



Ethnopharmacological study of plants used in Diabar region, Azerbaijan

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Research

Abstract

Background: Medicinal plants play an important role in traditional healthcare systems worldwide, and ethnopharmacological studies are essential for documenting traditional knowledge. The Diabar region in Azerbaijan's Talysh mountains possesses a rich heritage of traditional medicine; however, such knowledge remains largely undocumented. This study aimed to systematically record and analyze the medicinal plants used by local communities in this under-researched area.

Methods: Ethnobotanical data were collected from 140 participants across 21 villages using semi-structured interviews and field surveys. Quantitative indices, including Use Value (UV) and Relative Frequency of Citation (RFC), were calculated to assess plant importance.

Results: The research documented 205 plant species from 60 families used to treat various ailments. The most cited families were Asteraceae (30 species) and Lamiaceae (20 species). *Cydonia oblonga* recorded the highest RFC (0.90). The most frequently treated conditions were cough (67 reports), digestive disorders (55), and inflammation (53). Quantitative analysis highlighted species with high cultural significance; notably, *Cydonia oblonga* also demonstrated a high Use Value (0.89), alongside *Thymus trautvetteri* (UV = 0.70) and *Morus nigra* (UV = 0.71). The data further revealed significant use of plants for liver disorders, infections, and as sedatives.

Conclusions: This study provides the first comprehensive inventory of medicinal plants in the Diabar region, preserving valuable traditional knowledge. The findings identify culturally important plants that warrant further phytochemical and pharmacological research to validate their therapeutic applications and potential for drug development.

Keywords: Azerbaijan, Diabar, ethnobotany, ethnopharmacology, medicinal plants, Talysh.

Background

Medicinal plants have been an essential component of traditional healthcare systems worldwide for centuries. Ethnopharmacological research plays a crucial role in documenting indigenous knowledge, preserving cultural heritage, and identifying plant species with potential therapeutic value. Currently, numerous studies on the use of medicinal plants in traditional medicine are being conducted worldwide, and related findings are increasingly being published (Abdelfettah *et al.* 2026; Ali *et al.* 2026; Doğan *et al.* 2026; Haq *et al.* 2022; Hardiman *et al.* 2025; Hedges *et al.* 2026; Islamova *et al.* 2026; Jalali *et al.* 2026; Maataoui *et al.* 2026; Rehman *et al.* 2023). Despite the global importance of medicinal plants, traditional knowledge in many regions remains insufficiently documented and is at risk of being lost due to modernization and socio-cultural changes. In this context, Azerbaijan represents a region with rich biodiversity and diverse cultural traditions related to the use of medicinal plants. The Republic of Azerbaijan is a multiethnic and multicultural country where Azerbaijani, Lezgi, Russian, Talysh, Avar, Turkish, Tatar, Tat, Ukrainian, Sakhur, Georgian, Jewish, Kurdish, Griz, Udin, and Khinalyg peoples have coexisted over centuries. Azerbaijan is located in the eastern part of the South Caucasus, at the intersection of Western Asia and Eastern Europe (Heydar Aliyev Foundation 2025; State Statistical Committee of the Republic of Azerbaijan 2025). The Caucasus region, historically known as a bridge between the Black and Caspian seas, has been recognized by the Worldwide Fund for Nature as one of the world's 200 global biodiversity hotspots (Alakbarli 2001). Azerbaijan shares borders with Georgia and Armenia to the west, Russia to the north, Iran and Turkey to the south, and is bordered by the Caspian Sea to the east (Gadimli *et al.* 2024). Its rich biodiversity is attributed to its geographical location and diverse landscape, including the Greater Caucasus, Lesser Caucasus, Talysh mountain systems, and the Kur-Araz lowland (WWF Azerbaijan 2025; Convention on Biological Diversity 2000; USAID 2020; Worldwide Fund for Nature 2025).

Azerbaijan is characterized by rich cultural and ethnic diversity, which is reflected in its folklore and traditional medicine practices, locally known as *turkechare*. Historical sources document centuries of plant use for food, medicine, construction, and agriculture (Bussmann *et al.* 2018; Damirov *et al.* 1983). However, ethnobotanical and ethnopharmacological studies in Azerbaijan remain limited, particularly in remote and understudied regions (Asgarov 2016; Grossheim 1949; Ibadullayeva *et al.* 2010; Ibadullayeva 2020; Pieroni & Sökand 2019).

Medicinal plants have been widely used in folk medicine in the Diabar region, one of the ancient settlements of Azerbaijan. Despite long-standing traditional practices, no comprehensive ethnopharmacological studies had been conducted in this region prior to this research.

