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Ethno-medicinal Survey of Plant Flora Utilized by the Ethnic Communities of Minab and Rudan Counties (Hormozgan, Iran)

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ABSTRACT

Introduction: The survival of Cultural Ecosystem Services, specifically Indigenous Knowledge (IK) of medicinal plants in Southern Iran, is undergoing rapid erosion due to accelerated generational shift and modernization. This study moves beyond simple documentation in the Hormozgan biodiversity hotspots (Minab and Rudan counties), aiming to quantify, validate, and identify candidate species for novel phytochemical exploration. Methodology: A comprehensive cross-sectional study was conducted, where deep, semi-structured interviews were performed with 31 Key local informants, focusing on the inter-generational transfer of knowledge. Data on the number of species, preparation methods, and therapeutic uses were analyzed using established quantitative ethnobotanical indices, namely the use reports (UR) relative frequency index (RFC), Cultural index (CI), and the Informant Consensus Factor (ICF), to optimize the pharmacological screening process. Key Findings: A total of 118 medicinal plants species across 44 plant families were registered. Our analyses showed that treatments for Dermatological, gastrointestinal, and respiratory disorders commanded the highest consensus among informants (ICF > 0.90). The ethnobotanical survey demonstrated that the Lamiaceae, Asteraceae and Fabaceae were the most represented and highly utilized plant families, with 1,347 use reports documented across all taxa. The primary plant parts employed in descending order of frequency, were leaves, flowers, fruits, and roots. The predominant preparation methods were decoction, followed by poultice and infusion. These reports were categorized into 14 use categories addressing 79 distinct diseases. The most dominant medicinally utilized plant species were identified as *Cynanchum acutum*, *Cymbopogon iwarancusa*, *Matricaria aurea*, *Malva neglecta,* and *Lawsonia inermis*, respectively. Furthermore, 41% of the recorded therapeutic applications were identified as novel indigenous uses not previously documented in any major national or international medicinal plant databases, suggesting a unique biochemical reservoir in the region. Conclusion and implications: The findings provide an immediate roadmap for the targeted screening of active compounds from Minab and Rudan flora. Prioritizing species with the highest cultural weight (high CI) significantly increases the probability of discovering new bioactive molecules. The urgent conservation of this unique IK and its associated botanical reserves is a critical conservation priority that will secure the region's pharmaceutical potential and bio-economy.

Keywords: Ethnopharmacology, Hormozgan, Medicinal plants, Quantitative Indices

INTRODUCTION

Identifying and protecting medicinal species can be one way to sustainably manage and preserve knowledge related to their use. Based on the World Health Organization information about 80 % of the population in many Asian countries rely on medicinal plant species for primary health care [1]. In this case, Iran is one of the richest regions in Southwest Asia in terms of plant biodiversity. The presence of 11 of the world's 13 known climates has provided favorable conditions for the growth and development of diverse medicinal plants throughout the country [2-4]. Traditional herbal knowledge is a fundamental part of Iranian culture [5, 6]. In this case, Hormozgan province is one of the important regions in the south of Iran with diverse ecological condition and rich ethnobotanical culture. According to some reports, the coastal areas of this region, the Persian Gulf, were one of the first human settlements [7]. In the ecological point of view, medicinal plants of Hormozgan province distributed from 10 to 300 m altitude gradient. So that, these plant species grow on coastal sand dunes, vast plains, hills, salty lands, and mountainous area [8]. Minab and Rudan are two main counties in Hormozgan province and in these rejoin ethnobotanical knowledge is fundamental part of cultural medicine of ethnic communities. In the other words, like the other Iranian counties, Minab and Rudan communities use medicinal plants to care various ailments. Also, these rejoins have especial ancestral ethnobotanical knowledge, the use of plants for flavoring and preserving foods, as well as the extraction of aromatic plant species. In this area, wild food plants play an important role in the lives of local communities, serving as a permanent food source or supplement and over time, these practices have become an integral part of the local's culture. Locals of this district have depended on plant species, and leveraging their traditional knowledge to address various life issues. Generally, this valuable ethnobotanical knowledge is increasingly at risk due to climate change, habitat destruction, and etc. [9]. Finally, this study carried out to document and preserve ethnobotanical and ethnobotanical knowledge of the Minab and Rudan counties, due to their especial ecological and cultural context, classify the threat facing the medicinal plants and their traditional uses, and suggesting conservation guide to the local government of the medicinal plants in Hormozgan region were another purpose of this work.

