-structured questionnaires, surveys, interviews, participant observations, and guided field walks (Cavendish 2012, Wali *et al.* 2022). During the filed survey, we interacted with 160 locals, comprising 105 male and 55 female, uncovering the richness of their traditional knowledge. The native language was Shina (Astori), and the population was entirely Muslim, adhering to the Islamic faith. Significantly, were 3 outstanding folk doctors, adept in traditional medicine, carefully selected through the intriguing snowball method. The remaining 157 participants were sharers of information about Parishing Valley's traditional use of medicinal plants, lacking specialized knowledge as compared to herbalist.

Our study adhered strictly to global ethical guidelines, ensuring informed consent from each participant before interviews. In consideration of intellectual property rights, our study refrained from discussing confidential remedies. The study's aim was conveyed to the interviewer. Prior to conducting interviews, explicit consent, both verbal and written, was diligently obtained from each respondent and elders of the study area for documenting and publishing the results. To understand the medicinal plants used by local people, we utilized unstructured and semi-structured interviews. Beforehand, we identified potential participants through initial inquiries, recording demographic details such as age and gender. Information on the local names of plants used for medication, treatments administered, preparation methods, and plant parts utilized was also systematically collected.

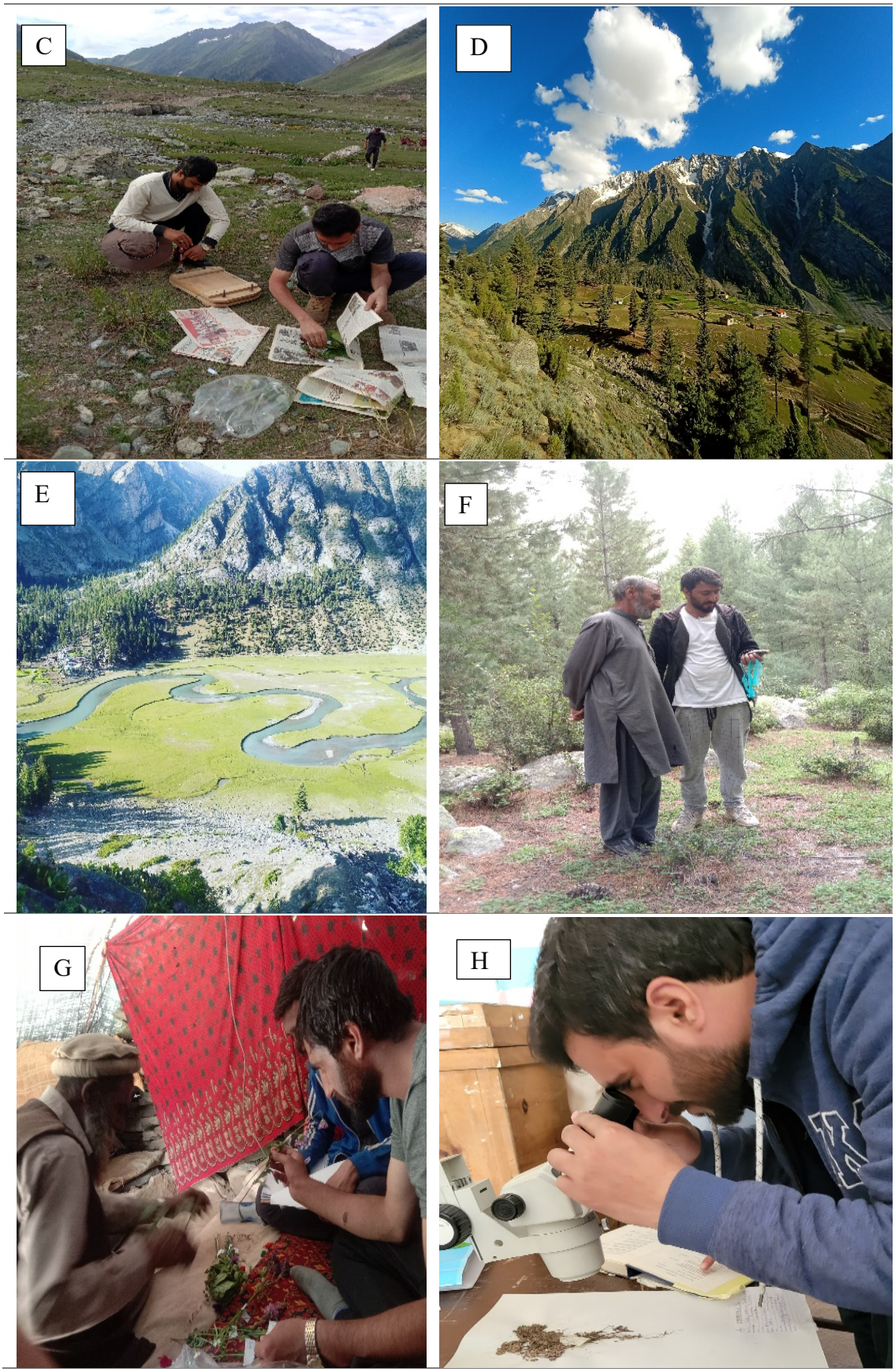

Figure 2. (A and B) While collecting plant specimens, (C) pressing collected plant specimens by presser during field, (D) Allah Wala Lake very famous tourist place in the study area, (E) Study area (F and G) collecting ethnobotanical data on field and (H) Identifying plant specimens by the help of microscope.

Statistical analysis of quantitative data

We analyzed the collected quantitative data statistically, using key quantitative indices: Relative Frequency of Citation (RFC), Use Value (UV), Fidelity Level (FL) and Informant Consensus Factor (ICF).

Relative Frequency of Citations (RFC)

Relative Frequency of Citations (RFC) was applied to gauge the significance of plant species mentioned by informants (Ali *et al.* 2023).

$$\mathbf{RFC} = \frac{\mathbf{FC}}{\boldsymbol{N}}$$

(0 < RFC < 1) It illustrates the importance of each species and is calculated by the Frequency of Citation 'FC' represents the count of informants reporting the use of a specific species, while 'N' stands for the total number of informants (Pradhan *et al.* 2020, Shah *et al.* 2023).

Use Value (UV)

The "Use Value" introduced by Prance in 1987, it calculates a species' primary and secondary use values within a specific culture (Bhat *et al.* 2012). The Use Value (UV) is employed to indicate the relative value of each plant as utilized by the indigenous people The UV metric, ranging from zero to a positive value, indicates higher importance with greater UV values and lesser importance with lower UV values. (Zhou *et al*. 2023). Following the formula:

$$\mathbf{UV} = \frac{\boldsymbol{\Sigma Ui}}{\boldsymbol{N}}$$

Here, 'ΣUi' signifies the count of use reports provided by each respondent, while N indicates the overall number of respondents.

Fidelity Level (FL)

The Fidelity Level is defined as the percentage of respondents who indicated the use of a particular plant species for treating a specific disease in the research area.

$$\mathbf{FL} = \frac{\boldsymbol{Np}}{\boldsymbol{N}} \times \mathbf{100}$$

Here, 'Np' represents the specific number of citations for a particular ailment, while 'N' is the total number of informants mentioning the species for any disease (Hankiso *et al.* 2023).

Informant Consensus Factor (ICF)

After quantifying ethnobotanical data, we calculated the Informant Consensus Factor (ICF). In traditional medicine, a common practice is using the same plant species to treat different unrelated ailments. To examine the consistency of ethnomedical knowledge, we applied Heinrich's (Heinrich 2000) ICF to determine agreement among respondents regarding the use of plant species in each disease category.

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

Here, 'N_{ur}' represents the number of use reports for each disease category, while 'N_t' is the count of species used in that category by all informants. ICF values, ranging from 0 to 1, indicate agreement among respondents. A high ICF suggests a clear criterion for selecting species to treat a disease category (Horackova *et al.* 2023).

Demographic details

Of the survey respondents, 12 were under 30 years old, 30 fell within the 31-40 age range, 42 were aged 41-50, 55 were in the 51-60 age group, and 21 were over 61 depicted in (Table 1). These individuals reside in the study area. The survey findings revealed a higher proportion of male participants (65.6%) in comparison to females (34.4%). This discrepancy can be attributed to the tendency of women in rural areas to demonstrate more reserved behavior and possess lower levels of education compared to their male counterparts.