This study contributes to preserving local ethnobotanical knowledge and provides a foundation for future research, including phytochemical and pharmacological evaluation of lesser-studied species. The findings will enhance understanding of traditional herbal medicine practices in Azerbaijan and promote the sustainable use of medicinal plant resources (Isayev 2006; Isaev *et al.* 2016; Isayev *et al.* 2017; Isayev *et al.* 2024; Kerimov *et al.* 2010; Olennikov *et al.* 2019; Olennikov *et al.* 2022; Safarova & Isayev 2022).

The aim of this study is to document and analyze traditional knowledge regarding medicinal plants used for treating various diseases in the Diabar region. For the first time, an inventory of wild and cultivated medicinal plant species used by local inhabitants has been compiled, along with quantitative data on their therapeutic applications.

Materials and Methods

Study area

The Talysh mountainous region is located in the southeast of Azerbaijan and is represented by four ridges: the Talysh Ridge (with its highest peak, Kemyurkei Mt., 2493 m), the Peshtasar Ridge, the Dizgoni Ridge, the Burovar Ridge, and the Diabar (Zuvand) depression. This area is particularly rich in rare endemic flora. The region is predominantly rural, with communities engaged in agriculture, animal husbandry, and traditional crafts.

Diabar is considered one of twenty main geobotanical regions characterized by homogeneous and unique vegetation cover with high endemism (Grossheim 1949). It includes Lerik and Yardimli districts of Azerbaijan (Fig. 1).

Lerik district is located at elevations of 2000–2400 m and has a temperate climate, with annual precipitation ranging from 300 to 800 mm. Agriculture is the primary livelihood, including grain and potato farming, fruit cultivation (apple, pear, walnut) and livestock breeding (sheep and cattle) (WWF Azerbaijan 2025; Convention on Biological Diversity 2000; USAID 2020).

Yardimli district lies at elevations of 1000–1800 m and has a warm and humid climate with mild winters and hot summers. Agriculture is the main occupation, including grain, potato and tobacco farming, livestock breeding and beekeeping (State Statistical Committee of the Republic of Azerbaijan 2025). Rural healthcare facilities include Central District Hospitals (CDH), village site hospitals, village doctor ambulatories and feldsher-midwife points (FMP). Lerik has one CDH, one family health center and three village site hospitals (Peshtatuk, Aliabad and Veri). Yardimli has one CDH, two village site hospitals (Shefeqli and Berjan), 17 village ambulatories and 16 FMPs (Lerik District Executive Power 2025). Mountainous terrain and dispersed settlements make healthcare access difficult, particularly in winter, resulting in continued reliance on traditional healers (tabibs) and herbal remedies. Respiratory, gastrointestinal and cardiovascular disorders are common (State Statistical Committee of the Republic of Azerbaijan 2025).

Table 1. Ethnopharmacological sampling sites of the Diabar region with population and geographical data.

Name of the village	Population	Altitude	Latitude	Longitude
Pirasora	289	1758	48°22'51"E	38°43'14"N
Mistan	186	1400	48°25'55"E	38°38'46"N
Jonu	354	1300	48°30'38"E	38°36'54"N
Kalakhan	942	1600	48°20'56"E	38°39'00"N
Gosmalian	854	1800	48°23'34"E	38°41'20"N
Shonachola	552	1700	48°24'44"E	38°41'43"N
Rvarud	820	900	48°29'31"E	38°41'43"N
Kalvaz	270	1800	48°21'40"E	38°37'25"N
Kekonu	178	1700	48°18'58"E	38°47'38"N
Dastar	362	1400	48°36'22"E	38°38'48"N
Nuravud	1542	1500	48°21'09"E	38°46'23"N
Orand	1378	1600	48°20'46"E	38°44'55"N
Pirembel	557	1100	48°07'39"E	38°55'15"N
Shilavanga	388	1100	48°13'36"E	38°53'23"N
Avash	1047	1100	48°05'56"E	38°54'11"N
Demam	950	1300	48°02'27"E	38°52'40"N
Kurekchi	1851	900	48°07'45"E	38°53'01"N
Chayyuz	956	900	48°10'41"E	38°53'00"N
Hamarkand	722	1000	48°15'55"E	38°51'34"N
Peshtasar	459	1100	48°10'32"E	38°51'00"N
Allar	1674	1200	48°14'12"E	38°47'53"N

Fieldwork

The study involved three phases: literature review, field data collection and statistical analysis. Fieldwork was conducted from March 2022 to August 2024 in 12 villages of Lerik (Pirasora, Mistan, Jonu, Kalakhan, Gosmalian, Shonachola, Rvarud, Kalvaz, Kekonu, Dastar, Nuravud and Orand) and 9 villages of Yardimli (Pirembel, Shilavanga, Avash, Demam, Kurekchi, Chayyuz, Hamarkand, Peshtasar and Allar).