MATERIALS AND METHODS

Study Area

This research was carried out in Minab and Rudan counties as two main cities in Hormozgan province (Fig. 1). Rudan County, located in the east of Hormozgan, is bordered by Faryab to the north, Kahnouj to the northeast, Hajiabad to the northwest, Manojan to the east, Minab to the south and southwest, and Bandar Abbas to the west. The district is bounded by Kerman province (Faryab county, Kahnouj, and Hajiabad) in the north, northeast, and southwest. Fars and Bushehr provinces in the west and northwest and Sistan and Baluchestan province in the east. The southern parts of this province which is surrounded by warm waters of the Persian Gulf and Oman Sea is approximately 900 km in length [10]. Rudan with an area of about 3044.5 square kilometers is located 100 kilometers from Bandar Abbas. The center of Rudan County, is located at 27 degrees and 27 minutes' north latitude and 57 degrees and 11 minutes' east longitude, and its altitude is about 190 meters above sea level. In terms of topography and geographical features, Rudan County consists of two parts: plain and mountainous. The plain and flat part covers most of the central and southern regions. The lands of this region are mostly flat and have an altitude of between 150 and 700 meters above sea level. The Joghin and Rodan rivers, the main branches of the Minab river, pass through the center of the Rudan and irrigate the plains, and create many sedimentary and alluvial beds, which has led to the expansion of agriculture in the region. There is a mountainous area with significant heights in the north, west and east, which surrounds the city like a wall. The heights of this area are the foothills of the southern Fars Mountains and the scattered central mountains. Minab county, as second largest city of Hormozgan Province, is widely considered to mark the western extremity of the Makran Coastline in Iran. The region's inherent environmental advantages, specifically its conducive climatic and pedological factors, support a high level of agricultural productivity, evidenced by the successful cultivation of commercially valuable crops such as citrus (oranges), dates, grains, tomatoes, and mangoes. Minab's nomenclature is hypothesized to originate from Mianab, referencing its location proximate to regional waterways. Historically, the city's foundation is traditionally ascribed to Ardeshir I of the Sasanian dynasty. The city, documented as a significant commercial center, experienced a catastrophic decline following the Mongol invasions, with the Minab Fortress being the primary surviving structure of its older construction. According to multivariate statistical methods classification, the study area is belonging to arid and ultra-warm Bio-climatic zone. The most important predominant vegetation species in this area are the following vegetation's: *Gaillonia aucheri, Cymbopogon Olivieri, Taverniera glabra, and Convolvu lus leiocalycinus* [11]. The region's present-day populace is ethnically diverse, encompassing Arabs, Persians, and Baluch, alongside settlers from northern areas.

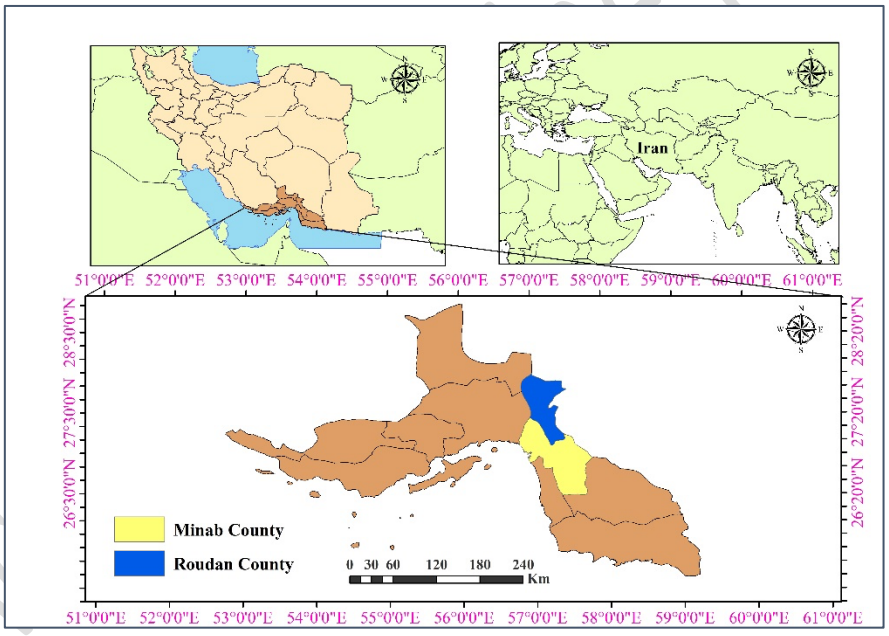

Fig. 1 Location of study area (Hormozgan province, Rudan and Minab counties).

Plant Identification

Present research was carried out from winter 2023 to autumn 2024 with 31 ethnic herbal healers of Rudan and Minab counties. According to the maps, natural features, vegetation, and subcultures in the study area, each county was classified. The herbarium specimens were gathered and prepared based on the standard methods [12-14], and identified by taxonomic experts from the Department of Plant Biology at the herbarium of the University of Jiroft, the vouchers were placed by UJH international code [15-17]. The nomenclatures were prepared according to the International Plant Name Index and The Plant List (www.ipni. org; www.the plantlist.org).