Table 1. Shows the demographic information of informants in the study area

Variables	Categories	No. of Individuals	%
Informants	Herbalist	3	1.9
	Common	157	98.1
Gender	Male	105	65.6
	Female	55	34.4
Age	under 30	12	7.5
	31-40	30	18.8
	41-50	42	26.3
	51-60	55	34.4
	61 ABOVE	21	13.1
Villages	Khangrol	15	9.4
	Shaypay	18	11.3
	Ramkhah	17	10.6
	Mushkay	25	15.6
	Theeing Paeen	28	17.5
	Theeing Bala	32	20.0
	Gutumsar	25	15.6
Educational Background	Illiterate	66	41.3
	elementary school	44	27.5
	secondary school	20	12.5
	College	25	15.6
	University	5	3.1
Herbalist experience	1-10 years	1	33.3
	above 10 years	2	66.7

Results and Discussion

Diversity of medicinal plants

In our study, we documented 90 medicinal plant species employed by the people of Parishing Valley for traditional healing. These plants belong to 79 genera and 35 families, the dominant families shown in (Figure 3). These medicinal plants provide valuable insights into their distribution and importance. Among the families, Asteraceae stands out as the most prevalent family, comprising 13 species and emphasizing its abundance in the local flora used in traditional medicine. Following closely are Polygonaceae and Rosaceae, each with 9 and 7 species, indicating their substantial presence in the study area. Similarly, previous studies also show the dominancy of Asteraceae family (Shaheen *et al.* 2023).

These families likely hold importance due to ecological, economic, or cultural reasons within the community. Additionally, families like Cupressaceae, Pinaceae, and Brassicaceae, each with 3 species, suggest a diverse botanical landscape in the study region. These findings are crucial for ecological studies, biodiversity assessments, and ethnobotanical research, providing valuable insights into the prominence and diversity of plant families within the local ecosystem. Exploring specific species within these families can reveal additional layers of understanding regarding their ecological roles and cultural significance in the area.

Habit categories play a key role in traditional medicine

In the study area, most of the reported medicinal plant species were herbs with 65 species (72%) used to cure different ailments by the people of the Parishing Valley, showcasing their adaptability. Previous studies also indicated that herbs were at the leading position to use in traditional medicine, (Cooper *et al.* 2005, Teklehaymanot 2009, Ahmad *et al*. 2014, Bahadur *et al*. 2023, Guo *et al*. 2023). The prevalence of herbs is ecologically significant, contributing to biodiversity and potentially holding cultural or medicinal importance within the community. Followed by Shrub with 14 species (16%), highlighting their importance in folk medicine. The remaining categories have the least usage, like trees about 8% and sub-shrub 4% used in the study area as folk medicine but have very special role to cure very specific ailments. Understanding these habit categories provides crucial insights for local ecology and conservation efforts. The percentages of habit category depicted in (Figure 4).

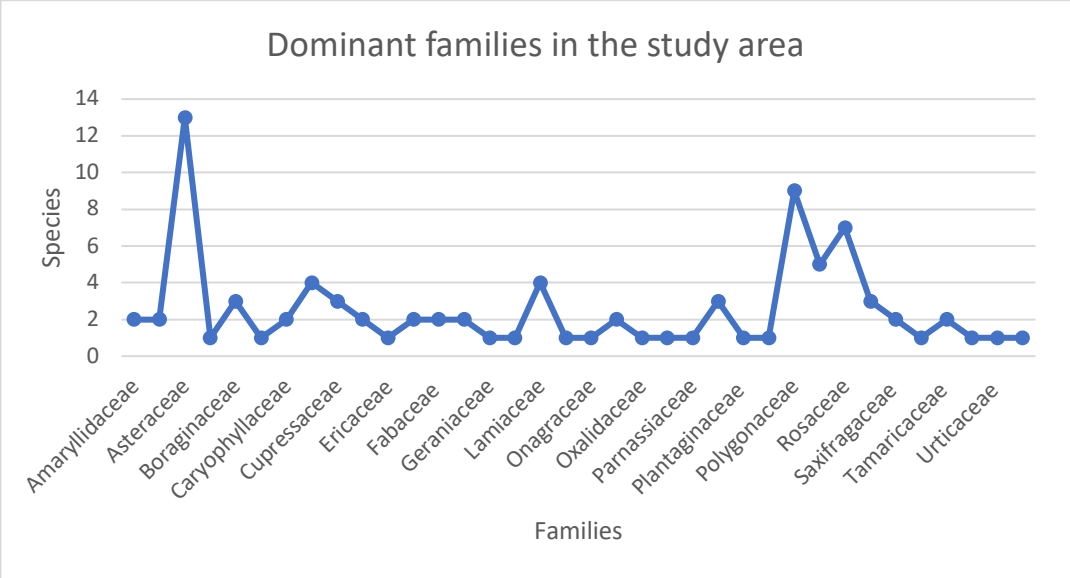

Figure 3. Dominant families of study area

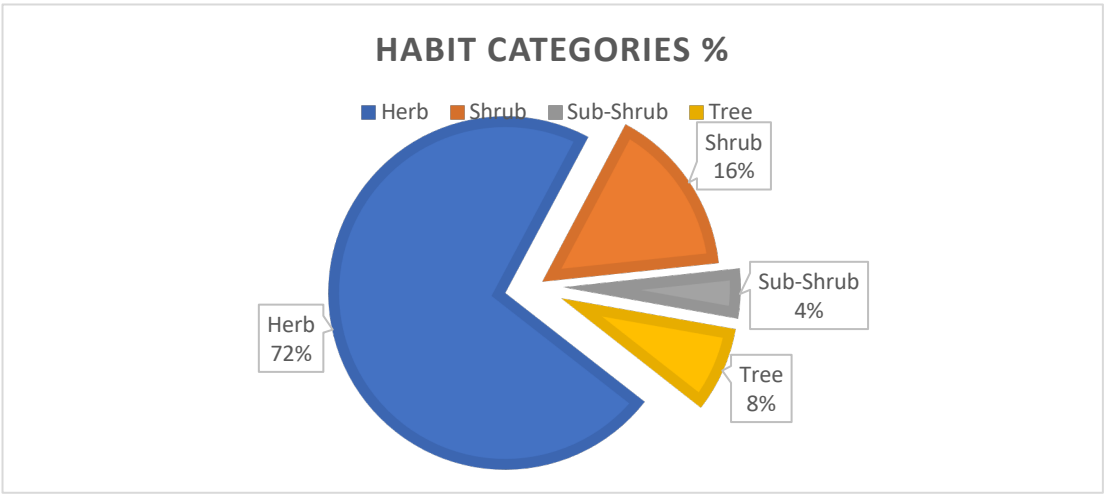

Figure 4. Habit category percentage.

Plant parts usage

In our research, we found how people in our study area use different parts of plants in their daily lives for medicine. The leaves emerge as the most widely utilized plant part, constituting 34.4% of traditional medicinal practices shown in (Figure 5). Similar studies shown same results (Gillani *et al.* 2024, Kayani *et al.* 2024, Manzoor *et al.* 2023). Leaves are valued for their rich content of bioactive compounds, including alkaloids and flavonoids, and their accessibility for harvest without harming the entire plant (Panmei *et al.* 2019). They serve as versatile ingredients, commonly employed in various medicinal forms such as extracts and teas. Conversely, the rhizome, comprising only 2.2%, stands as the least employed part. Despite its lower prevalence, the rhizome may hold specific medicinal properties, and its value may be context-dependent, potentially attributed to cultural preferences, regional practices, or the unique therapeutic effects associated with certain plant species. Overall, this distribution underscores the diverse nature of traditional medicine, with leaves emerging as a prevalent and versatile resource, while the rhizome, though less commonly used, may hold significance in specific traditional practices.