Interviews were carried out in participants' homes and through "walk-in-the-woods" surveys in private gardens, plantations, pastures, forests and meadows. Participants were selected using a snowball sampling approach, where initial informants were identified based on their knowledge of traditional medicine and subsequently recommended other knowledgeable individuals within the community. Interviews were conducted in Azerbaijani and Talysh, with informed consent obtained. Semi-structured questionnaires captured demographic information (gender, age, education) and plant-use details (vernacular names, plant parts used, preparation and application). The free-listing technique was used to record all plants cited by informants (Quinlan *et al.* 2002). Photographs of plants were shown to assist recognition and ensure accurate identification (Phillips *et al.* 1994).

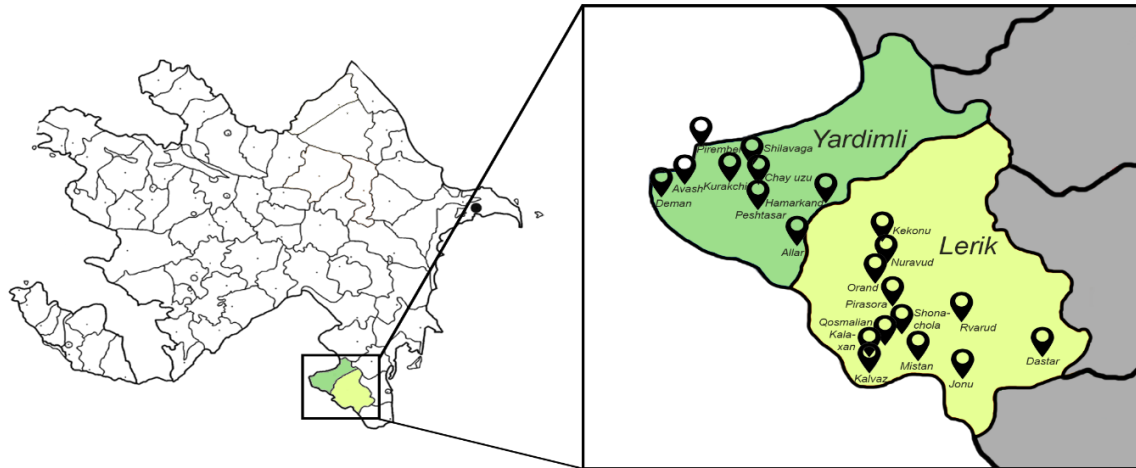


Figure 1. Map of the Diabar region, Azerbaijan, showing the ethnopharmacological study area.

Plant Collection and Identification

Plant identification during fieldwork was carried out by Prof. Isayev J.I., utilizing the *Flora of Azerbaijan* (Grossheim 1949; Karyagin 1957) and *Azərbaycanın Bitki Aləmi* (Asgarov 2016). The herbarium specimens were deposited at the Institute of Botany, Azerbaijan Academy of Sciences. The Latin names of the specimens were verified using Plants of the World Online (2025) and World Flora Online (2023). Detailed photographs of plant specimens were taken for documentation purposes.

Data Analysis

A thorough review of recent ethnopharmacological literature was carried out to provide the foundational references for the analysis presented herein (Etkin 1993; Hussain *et al.* 2022; Irfan *et al.* 2021; Jan *et al.* 2024; Karakaya *et al.* 2020; Leonti 2022; Mamedov *et al.* 2015). Several key indices were employed in analyzing the data:

Family Importance Value (FIV)

The Family Importance Value Index (FIV) is an ethnobotanical metric that quantifies the significance of a plant family based on its cultural relevance and utility. Different researchers have used slightly varying definitions, but the core concept revolves around the prominence of a plant family within a studied community. Family Importance Value (FIV) was calculated according to Equation 1 (Asghar *et al.* 2018).

$$FIV = FC(\text{Family})/N \times 100$$

FC – frequency of plant family citations, N – the total number of informants.