This suggests that these in traditional medicine, rituals, or as important materials for the community. We also found some plants, like bark, berries, or roots, although not used as much, still have their own special roles. Beyond science, this data gives us a glimpse into the plants that really matter to the local folks, and it was like a colorful cultural mystery waiting to be explored. This opens the door to more research, helping us understand the unique stories behind these plants and how they' were woven into the rich tapestry of everyday life in the area.

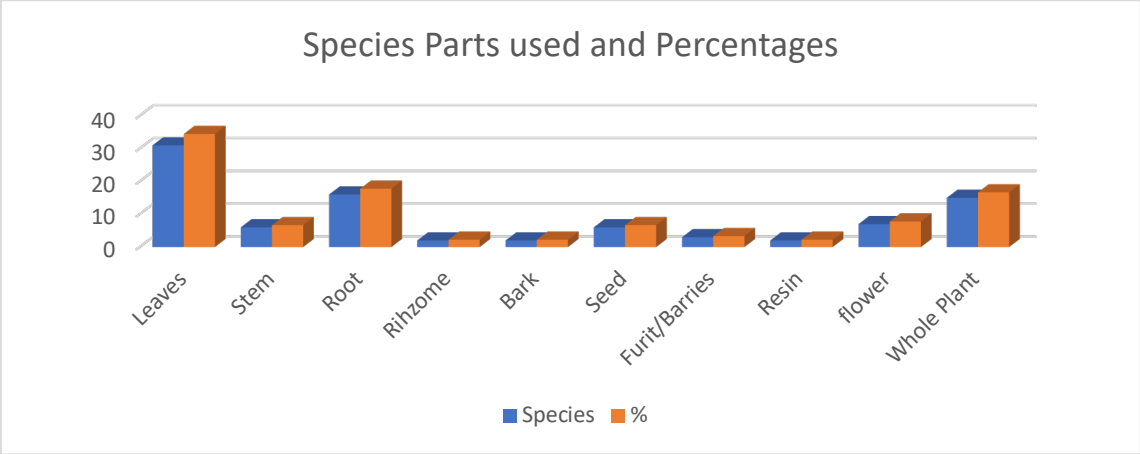

Figure 5. Use of plant parts and their percentages

Utilization and applications of plants

The utilization of plant parts in the ethnobotanical practices of the local community in the study area is depicted in (Figure 6), providing a window into diverse methods. In the context of traditional medicinal practices, this study investigates the prevalent methods of usage based on a quantitative analysis of collected data. The survey highlighted the prevalence of oral administration, followed by topical usage. This aligns with prior studies emphasizing the preferred status of oral administration (Bahadur e*t al*. 2023, Tahir *et al.* 2023). Decoction emerges as the predominant method, constituting 63% of traditional medicinal applications. Similar results were found in different regions of Pakistan by (Bahadur *et al*. 2023). This method involves boiling plant materials to efficiently extract medicinal compounds, yielding a potent and easily consumable form of traditional medicine, often incorporated into teas and infusions. *Delphinium brunonianum* Royle was used as decoction by the inhabitants of study area to treat the pneumonia and the paste was mixed with oil (mastered oil preferred) applied to the hair for removing dandruff and healthiness of hair. *Thymus linearis* Benthwas used as decoction for the treatment of various ailments mostly used for decreasing high blood pressure, indigestion (used as tea after having meal) and relief cough. Conversely, the least preferred method is smoke or fumes, representing a mere 2% of applications. The belief in burning the young leaves of *Juniperus communis* L*, Juniperus excelsa* Bieb, and *Juniperus squamata* Lamb, and using the resulting fumes or smoke at home is rooted in the notion that it can help dispel negative energies and ward off the influence of evil forces and malevolent gazes. And decoction used for treating diarrhea and liver worms. This method, characterized by inhaling the smoke produced by burning specific plant materials, appears less common, potentially influenced by practical challenges, cultural nuances, or perceived limitations in efficacy compared to alternative approaches. The people in the study area utilize a decoction of *Betula utilis* D. Don to address ear pain. Additionally, they hold a strong belief that having the bark at home symbolizes happiness. They follow a practice of wrapping the bark with locally prepared batter and burying it in soil for an extended period, attributing significant potential to this aged mixture. According to their beliefs, this aged batter surpasses the freshness of batter used in wedding ceremonies and other special occasions. The decoction of *Thlaspi arvense* L. is employed to alleviate discomfort associated with burning sensations during urination. The residents of the study area firmly believe that *Allium fedtschenkoanum* Regel and *Allium schoenoprasum* L. can effectively alleviate abdominal pain. Moreover, they use the fresh leaves as a substitute for onions in various vegetable dishes. The findings underscore the diverse landscape of traditional medicinal practices and emphasize the significance of methodological preferences, shedding light on potential factors influencing their adoption.

Ethnomedicinal applications in quantitative data

Relative Frequency Citation (RFC) and Use Value (UV)

The results revealed that the plant species *Thymus linearis* Benth demonstrated the highest Relative Frequency of Citation (RFC) at (0.800) similar study results by (Abbas *et al.* 2022, Awan *et al*. 2023), followed by *Delphinium brunonianum* Royle with an RFC of (0.368), *Hippophea rhamnoide* L with RFC of (0.563), *Allium fedtschenkoanum* Regel with an RFC of 0.563, and *Carum carvi* L with RFC of 0.519. The lowest RFC (0.056) was *Salix denticulate* Andersson followed by RFC of (0.069) for *Rhodiola wallichiana* (Hook.) S.H. Fu and *Tamarix arceuthoides* Bunge. The informants frequently mention a specific plant species for various purposes. This repeated citation is attributed to the plant's easy accessibility, effectiveness, and the fact that it tends to have minimal side effects referred to Relative frequency citation (RFC) (Kayani *et al*. 2015, Pradhan *et al*. 2020). The RFC serves as a crucial metric in our research, indicating the frequency with which these plant species are cited by informants for various purposes (Shah *et al.* 2023). A higher RFC suggests that a particular plant species is not only readily

available but is also highly valued for its effectiveness in addressing specific needs, underscoring its significance in the local knowledge and practices of the community. Plants with higher RFC are prevalent in the study area, likely due to their wide distribution. The locals and nomads commonly use these preferred species for various ailments. *Thymus linearis*, with the highest RFC, Boil stems, leaves, and flowers for a decoction treating cough, asthma, fever, respiratory issues, and stomach ailments. This versatile remedy also serves as green tea, aiding in managing cholesterol, acidity, and promoting digestion (Awan *et al.* 2023).

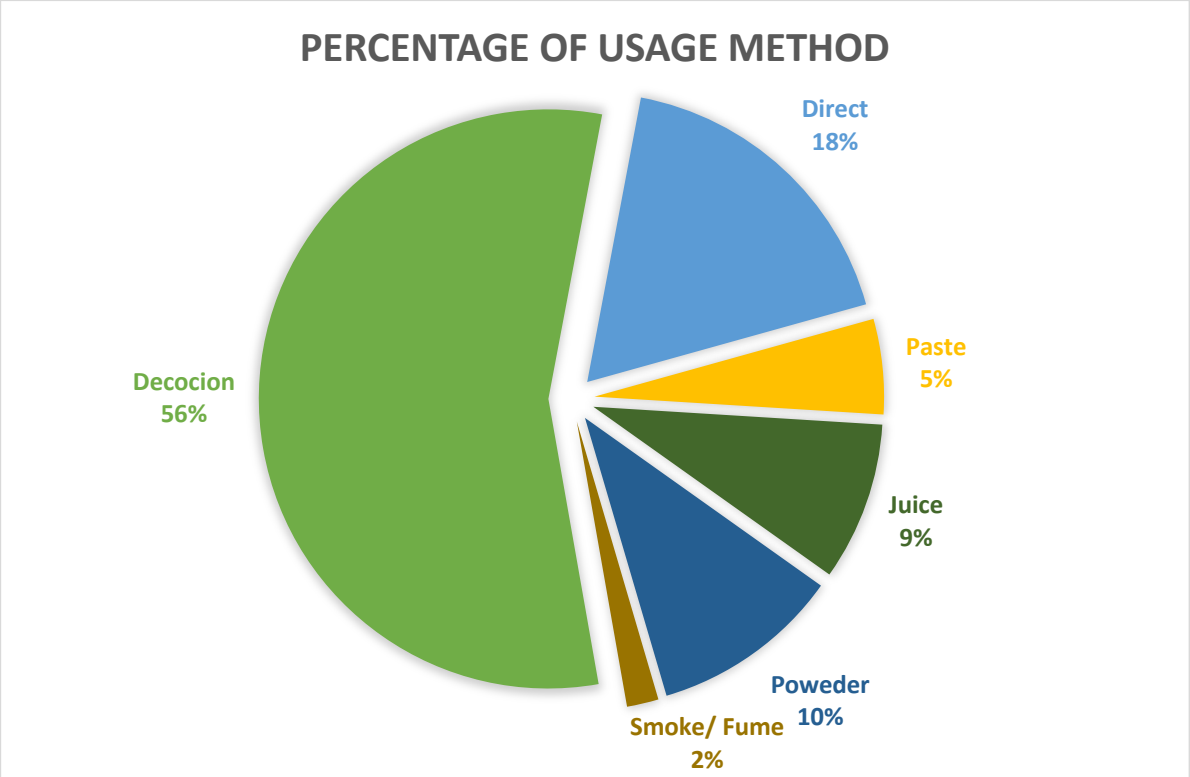

Figure 6. Percentages of used methods for treating ailment**.**

The Use Value (UV) is a metric that highlights the importance of various plants in indigenous practices, ranging from 0 to 1 value. Higher UV values signify greater significance, while lower values indicate lesser importance. Notably, *Delphinium brunonianum* Royle (0.950), *Thymus linearis* Benth (0.944), *Urtica dioica* L (0.894), Betula utilis D. Don (0.788), and *Carum carvi* L (0.750) demonstrated the highest UV, emphasizing their considerable importance in indigenous utilization. On the other hand, *Bistorta affinis* (D. Don) Greene (0.075), *Tanacetum artemisioides* Sch. Bip. ex Hook. f. (0.075), and *Tamarix arceuthoides* Bunge (0.081) exhibited lower UV values, indicating comparatively reduced significance in indigenous practices. This data illustrates the varying degrees of importance attached to different plants within the context of indigenous usage depicted in (Table 2).

Fidelity level (FL)

The analysis of fidelity levels (FL) data for reported plant species reveals a substantial range from 6.3% to 97.5% for specific ailments shown in (Table 2). *Thymus linearis* Benth exhibited the highest fidelity level at 97.5%, followed by *Delphinium brunonianum* Royle (96.3%), *Hippophea rhamnoide* L (81.3%), and *Allium fedtschenkoanum* Regel (76.3%). These plants, with their elevated fidelity levels, are crucial resources for addressing common health concerns such as cough, asthma, and digestive issues. On the other hand, *Arnebia euchroma* (Royle ex Benth.) I.M. Johnst., with a minimal fidelity level of 6.3%, specializes in addressing cough and lung problems. Our study shows the same results as (Awan *et al.* 2023) This could be attributed to the prevalence of these ailments in the region, leading to the specific use of these plant species for treatment. Globally, these plants are widely employed in ethnobotanical practices, supported by substantial scientific evidence of their therapeutic benefit (Awan *et al.* 2023). A heightened FL suggests that these plants are consistently cited within local communities, establishing them as dependable and favored options for treating particular diseases. Such traditional information is helpful for conserving plants and creating effective herbal remedies for specific health issues (Hussain *et al*. 2019, Awan *et al.* 2023).

Table 2. Medicinal plants in Parishing Valley, documenting their diverse applications and methods for treating various ailments

Family	Botanical name of Species	Voucher No	Habit	Local name	Plant part (s) used	Method of use	Purpose	UV	RFC	FL%
Amaryllidaceae	*Allium fedtschenkoanum Regel*	**Sk-2146**	Herb	Paloon	Leaves	Decoction, Direct	Bitter-tasting leaves, used as an onion substitute in raw vegetables. They help with stomach issues and alleviate abdominal pain.	0.681	0.563	76
Amaryllidaceae	*Allium schoenoprasum* L.	**Sk-2147**	Herb	Paloon/ jangli piyazz	Leaves	Decoction, Direct	Bitter-testing leaves, often used as a stand-in for onions in raw salads. They offer relief for stomach troubles and help ease abdominal pain.	0.613	0.475	71
Apiaceae	*Pleurospermum govanianum* (DC.) Benth. ex C.B. Clarke	**Sk-2148**	Herb	Kachy	Whole Plant	Direct	Used as forage	0.131	0.081	7
Apiaceae	*Pleurospermum stylosum* C.B. Clarke	**Sk-2149**	Herb	Khushy	Whole Plant	Direct	Forage and tonic	0.088	0.106	9
Asteraceae	*Anaphalis nepalensis* (Spreng.) Hand.-Mazz.	**Sk-2150**	Herb	Chikee	Leaves	Decoction, powder	Decoction, Powder: Gastrointestinal ailments. Use as Aromatic.	0.563	0.156	14
Asteraceae	*Anaphalis virgata* Thomson ex C.B. Clarke	**Sk-2151**	Herb	Sangopaje	Whole Plant	Decoction, Smoke	Insect killers, Sudorific, Pulmonary, and respiratory disorders. Kept flowers adorn local caps, homes, mosques, and the Holy Quran for their delightful aroma	0.250	0.231	8
Asteraceae	*Artemisia scoparia* Waldst. & Kit	**Sk-2152**	Herb	Jaa	Whole Plant	Decoction	Immerse fresh flowers and buds in water; use the resulting extract to relieve fever, cough, and abdominal pain in children. Employ stems with leaves for the purpose of crafting brooms	0.438	0.269	42
Asteraceae	*Artemisia rutifolia* Stephan ex Spreng.	**Sk-2153**	Herb	Zoon	Aerial parts	Decoction	Antibacterial, Antifungal	0.438	0.413	41
Asteraceae	*Artemisia santolinifolia* Turcz. ex Besser	**Sk-2154**	Herb	Zoon	Aerial parts	Decoction	Inflammation, antibacterial and Tumor	0.469	0.413	28
Asteraceae	*Aster altaicus* Willd. var. altaicus	**Sk-2155**	Herb	Pholy	Whole Plant	Direct	Used as forage	0.156	0.113	23
Asteraceae	*Conyza viscosa* Mill.	**Sk-2156**	Herb	Lakani	Aerial parts	Decoction	Sore throat, tonic, dysentery	0.213	0.075	21

Family	Botanical name of Species	Voucher No	Habit	Local name	Plant part (s) used	Method of use	Purpose	UV	RFC	FL%
Asteraceae	*Cousinia thomsonii* C.B. Clarke	**Sk-2157**	Herb	Cahcukony	Aerial parts	Direct, Decotion	Alleviating arthritis, bodily discomfort, cough, asthma, dermatitis, swelling, and joint pain	0.475	0.344	69
Asteraceae	*Echinops echinatus* Roxb	**Sk-2158**	Herb	Jacheer	Whole Plant	Juice	Juice/Direct: Diuretics, Digestive issues in horses. Abdominal pain, Stomach pain, Cough, Arthritis. Analgesic, Antibacterial, Antioxidant. Other: forage.	0.406	0.156	28
Asteraceae	*Leontopodium nanum* (Hook. f. & Thomson ex C.B. Clarke) Hand.-Mazz.	**Sk-2159**	Herb	Jangli kch	Whole Plant	Decoction	Used as forage, tonic	0.138	0.119	28
Asteraceae	*Scorzonera virgata* DC.	**Sk-2160**	Herb	Gori phool	Flowers	Decoction	Use as Anti-inflammatory and fungicidal	0.144	0.075	21
Asteraceae	*Tanacetum artemisioides* Sch. Bip. ex Hook. f.	**Sk-2161**	Sub-shrub	Jangli phonary	Aerial parts	Decoction	Use for inflammation	0.075	0.150	9
Asteraceae	*Taraxacum officinale* L.	**Sk-2162**	Herb	Ishkanache	Leaves, roots	Powder, juice	Powder/Juice: tonic, diuretic, blood purifier, Jaundice, Constipation. Leaves cooked as a wild vegetable Extract: Treats Cough, Cold	0.750	0.406	35
Betulaceae	*Betula utilis* D. Don	**Sk-2163**	Tree	Jonji	Bark	Decoction	Periderm from bark: Former writing material, packing, wrapping paper. Bark paper: Packing ghee, making binding ropes, roofing for wood protection. Bark paper: Used in rheumatism. Extract of bark paper: Used in ear infections	0.788	0.456	8
Boraginaceae	*Arnebia euchroma* (Royle ex Benth.) I.M. Johnst.	**Sk-2164**	Herb	Kono phoonar	Root	Powder	Dried root powder: Cure cough, and lung problems, and treat menorrhagia.	0.269	0.088	6
Boraginaceae	*Cynoglossum glochidiatum* Wall. ex Benth.	**Sk-2165**	Herb	Chiery	Aerial parts	Decoction	Managing male sexual issues and infertility	0.213	0.200	34
Boraginaceae	Lindelofia anchusoides (Lindl.) Lehm.	**Sk-2166**	Herb	Sharing	Aerial parts	Decoction	Alleviating skin diseases, fever, and headaches	0.281	0.338	28
Brassicaceae	*Thlaspi arvense* L.	**Sk-2167**	Herb	Brigah	Seed	Decoction	Utilized for its astringent, diuretic, stimulating, antibacterial, and antimicrobial	0.275	0.281	34
Caryophyllaceae	*Dianthus orientalis* Adams	**Sk-2168**	Herb	Jangli kach	Seed	Decoction	Used for toothache relief	0.206	0.144	28