Use Value (UV)

UV quantifies the relative importance of each species within a community. It is calculated by dividing the total usage reports for a species by the number of participants. Use Value (UV) was calculated according to Equation 2 (Khan *et al.* 2018; Ali *et al.* 2023).

$$UV = \sum Ui/N$$

$\sum U$ – the sum of all uses mentioned by each informant, N – the total number of participants.

Relative Frequency of Citation (RFC)

RFC identifies the preferred plant species for treating diseases by calculating the ratio of citations for a species to the total number of informants. Relative Frequency of Citation (RFC) was calculated according to Equation 3 (Birjees *et al.* 2022; Ullah *et al.* 2023).

$$RFC = FC/N$$

FC – the number of participants that report the uses of specific species, N – the total informants who are involved in the study. RFC values range between 0 and 1.

Informant Consensus Factor (ICF)

The values, ranging from 0 to 1, indicate the level of agreement among participants regarding plant usage for specific disease categories. Higher values suggest fewer species are commonly used by many informants, while lower values reflect a lack of consensus. Informant Consensus Factor (ICF) was calculated according to Equation 4 (Umair *et al.* 2017; Ayub *et al.* 2023).

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

Nur – the number of use-reports for a particular ailment category, Nt – the number of species used for that ailment category
Microsoft Excel was utilized for data processing and analysis.

Results

Demographic features of informants

A total of 140 individuals were questioned across several communities in the examined region. The participants' age ranged from 40 to 90, with a predominance in the 61–70 age group (47 people), and 9 participants were over 90 years old (Fig. 2). The age categories were defined based on the distribution of participants across age groups, with a higher representation of older individuals, consistent with their role in traditional knowledge practices. The younger generation demonstrates diminished interest in herbal therapies, likely due to the recent surge of over-the-counter pharmaceuticals, easily obtainable

from pharmacies in nearby towns. Informants also indicated a reduction in the transmission of traditional knowledge on plant use.

As nine-year general secondary education is mandatory in the country, the majority of respondents (90) have at least a secondary education level; 43 are university graduates, and only 7 are uneducated. The analysis of participants' marital status revealed a predominance of married individuals, while the gender distribution was skewed towards males (48 women and 92 men), probably attributable to socio-cultural barriers (Fig. 2).

In terms of occupation of the survey participants, retired people represented the vast majority of the informants, followed by teachers and shepherds. Typically, practitioner-healers were hesitant to disclose their expertise in traditional plant usage; however, in certain instances, they exhibited greater openness and provided information on treating ailments such as the common flu, fever, and gastrointestinal issues, among others (Isayev *et al.* 2024; Isayev *et al.* 2025).

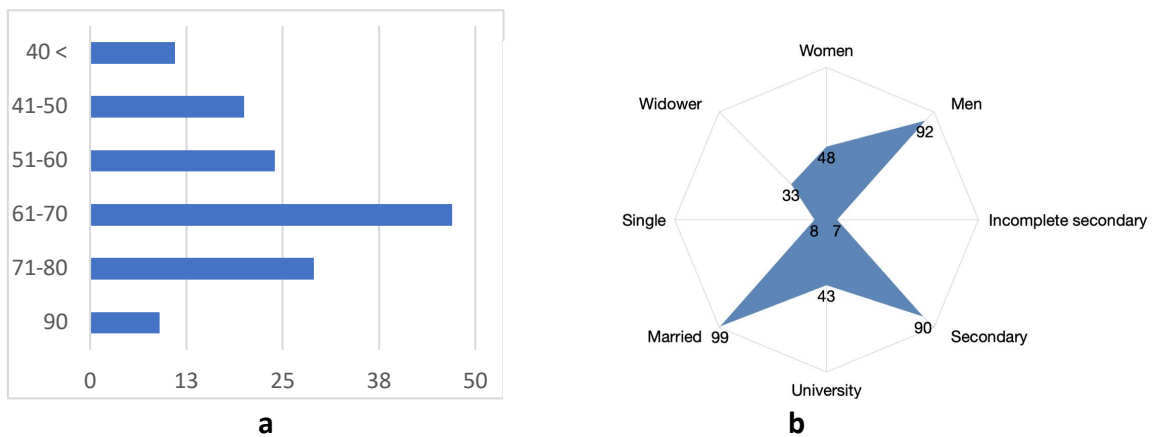


Figure 2. Demographic characteristics of informants: a – by age group; b – by gender, education, and marital status.

Family importance value (FIV)

A total of 205 plant species belonging to 60 families, including 176 dicotyledons, 26 monocotyledons, and 3 high spore-bearing plants, are mentioned in the survey (see Supplementary Table S1). The most mentioned families are Asteraceae with 30 species (14.63%), Lamiaceae with 20 species (9.76%), Rosaceae with 17 species (8.29%), Fabaceae with 14 species (6.82%), and Apiaceae with 10 species (4.88%). Six species from Malvaceae, Poaceae and Scrophulariaceae (2.93%), 5 species from Brassicaceae and Iridaceae (2.44%), and four species from Caryophyllaceae, Hyacinthaceae, Orchidaceae and Polygonaceae (7.80%) recorded to be useful in the treatment of different ailments. Other plant families were represented by two or just one species.

To consider the significance of the families represented by the limited number of species, the Family Importance Value Index was calculated (Fig. 3). This enabled identification of high values for plant families represented by single species like *Lythraceae* (FIV 72), *Pedaliaceae* (FIV 60), *Salicaceae* (FIV 48), or by 3 species like *Moraceae* (FIV 66).

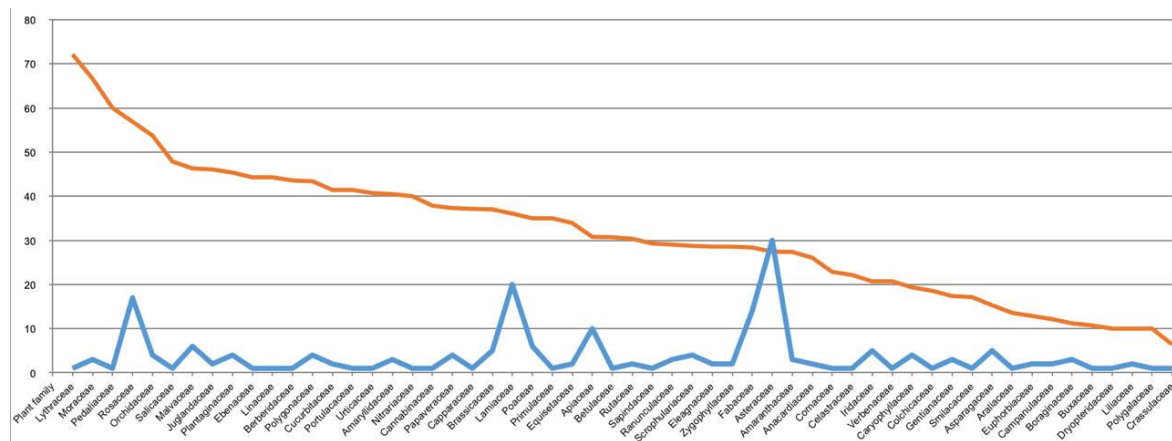


Figure 3. Relationship between the number of species in each plant family (blue line) and their corresponding Family Importance Value (FIV) (orange line).

Habit and status

The survey also includes mentions about such botanical characteristics as the life form and cultivation status of the plants. Among recorded plants, 168 (81.95%) were represented by herbs, 21 (10.24%) by trees, 11 (5.37%) by shrubs, 4 (1.95%) by subshrubs, and 1 (0.49%) liana. Out of the recorded 205 medicinal plant species, 32 are cultivars and 173 are wild varieties. Cultivated plants such as onion, garlic, fennel, beetroot, cabbage, pepper, cumin, saffron, pumpkin, anise, breadfruit, radish, spinach, sesame, beans, and corn serve both culinary and medicinal purposes.

Parts used

According to the results, whole plants (herbs) are the most used plant parts with 79 mentions (38.54%), following the fruits in 38 plants (18.54%), leaves in 21 plants (10.24%), flowers in 13 plants (6.34%), tubers in 10 plants (4.88%), rhizomes in 7 plants (3.41%), roots in 6 plants (2.93%), seeds in 5 plants (2.44%), bulbs in 3 plants (1.46%), tendrils and bark (0.49%) in one plant species (Fig. 4). For some plants, two different parts are mentioned. As for the preparation methods, infusion, decoction, extraction, fruit juice, fresh plant, ash, tar, and smoke (cigarette) are mentioned, with a predominance of infusion, decoction, and fresh plant.