Family	Botanical name of Species	Voucher No	Habit	Local name	Plant part (s) used	Method of use	Purpose	UV	RFC	FL%
Caryophyllaceae	*Silene gonosperma* (Rupr.) Bocquet	**Sk-2169**	Shrub	Phonary	Flowers	Decoction	Treated are hearing defects, nasal problems, and constipation.	0.281	0.263	34
Crassulaceae	*Hylotelephium ewersii* (Ledeb.) H. Ohba	**Sk-2170**	Herb	Loyoun shina	Aerial parts	Direct, Decoction	Appetizer	0.088	0.081	21
Crassulaceae	*Hylotelephium pakistanicum* (G.R.Sarwar) G.R.Sarwar	**Sk-2171**	Herb	Rabrd phonar	Whole Plant	Decoction	Employed for addressing headaches, colds, and fever.	0.219	0.131	18
Crassulaceae	*Rhodiola heterodonta* (Hook. f. & Thomson) Boriss.	**Sk-2172**	Herb	Jangli rabad phool	Leaves	Decoction	Digestive, Hemostatic	0.281	0.144	41
Crassulaceae	*Rhodiola wallichiana* (Hook.) S.H. Fu	**Sk-2173**	Herb	Jangli rabad phool	Leaves	Decoction with milk, juice	Applied to burns and wounds.	0.188	0.000	8
Cupressaceae	*Juniperus communis* L.	**Sk-2174**	Shrub	Metharii	Barries, Aerial parts	Paste, juice, poweder	Berries: Used in beverages, against kidney stones, urine problems, leucorrhoea, expels gas, and stimulates and tuberculosis. Shoots: Used for fuel.	0.419	0.213	14
Cupressaceae	*Juniperus excelsa* Bieb	**Sk-2175**	Tree	Chilli	Barries, Aerial parts	Powder, fume, paste, Decoction	Berries (Powder, Paste): Tuberculosis, Diabetes, Joint pain, Swelling, leaf Decoction: Liver worms, Diarrhea. Wood Coal: Blindness Remedy Fume: Repelling evils. The wood used as the construction of buildings and instruments.	0.388	0.275	41
Cupressaceae	*Juniperus squamata* Lamb.	**Sk-2176**	Shrub	Chilli	Barries, Aerial parts	Powder, fume, paste, Decoction	Berries (Powder, Paste): Tuberculosis, Diabetes, Joint pain, Swelling, leaf Decoction: Liver worms, Diarrhea. Wood Coal: Blindness Remedy Fume: Repelling evils. The wood used as the construction of buildings and instruments.	0.350	0.344	36
Elaeagnaceae	*Elaeagnus umbellata* Thunb.	**Sk-2177**	Shrub	Jangli tamatr	Fruits	Direct	Tonic, digestive disorder, cough, heart problems	0.213	0.150	14

Family	Botanical name of Species	Voucher No	Habit	Local name	Plant part (s) used	Method of use	Purpose	UV	RFC	FL%
Elaeagnaceae	*Hippophea rhamnoide* L	**Sk-2178**	Shrub	Buru	Fruits	Juice, powder, paste and Direct	Fruits: Cough, Heart, Kidney, Stomach, Brain, Cancer. High blood pressure, Cholesterol, Irregular palpitation, Reproductive disorders in women. Roots: Ash for toothache. Shoots: Fuel. Whole plant: Barbed fences to fend off cattle	0.688	0.563	81
Ericaceae	*Rhododendron hypenanthum* Balf. f.	**Sk-2179**	Shrub	Susansr	Aerial parts	Direct	Used for aroma at home	0.413	0.488	61
Fabaceae	*Medicago sativa* L	**Sk-2180**	Herb	Ishpit	Aerial parts	Decoction, seeds	Young shoots are used as a vegetable and considered as tonic; Seeds are employed to alleviate Arthralgia.	0.550	0.494	56
Fabaceae	*Robinia pseudoacacia* L	**Sk-2181**	Tree	Kikar	Flowers	Decoction	Flowers: Antispasmodic, Aromatic, Laxative. Used for eye ailments, Inner bark, and root bark: Emetic, Purgative, Tonic. Inducing vomiting and toothache relief.	0.094	0.081	21
Fabaceae	*Cicer microphyllum* Royle ex Benth.	**Sk-2182**	Herb	Khokooni	Seed, flower	Direct	Indigestion, vomiting use as vegetable	0.350	0.144	14
Fabaceae	*Oxytropis chiliophylla* Royle ex Benth.	**Sk-2183**	Herb	Haloskar	Aerial parts	Decoction	Use to cure inflammation	0.144	0.088	14
Gentianaceae	*Gentianodes tianschanica* (Rupr.) Omer, Ali & Qaiser	**Sk-2184**	Herb	Nilkach	Leaves	Infusion, paste	Gastric trouble, apply crushed plant paste externally for treating wounds and cuts.	0.488	0.219	44
Gentianaceae	*Gentianopsis vvedenskyi* (Grossh.) Pissjauk.	**Sk-2185**	Herb	pooly	Root	Decoction	Digestive issues, including appetite loss, bloating, diarrhea, and heartburn	0.144	0.081	9
Geraniaceae	*Geranium pratense* L.	**Sk-2186**	Herb	Kurtakasho	Aerial parts	Powder	Powder: External injuries, utis, Rheumatism. Extract: Cooling agent, Cathartic.	0.406	0.081	21
Grossulariaceae	*Ribes alpestre* Wall. ex Decne.	**Sk-2187**	Shrub	Shatuu	Fruit,root	Decoction	Fruit: Skin allergies, Hepatitis. Root Decoction: Cures backache, Ulcer.	0.644	0.144	56