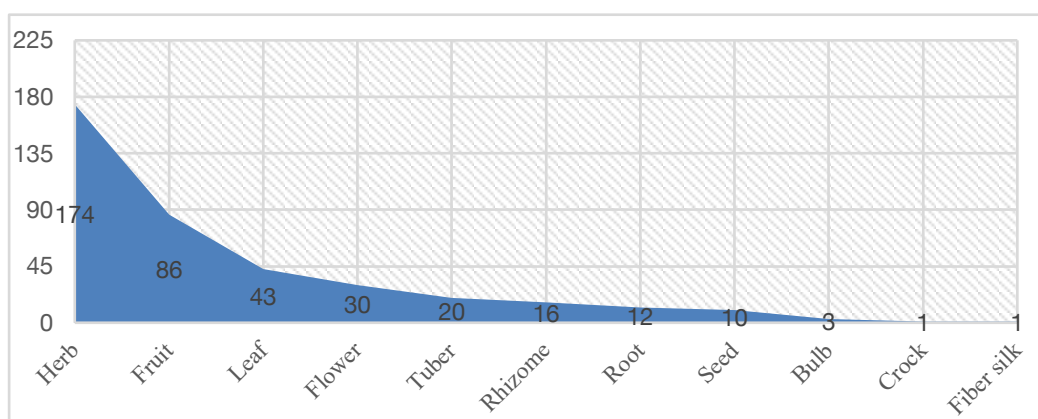


Figure 4. Distribution of plant parts used in traditional medicine, showing the number of use-reports for each plant part recorded during the survey.

Relative frequency of citation

The highest RFC values are recorded for *Cydonia oblonga* (0.90), *Crataegus pentagyna* (0.99), *Plantago major* L. (0.78), *Crataegus orientalis* (Mill.) M.Bieb. (0.99), *Glycyrrhiza glabra* (0.74), *Punica granatum* L. (0.89), *Morus nigra* L. (0.73), *Thymus trautvetteri* Klok. et Shost. (0.87), *Rumex confertus* Willd. (0.79), and *Rosa canina* L. (0.74).

The lowest values recorded for *Cirsium cinerlus* Bieb. (0.11), *Silene schafta* (0.16), *Rosularia cymbalaria* L. (0.08), *Euphorbia marschalliana* Boiss. (0.09), *Scrophularia zuvandica* Grossh. (0.10), *Onopordum acanthium* L. (0.05) indicate that these species cannot be considered important in terms of use in the treatment of specific ailments.

Use value (UV)

Cydonia oblonga Mill. (0.89), *Thymus trautvetteri* Klok. et Shost. (0.70), *Morus nigra* L. (0.71), *Althaea officinalis* L. (0.59), *Rosa canina* L. (0.69), *Rhaphanus sativus* L. (0.62), *Malva sylvestris* L. (0.66), *Thymus kotschyanus* Boiss. et Hohen. (0.61), *Ficus carica* L. (0.67), *Plantago major* L. (0.76), *Foeniculum vulgare* Mill. (0.55), *Calendula persica* C.A. Mey (0.49), *Zea mays* L. (0.49), *Achillea millefolium* L. (0.55), *Crataegus pentagyna* Waldst. et Kit. ex Willd. (0.81), *Glycyrrhiza glabra* L. (0.74), *Citrus limon* (L.) Osbeck (0.51), *Carum carvi* L. (0.52), *Cichorium intybus* L. (0.43), *Linum usitatissimum* L. (0.44), *Althaea cannabina* L. (0.49), and *Nepeta mussini* Spreng. ex-Henck. (0.42) are among the species that demonstrated the highest UV values (Table S1).

Ailments cured

The ailments most frequently reported by informants include cough relief (67), digestive disorders (55), urinary problems (30), and skin conditions (29). Plants are also reported to be used as sedatives (25), cholericics (24), and in diabetes management (22), as well as for the common cold and as laxatives (19). Additionally, moderate use of plants as mouthwashes, for sleep disorders, joint pain, and as analgesic and anti-allergic agents was recorded (Fig. 5).

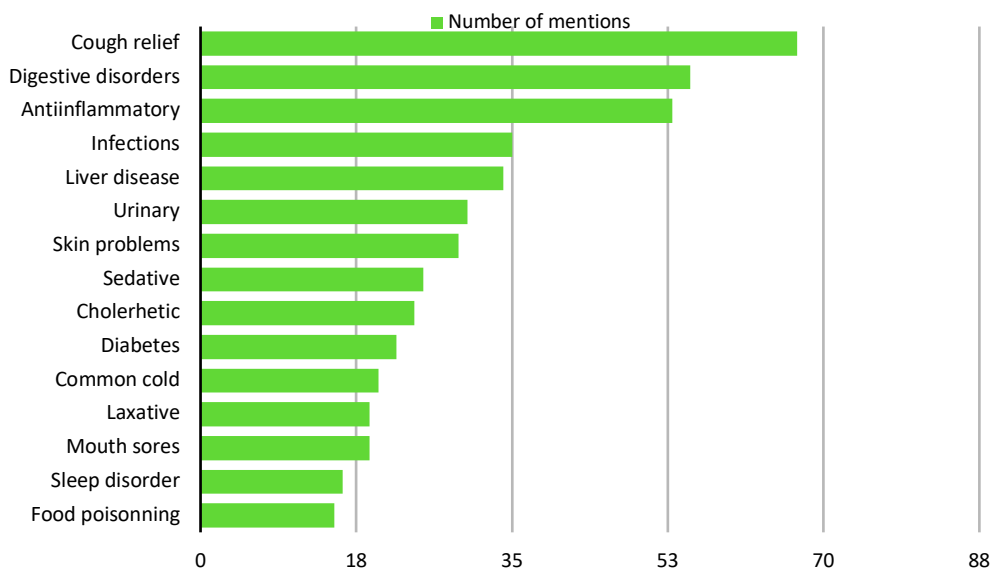


Figure 5. Distribution of medicinal plant uses across different disease categories, showing the number of use-reports recorded for each category.

Discussion

Through comparison of the recorded plant species and their corresponding uses in our dataset with those in the cited papers, we discerned both consistencies and discrepancies in the acquired ethnobotanical knowledge. As mentioned earlier, our study is the first ethnobotanical and ethnopharmacological investigation conducted in the Diabar region; therefore, we chose to compare existing research carried out in Azerbaijan and neighboring countries, including northern Iran, Turkey, and Georgia (Görhan *et al.* 2021). Overall, such comparisons with regional ethnobotanical studies highlight both similarities and differences in medicinal plant use (Bussmann *et al.* 2016; Bussmann *et al.* 2018; Pieroni & Sökand 2019; Sökand & Pieroni 2019; Younessi-Hamzekhanlu *et al.* 2020). While a high diversity of plant species has been documented across these regions, our findings show only limited overlap with those reported for the Diabar region.

Fourteen plants recorded in our survey are listed in the work of Ibadullayeva, with similar or differing medicinal use reports (Ibadullayeva *et al.* 2010; Ibadullayeva 2020). For instance, *Spinacia oleracea* L. and *Allium cepa* L. show alignment in therapeutic uses. In the case of *Amaranthus sylvestris*, treatment of diabetes and its use as a laxative noted in our report contrasts with the more general “use in digestive disorders.” *Beta vulgaris* L. showed a discrepancy in use: treatment of liver disease by informants vs. anemia reported by Ibadullayeva — possibly reflecting regional or cultural variations.

In addition, our findings are consistent with our previous ethnopharmacological study conducted in the Gadabay region of Azerbaijan (Isayev *et al.* 2025b), where traditional medicinal knowledge was also predominantly preserved among older generations and similar dominant plant families, including Asteraceae, Apiaceae, Rosaceae, and Lamiaceae, were reported. However, unlike the Gadabay study, which focused specifically on the treatment of urological diseases, the present research covers a broader range of ailments and provides a more comprehensive analysis of medicinal plant use in the Diabar region.

Furthermore, our findings can be compared with our previous quantitative ethnobotanical study conducted in the Zagatala District of Azerbaijan (Isayev *et al.* 2026), which documented 121 medicinal plant taxa belonging to 44 families. Similar to the present study, dominant families such as Asteraceae, Lamiaceae, and Rosaceae were prominently represented, indicating consistent ethnopharmacological patterns across different regions of the country. In both studies, species such as *Cydonia oblonga* and *Thymus* spp. were identified as culturally important taxa with high quantitative indices.

In contrast, the present study revealed a substantially higher species diversity (205 species across 60 families), reflecting regional ecological variation and broader documentation of traditional knowledge in the Diabar region. Additionally, while both studies applied quantitative ethnobotanical indices, differences in the most cited species and therapeutic categories highlight the influence of local environmental conditions and cultural practices on medicinal plant use.

Twenty-eight plant taxa showed alignment with the ethnopharmacological study conducted in Khoys city, West Azerbaijan-Iran (Younessi-Hamzekhanlu *et al.* 2020). *Malva neglecta* Wallr., *Ficus carica* L., and *Verbascum thapsus* L. were cited for analogous therapeutic uses. *Morus alba*, *M. nigra*, *Punica granatum*, and *Portulaca oleracea* L. exhibited distinct medicinal applications compared with our observations. Despite differences in total species richness, both studies identified similar dominant families, including Asteraceae, Lamiaceae, Rosaceae, Fabaceae, and Apiaceae, suggesting common ethnopharmacological patterns across the region.