Family	Botanical name of Species	Voucher No	Habit	Local name	Plant part (s) used	Method of use	Purpose	UV	RFC	FL%
Lamiaceae	*Mentha longifolia* L.	**Sk-2188**	Herb	Phileel	Leaves	Juice	Leaf juice: Headache, Cold, Fever, Anti-rheumatic, Respiratory relief, Diarrhea, Worms, Disorders, Vomiting, Stomach	0.750	0.331	57
Lamiaceae	*Mentha royleana* Benth.	**Sk-2189**	Herb	Phileel	Leaves, stem	Decoction	Leaf juice: Headache, Cold, Fever, Anti-rheumatic, Respiratory relief, Diarrhea, Worms, Disorders, Vomiting, Stomach	0.538	0.419	55
Lamiaceae	*Nepeta discolor* Royle ex Benth.	**Sk-2190**	Herb	Shaye	Aerial parts	Decoction	Treat ringworms	0.213	0.269	28
Lamiaceae	*Thymus linearis* Benth.	**Sk-2191**	Sub-shrub	Tumoro	Aerial parts	Decoction	Boil stems, leaves, and flowers in water for a decoction used to address cough, asthma, fever, respiratory inflammation, and stomach issues. This decoction also serves as green tea to manage cholesterol, acidity, and aid digestion	0.944	0.800	98
Oleaceae	*Fraxinus xanthoxyloides*	**Sk-2192**	Shrub	Kasonar	Aerial parts	Decoction	Pneumonia, discomfort, yellowing of the skin, malaria, bone fractures, and internal injuries.	0.481	0.213	49
Onagraceae	*Epilobium angustifolium* L.	**Sk-2193**	Herb	Danoye	Leaves	Decoction, Paste	Leaves alleviate inflammation, aid in gastrointestinal issues, and enhance healing for wounds, swelling, and skin sores	0.281	0.150	21
Orchidaceae	*Dactylorhiza hatagirea* (D. Don) Soó	**Sk-2194**	Herb	Karah	Aerial parts	Decoction	Boosting semen production, it enhances physical radiance and provides relief from kidney diseases.	0.144	0.081	10
Orchidaceae	*Epipactis gigantea* Douglas ex Hook.	**Sk-2195**	Herb	Kachh	Root	Decoction	The roots are employed as a tonic in serious illnesses	0.213	0.169	11
Oxalidaceae	*Oxalis corniculata* L.	**Sk-2196**	Herb	Char	Aerial parts	Decoction	Constipation, ulcer	0.156	0.094	10
Papilionaceae	*Trifolium pratense* L.	**Sk-2197**	Herb	Chepatii	Leaves	Decoction	Leaf Decoction: Sore throat, Fever, Pneumonia, Meningitis.	0.188	0.269	28
Parnassiaceae	*Parnassia nubicola* Wall. ex Royle	**Sk-2198**	Herb	Shayee phoonar	Whole Plant	Decoction	The whole plant is cooked as a vegetable and cure digestion problems	0.281	0.144	32

Family	Botanical name of Species	Voucher No	Habit	Local name	Plant part (s) used	Method of use	Purpose	UV	RFC	FL%
Pinaceae	*Picea smithiana* (Wall.) Boiss.	**Sk-2199**	Tree	Kachul	Whole Plant	Direct	Timber, wood for fuel.	0.306	0.244	31
Pinaceae	*Pinus wallichiana* A.B.Jacksn	**Sk-2200**	Tree	Chuii	Resin	Direct	Timber: Wood for construction. Medicine: Resins for cuts, blood clotting and wounds. Other uses: Powder for incense.	0.281	0.138	14
Pinaceae	Pinus roxburghii Sarg.	**Sk-2201**	Tree	Chiyotu	Resin, bark, seed	Paste, juice	Medicine: Antiseptic, Tonic Treatments: Indigestion, Cough, Cold, Skin disease, Asthma, bloody diarrhea, Tuberculosis (Tuberculosis patients sit under its shade for a swift recovery) Timber: Heartwood for Construction, Furniture Other uses: Powder of heartwood, seed, leaves for Incense	0.213	0.281	20
Plantaginaceae	*Picrorhiza kurrooa* Royle ex Benth.	**Sk-2202**	Herb	Kardho	Root	Decoction	Root decoction treats abdominal pain, diarrhea, purifies blood, relieves constipation, it effectively eases stomach pain, helps with dyspepsia, and alleviates nervous pain from stomach and bowel issues. The decoction also serves as an appetizer.	0.281	0.213	28
Podophyllaceae	*Podophyllum emodi* Wall. ex Royle	**Sk-2203**	Herb	Ishmandy / Ishmanay	Rhizome, fruit,	Decoction	Root: Hepatic, Tonic, Hair Growth Fruit: Tasty, Tonic, Anti-diarrheal	0.350	0.419	55
Polygonaceae	*Aconogonon alpinum* (All.) Schur	**Sk-2204**	Herb	Lamy	Whole Plant	Direct	The tender stem is consumed raw for its flavor and is believed to help with fever and heart issues. The entire plant serves as animal fodder.	0.475	0.363	55
Polygonaceae	*Bistorta vivipara* (L.) Gray	**Sk-2205**	Herb	Rengle	Root and stem	Decoction	Root tea helps with chest issues, piles, stuffy nose, vomiting, ongoing cough, wounds, and stomach pain	0.213	0.131	34

Family	Botanical name of Species	Voucher No	Habit	Local name	Plant part (s) used	Method of use	Purpose	UV	RFC	FL%
Polygonaceae	*Bistorta affinis* (D. Don) Greene	**Sk-2206**	Herb	Rengle	Seed, Rhizome	Powder	Large fruits: Dysentery remedy for infants Rhizome powder: Anti-inflammatory, Astringent (taken with milk)	0.075	0.081	19
Polygonaceae	*Oxyria digyna* (L.) Hill	**Sk-2207**	Herb	Chorko	Stem	Direct	Eat young stem for its taste; it helps with fever and purifies the blood	0.419	0.406	35
Polygonaceae	*Rheum emodi* Wall	**Sk-2208**	Herb	Chuntal	Whole Plant	Juice	Processed flowers (Arq): Asthma treatment Bark: Mild astringent Roots: Hair coloring, Blood purifier, Stomachic	0.450	0.419	43
Polygonaceae	*Rumex hastatus* (Don)	**Sk-2209**	Herb	Churki	Leaves, roots, stem, berries	Direct, powder, juice	Leaf Direct, leaf juice: Carminative, Stomachic, Flavoring, Purgative Ground leaves combat jaundice. Fresh leaves halt bleeding, clean rusted vessels and serve as fodder Roots: Against skin disease, piles, and bleeding of the lung, Root Decoction also fights jaundice.	0.350	0.281	27
Polygonaceae	*Rumex patientia* L.	**Sk-2210**	Herb	Hobabal	Leaves, roots	Decoction	Roots decoction is used for constipation and skin problems, leaves are used for sore throat.	0.550	0.475	68
Polygonaceae	*Rumex acetosa* L.	**Sk-2211**	Herb	Chirkhi	Leaves, roots	Decoction	Used to cure constipation, joint inflammation, and stomach problems	0.275	0.200	15
Polygonaceae	*Rumex nepalensis* Spreng.	**Sk-2212**	Herb	Hobabal	Root	Decoction, powder	Roots Decoction: Constipation remedy Powder of leaves: Swelling, Joint pain, Infection, Pus remedy Boiled leaves juice: Lung disease, Cough, Cold, Sinusitis, Headache, Wound, Body pain Edible: Tender leaves and shoots as vegetables, Healing, Respiratory disorders, Worm removal from wounds	0.406	0.206	21
Ranunculaceae	A*conitum violaceum Jacquem.* ex Stapf var. *violaceum*	**Sk-2213**	Herb	Booma	Root	Decoction, powder	Leprosy, Powders are employed for sciatica and pain relief	0.081	0.150	14

Family	Botanical name of Species	Voucher No	Habit	Local name	Plant part (s) used	Method of use	Purpose	UV	RFC	FL%
Ranunculaceae	*Aconitum violaceum var. weileri* (Gilli) Riedl	**Sk-2214**	Herb	Bzoumolo	Rhizomes	Direct, Paste	Boil rhizomes in milk, Crush into powder. Treatment for rheumatism, arthritis. Caution: Overdosing may cause death or mental problems.	0.144	0.219	11
Ranunculaceae	*Aquilegia fragrans* var. kanawarensis (Jacquem. ex Cambess.) Riedl	**Sk-2215**	Herb		Whole Plant	Decoction, ornamental	Astringent, purifying, induces perspiration, promotes urination, and combats parasites. Used as an ornamental plant for its appealing and fragrant spike flowers.	0.281	0.331	14
Ranunculaceae	*Delphinium brunonianum* Royle	**Sk-2216**	Herb	Makhutii	Flowers	Decoction	Flower Decoction: Heart disease, High BP, Pneumonia, Cold fever, Arthritis, Backbone ache, Asthma, Dysentery. Oil-extracted or fresh paste for dandruff. They are also used for forage.	0.950	0.638	96
Ranunculaceae	*Pulsatilla wallichiana* (Royle) Ulbr.	**Sk-2217**	Herb	Makhoty	Root, flower	Decoction	Root infusion: alleviating abdominal discomfort, regulating menstrual cycles, and combating fever, dermatitis	0.281	0.338	34
Rosaceae	*Cotoneaster microphyllus* Wall. ex Lindl.	**Sk-2218**	Shrub	Phoppy	Leaves, roots	Decoction	Tea made from leaves is utilized to halt bleeding and alleviate pain.	0.288	0.213	28
Rosaceae	*Fragaria nubicola* (Hook. f.) Lindl. ex Lacaita	**Sk-2219**	Herb	Borsay	Fruit, leaves, and roots	Direct, Plant Juice	Edible, Strawberry Hemostatic Fruit with *Berberis lycium* leaves: Ulcerative, Antiseptic, Astringent, leaves and root tea for Diuretic, sexual disease	0.556	0.213	21
Rosaceae	*Geum elatum* Wall. ex G. Don	**Sk-2220**	Herb	Phonar	Root	Decoction	Root tea helps with diarrhea and dysentery, acting as an astringent.	0.213	0.200	13
Rosaceae	*Rosa indica* L	**Sk-2221**	Shrub	Gulab	Flowers	Decoction	Pneumonia, Fever, Stomachache, and Eye diseases.	0.481	0.431	68

Family	Botanical name of Species	Voucher No	Habit	Local name	Plant part (s) used	Method of use	Purpose	UV	RFC	FL%
Rosaceae	*Rosa webbiana* Wall. ex Royle	**Sk-2222**	Shrub	Shingaye	Aerial parts	Decoction	Shoots: Tea, Fever, Cough, Sore throat. Fruits: Digestives. Seed: Veterinary disease treatment. Others: Handles for agricultural tools, Fuel.	0.506	0.469	35
Rosaceae	*Rubus irritans* Focke	**Sk-2223**	Sub-shrub	Ainchay	Barries, leaves	Decoction	People believe that it helps to cure cancer, anemia, diarrhea, and dysentery.	0.281	0.213	31
Rosaceae	*Spiraea canescens* D. Don	**Sk-2224**	Shrub	Shai	Root and seed	Decoction	Insomnia	0.144	0.225	27
Salicaceae	Salix denticulateAndersson	**Sk-2225**	Tree	Brawo	Leaves	Decoction	Leaf juice: Low BP, Fever.	0.131	0.000	14
Salicaceae	*Salix alba* L.	**Sk-2226**	Shrub	Beynwo	Stem, leaves	Direct, juice, paste	Juice/Paste: Joint pain, Headache, Body pain. Other: Toothpicks, Handcrafts.	0.419	0.275	29
Salicaceae	*Salix karelinii* Turcz. ex Stschegl.	**Sk-2227**	Sub-shrub	Brayuo	Whole plant	Decoction	Leaf decoction is used to treating fever and body pain also used as fuel and fodder	0.350	0.213	62
Saxifragaceae	*Bergenia stracheyi* (Hook. f. & Thom.)	**Sk-2228**	Herb	Shapur	Leaves	Decoction	Leaves: tea, blood purifier, analgesic, wounds. Root, rhizome, and leaves: abdominal pain., kidney stones.	0.488	0.206	28
Saxifragaceae	Bergenia ciliata Sternb.	**Sk-2229**	Herb	Shapur	Leaves	Decoction	Leaves used for making tea, which purifies blood , and pain reliever, aiding wounds, asthma, and diarrhea. Root, rhizome, and leaves alleviate abdominal pain and kidney stones.	0.569	0.281	46
Scrophulariaceae	*Verbascum thapsus* L.	**Sk-2230**	Herb	Rangkato	Leaves	Decoction	Leaves: febrifuge, laxative, antitussive, hemostatic Root Decoction: lactogenic, anti-enlargement(prostate). Applied: anti-dandruff, anti-baldness.	0.581	0.488	48
Tamaricaceae	*Myricaria germanica* (L.) Desv.	**Sk-2231**	Herb	Hookar	Leaves	Decoction	Used for pain relief	0.163	0.200	21
Tamaricaceae	*Tamarix arceuthoides* Bunge	**Sk-2232**	Shrub	Hookar	Leaves, stem	Direct	Leaves play a role in enhancing soil fertility, while stems are utilized as a valuable source of firewood.	0.081	0.069	9

Family	Botanical name of Species	Voucher No	Habit	Local name	Plant part (s) used	Method of use	Purpose	UV	RFC	FL%
Umbelliferae	*Carum carvi* L.	**Sk-2233**	Herb	Hayoo	Seed	Direct	Seeds: Anthelmintic, Cardioprotective Premature seeds: Vertigo Asthma, Carminative, Hypotensive,	0.750	0.519	55
Urticaceae	*Urtica dioica* L.	**Sk-2234**	Herb	Juumii	Aerial parts	Leaves	Young leaves: Vegetable, Hepatitis, Stomach, Joint pain, Skin diseases Root and leaves powder/paste: Chest pain, Gastritis, Wounds	0.894	0.475	61
Violaceae	*Viola biflora* L.	**Sk-2235**	Herb	Lilio	Whole Plant	Decoction	Decoction: cough, throat, bronchitis, kidneys, liver. Paste: eczema, skin	0.556	0.419	39

Legends: UV represents the Use Value; RFC indicates the relative frequency Citation and FL, is the fidelity Level, Sk Salim Khadim

Informant consensus factor (ICF)

The documentation meticulously recorded the percentage of plant species utilized for treating diseases showed in (Table 3), spanning from Pneumonia and Cancer to External injuries, Digestive system, Fever, Cold and cough, Asthma, Dermatology, Reproductive health, Hematology, Dental, Respiratory system, Jaundice, Renal and hepatic, Diabetes, and a miscellaneous category encompassing arthritis, eye disease, and malaria.

The Informant Consensus Factor (ICF) was computed to assess the consensus among informants regarding the selection of plant species for various ailment classifications (Boro *et al.* 2023). In this study, noteworthy findings reveal a substantial ICF value shown in (Table 3) for the Digestive system (0.91), signifying a high level of agreement among informants in the utilization of specific plant species for digestive ailments shown in (Figure 7). Similar study was done by (Panmei *et al*. 2019) in Manipur, northeast India There were a total of 174 use reports for 44 plant species used for digestive system disorders. Pneumonia closely follows with a notable ICF value of 0.90. Conversely, the category labeled as cancer demonstrates the lowest ICF value of 0, This discrepancy arose from disagreements among informants in selecting taxa for specific ailment categories. The high FIC value signifies a consistent pattern in how common people use plants, relying on only one or a limited number of plants for treating specific ailment categories (Boro *et al*. 2023).

The use of herbal treatments for digestive issues is a common practice worldwide. Over the past few decades, there has been increasing attention in research on medicinal plants and their uses in various parts of Pakistan (Bahadur *et al.* 2023). In the last few years, a wealth of information has been compiled, shedding light on how ethnic communities worldwide, Pakistan included, rely on plants for traditional healing practices. (Jimenez-Arellanes *et al.* 2003, Kayani *et al.* 2014, Bahadur *et al.* 2023).