Twenty-nine taxa from our list were recorded in Ethnobotany of the Caucasus with broadly similar pharmacological uses (Bussmann 2017). In addition to comparative alignment of use-reports, the quantitative results of the present study also provided internal evidence of culturally preferred taxa and families. Asteraceae and Lamiaceae were the most represented families in the dataset and achieved high FIV scores, indicating that these families were repeatedly cited and highly valued in the local materia medica. Herbs were the dominant life-form, followed by trees and shrubs, suggesting that easily accessible taxa are more frequently integrated into remedies. Whole herbs, fruits, and leaves were the most commonly used plant parts, whereas roots, seeds, and bulbs were less frequently used — a pattern also reported in ethnomedicinal surveys from Pakistan and surrounding regions (Ullah *et al.* 2023; Irfan *et al.* 2023; Ullah *et al.* 2024).

In our study, species such as *Cydonia oblonga*, *Thymus* spp., *Morus nigra*, and *Rosa canina* attained high RFC and UV values, demonstrating their broad acceptability across respondents. Informant Consensus Factor values were highest for respiratory and digestive disorders, indicating widely shared traditional knowledge in these categories. Overall, the distribution of dominant plant families, habit types, plant parts used, and index-based rankings reinforces that medicinal plant use in the Diabar region follows clear cultural patterns rather than random selection.

This study has several limitations. Although the study area includes multiple ethnic groups, the data were analyzed collectively and therefore do not allow for comparative assessment among them. Furthermore, the cross-sectional design limits the ability to capture temporal variations in plant use. The data were based on self-reported information and may be subject to recall bias and subjective interpretation. Cultural factors may have constrained the willingness of some informants to disclose detailed knowledge. In addition, a preference for modern pharmaceuticals among certain participants may have influenced the reporting of plant-based practices.

Future research should prioritize the phytochemical and pharmacological evaluation of the most frequently cited plant species. The findings of this study will be disseminated among local communities to enhance awareness and support the preservation of ethnobotanical knowledge. Expanding investigations across diverse regions of Azerbaijan and over extended time frames will provide a more comprehensive understanding of the diversity and dynamics of traditional medicinal knowledge. In addition, comparative studies focusing on the same ethnic groups across different regions will offer valuable insights into spatial variations in traditional plant use and knowledge systems.

Conclusion

The health system in the Diabar region is shaped by its rural and mountainous context, combining conventional medicine with traditional practices involving the use of medicinal plants in their natural form or homemade remedies. This study allowed us to yield significant insights into these practices and identify areas for additional investigation or validation. Further research could focus on plants used by the Talysh ethnic group living in other regions of Azerbaijan, including Shirvan, Bilesuvar, Absheron and Sumgayit. Comparison of medicinal plant uses between different ethnicities living in Azerbaijan can help to understand the general approach to healing with plants that is used in the country, and also plants with consistent uses across the country could be prioritized for further phytochemical research and pharmacological validation.

Declarations

List of abbreviations: Not applicable.

Ethics approval and consent to participate: Prior to each interview, the aims of the study were explained to all participants, and verbal informed consent was obtained. Approval to conduct the study was granted by local authorities and community representatives. As the research involved non-clinical ethnobotanical data collection without medical intervention or the recording of sensitive personal health information, formal institutional ethical approval was not required. All procedures were carried out in accordance with accepted ethical standards for research involving human participants and followed the

International Society of Ethnobiology Code of Ethics (ISE 2006). Participant anonymity was ensured throughout data collection, analysis, and reporting.

Consent for publications: Not applicable.

Availability of data and materials: The figures and tables supporting the results of this study are included in the article, and the original data sets are available from the first author upon request.

Competing interests: The authors declare that there are no conflicts of interest in this article.

Funding: Authors have not received any funding during this research.

Authors' contributions: J.I.I. conceptualized the study, led the overall research design, personally participated in field expeditions and community surveys, supervised the field and analytical phases, ensured scientific quality, and critically revised the final manuscript.

Kh.M.N. contributed to the core scientific concept, guided methodological development, and provided substantial intellectual input to data interpretation and manuscript preparation.

N.B.T., N.S.M., A.G.I., and G.J.S. conducted field surveys, administered questionnaires, collected ethnobotanical data, and assisted in initial data handling and draft preparation.

K.U.R., G.M.Sh., I.Kh. and F.U. contributed to scientific collaboration, supported methodological validation, and assisted in comparative literature review and contextual analysis.

All authors read and approved the final manuscript.

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