Cultural ideologies

The residents of Parishing Valley are profoundly shaped by their religious, cultural, and mythical convictions linked to specific indigenous plants. Delving into the intricate connections between the community and these plants reveals the rich tapestry of beliefs that permeate the valley. People keep branches of the plant species *Rhododendron hypenanthum* Balf. f. in their homes for its fragrance, believing that it contributes to happiness and a positive atmosphere within the household. A unique group in Parishing Valley known as the Dayal, they have the extraordinary knack for tapping into special insights by simply inhaling the smoke of *Juniperus excelsa* leaves. They unveil hidden mysteries like misdeeds, good deeds, diseases etc. the sway of unseen beings called Shiyateen, and the consequences of malevolent spirits. They were also employed *Juniperus excelsa* in insane at home (Abbas *et al*. 2016) and constructing shelters for their cattle, known as "Doban," and the rationale behind this practice is rooted in myth, aiming to safeguard their cattle and ensure their secure return home. What is even more fascinating is how deeply the community relies on and cherishes the revelations from these Dayal folks, considering them vital for their lives and overall well-being. It is like a captivating dance between cultural beliefs and age-old practices that adds a touch of magic to Parishing Valley. The residents of the study area hold the belief that cultivating certain *Rosa* species, particularly *Rosa webbiana*, and *Fragaria nubicola* in their lawns will not only enhance the beauty of the surroundings but also bring joy through the delightful fragrance of the roses. The inhabitants of the region hold a profound belief in the auspicious qualities of certain alpine plants, notably *Betula utilis* and Delphinium brunonianum. These botanical treasures are not just seen as flora, they are regarded as potent symbols of prosperity and well-being. The community entrusts these plants with a special significance, considering their presence as a harbinger of wealth and positive fortune. The intertwined relationship between these alpine plants and the community's aspirations creates a narrative of hope, connecting the natural environment with the collective dreams of prosperity in the hearts of the inhabitant**.**

Table 3. Informant consensus frequency (ICF)

Disease category	N_{ur}	N_{ur} %	N_t	N_t %	N_{ur}-N_t	N_{ur}-1	ICF= (N_{ur}-N_t) / (N_{ur}-1)
Pneumonia	11	1.2	2	1.8	9	10	0.90
Cancer	2	0.2	2	1.8	0	1	0
External injuries	17	1.9	6	5.5	11	16	0.69
Digestive system	234	25.7	23	20.9	211	233	0.91
Fever	98	10.8	12	10.9	86	97	0.89
Cold and cough	102	11.2	13	11.8	89	101	0.88
Asthma	35	3.8	6	5.5	29	34	0.85

Dermatology	41	4.5	7	6.4	34	40	0.85
Reproductive health	20	2.2	4	3.6	16	19	0.84
Hematology	12	1.3	3	2.7	9	11	0.82
Dental	6	0.7	2	1.8	4	5	0.80
Respiratory system	44	4.8	10	9.1	34	43	0.79
Jaundice	5	0.5	2	1.8	3	4	0.75
Renal and hepatic	12	1.3	4	3.6	8	11	0.73
Diabetes	8	0.9	4	3.6	4	7	0.57
Others (arthritis, eye disease, malaria)	19	2.1	10	9.1	9	18	0.5
Mean (ICF)	-	-	-	-	-	-	0.735

Where 'Nur' indicates number of use reports for each disease category,' Nt' is the sum of species used in that category by all informants and 'ICF' Informant Consensus Factor.

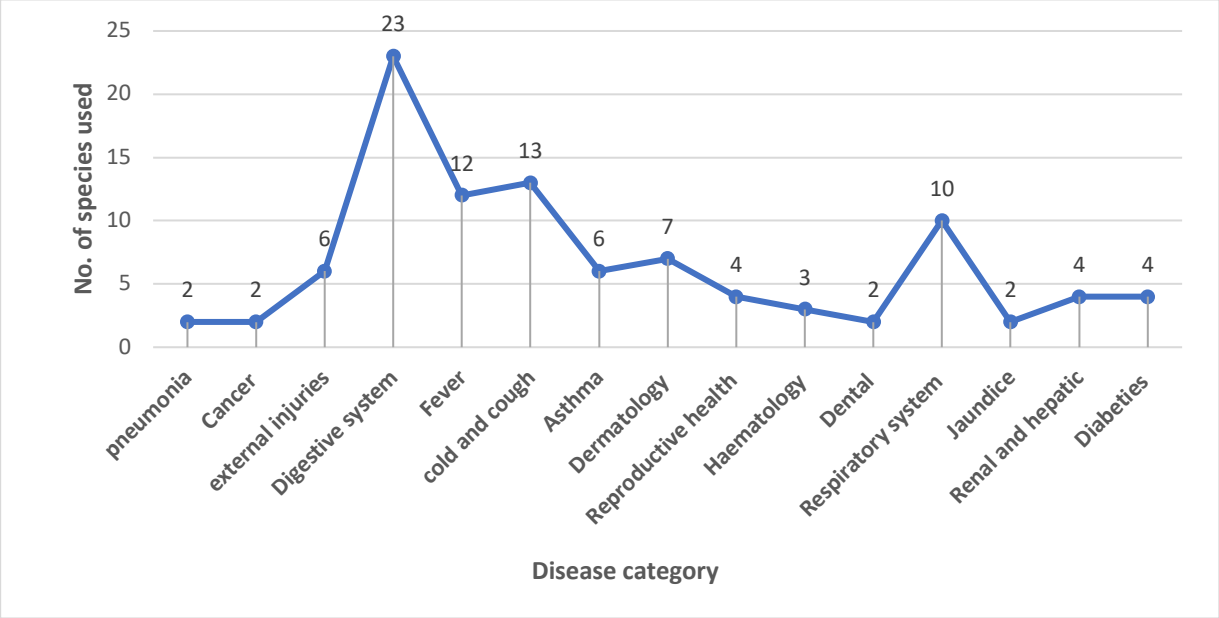

Figure 7. Dominant disease category treated by traditional medicine.

Conclusion

The research unveiled the profound expertise of ethnic communities in understanding the therapeutic qualities of wild medicinal plants. This invaluable traditional knowledge, crucial for their healing practices, has been orally transmitted across generations but lacks substantial documentation. This study aimed to document the traditional knowledge and practices.

As this ancestral wisdom faces the potential challenge of diminishing under the sway of modern pharmaceuticals, the research emphasizes the need for urgent investigations into the medicinal potential of these plants. With the rapid usage of wild medicinal plants, sustaining equilibrium becomes increasingly challenging.

To promote conservation and sustainable utilization, this study proposes five key actionable recommendations.

1. ***Community-Based Conservation Committees***: Establish committees comprising government representatives, local leaders, and community members to jointly oversee the conservation efforts of medicinal plants in Parishing Valley.
2. ***Capacity Building Workshops***: Organize workshops and training sessions facilitated by government agencies in collaboration with local communities to educate them about sustainable harvesting techniques and the importance of preserving medicinal plant species.

3. ***Incentive Programs:*** Develop incentive programs in partnership with the government to encourage local communities to engage in conservation activities, such as offering subsidies for sustainable farming practices or providing monetary rewards for maintaining medicinal plant reserves.
4. ***Regulatory Framework:*** Work collaboratively to develop and enforce regulations that govern the harvesting and trade of medicinal plants, ensuring that local communities have a voice in the decision-making process and that their traditional practices are respected.
5. ***Public Awareness Campaigns:*** Launch joint campaigns led by both the government and local communities to raise awareness among residents about the ecological and cultural significance of medicinal plants, fostering a sense of stewardship and collective responsibility for their conservation.

Declarations

List of abbreviations: UV Use Value, RFC Relative Frequency Citation, FL Fidelity Level, ICF Informant consensus factor.
Ethics approval and consent to participate: All interviewees gave their poral prior informed consent.
Consent for publication: All persons shown in images gave their poral prior informed consent to have their images shown.-
Availability of data and materials: Not applicable
Competing interests: The authors declare that there is no conflict of interest.
Funding: No funding has been received for the study.
Author contributions: SK, the primary author, meticulously managed all aspects of the research, from planning and data collection to specimen preparation, identification, results analysis, and manuscript production. SH, in a supervisory role, contributed to the research design, aided in specimen identification, and facilitated results analysis. TZ and HA actively participated in specimen collection, provided support in pressing and mounting, and assisted in professional formatting. Together, their collaborative efforts ensured a comprehensive and well-executed study on the ethnobotanical inventory and indigenous therapeutic applications of wild medicinal plants in Parishing Valley, Gilgit-Baltistan, Pakistan

Acknowledgements

This research paper is part of MS/M.Phil. Thesis of Salim Khadim. The appreciation goes to the participation and valuable knowledge shared by all respondents. Special thanks to the supporters, including Khadim Hussain, Laila, Almas Khadim, and Adnan, for their assistance morally and in collecting and managing plant specimens. Additionally, special gratitude to Karakoram International University Gilgit for creating a conducive environment during the research**.**

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