Ethnobotanical Data Collection

The Ethnomedicinal data was gathered using open interviews and semi-structured questionnaires [18-20]. For this aim, a total of 31 herbal healers and local informants were interviewed (Table 1). During the survey, ethnomedicinal data including local name, part(s) of the plant used, medicinal use, ways of preparation, and administration methods was recorded (Table 2).

Table 1 Demographic characteristics of the interviewees (n=31)

Specification		Abundance	Relative abundance
Gender	Female	21	67.7
	Male	10	32.3
Education	Illiterate	2	6.45
	Elementary	4	12.90
	Guidance	7	22.58
	Diploma	11	35.48
	Masters	5	16.13
	Masters>	2	6.45
Age	<30	3	9.68
	31-40	5	16.13
	41-50	8	25.80
	51-60	13	41.90
	61-70	2	6.45

Ailment Categories

Classification of the recorded medicinal plant uses was done using the International Classification of Primary Care (ICPC-2) (http://www.who.int/classifications/icd/adaptations/icpc2/en/) [21]. Based on this classification method 14 disease categories were certified as follow: (1) Gastrointestinal; (2) General and Unspecified (3) Ophthalmological; (4) Ear, Nose and Throat; (5) Cardiovascular; (6) Musculoskeletal; (7) Neurological (8) Respiratory; (9) Dermatological; (10) Endocrine/ Metabolic and Nutritional; (11) Urological; (12) Pregnancy, Childbearing, Family Planning; (13) Blood, Blood Forming Organs and Immune Mechanism; and (14) Female Genitals (Table 4).

Ethno-medicinal Data Analysis

Descriptive and quantitative statistical methods were used to analyze ethno-medicinal data. Use reports (whenever the local informants referred a plant species for a specific use or disease); RFC (RFC = FC/N; FC: the number of informants who referred plant species use report, and N is the total informants in the study); Cultural index (CI=UR/N); and ICF (ICF = Nur − Nt / Nur − 1) were used to analyze ethnobotanical data. Nur is the number of use reports for each diseases class and Nt is the number of plant species which are utilized for the same diseases class by all the local informants [22]. ICF index ranged between 0-1 [23].

RESULTS

Plants Composition

Ethnobotanical data were collected via semi-structured interviews with 31 local informants, leading to the documentation of 118 medicinal plant species distributed across 44 distinct plant families. The floristic analysis revealed the dominance of the Lamiaceae family, which contributed 14 species, followed by Asteraceae (11 species) and Fabaceae (9 species). Comprehensive ethno-medicinal details—including voucher specimen numbers, local nomenclature, plant parts utilized, preparation methods, reported uses (expressed as Use Report percentage), and ICPC classification—are systematically presented in Table 2.

Medicinal Plant Parts

All parts of plant species, including Flower, Leaf, Fruit, Seed, Stem, Root, Aerial parts, Gum, Latex, Branches, Petiole, and Pollen were ethno-botanically used. The leaves were used the most with a 32.52%, followed by flowers (14.07%), Fruits (12.62%), Seeds (8.73%), and Roots (8.25%).

Preparation Method

In this ethno-medicinal research, plants were utilized in 13 methods, including decoction, Poultice, Infusion, Nut, Aromatic water, Powder, Maceration, Vegetable, Vapor, Flavoring, Food, Spice, and Capsule. The most widely preparation way was decoction (19.88%), Poultice (18.71%), and infusion (16.9) (Table 2).

Informant Consensus Factor (ICF)

The results revealed that the ethno-medicinal knowledge of the Minab and Rudan counties is widely and successfully utilized for the treatment of a wide range of ailments. A total of 1347 use reports was recorded for all taxa, referring to 14 categories and 79 diseases.

Cultural Importance (CI) and Relative Frequency of Citation Index (RFC)

The highest value of CI and RFC was recorded for *Cynanchum acutum*, *Cymbopogon iwarancusa*, *Matricaria aurea*, *Malva neglecta*, and *Lawsonia inermis* in the Minab and Rudan counties. This finding highlights the strong cultural relevance and widespread traditional use of these species within local communities. Moreover, ease of access, and therapeutic efficacy of these plants are advantages in increasing CI and RFC. These scores suggest not only frequent citation in ethnobotanical surveys but also a high degree of consensus among informants regarding their medicinal importance. Such agreement often reflects long-standing empirical knowledge and trust in the therapeutic efficacy of these plants. Moreover, the prominence of these species underscores their potential role as key candidates for future pharmacological investigations and conservation strategies, particularly in regions where traditional medicine continues to play a central role in primary healthcare Table 2 presents recent studies on the primary phytochemicals, pharmacological activities, and uses of these species.

Phytochemical investigation of *Cynanchum* plants revealed the presence of several natural compounds, including triterpenes, carbohydrates, long-chain fatty acid esters, alkaloids, flavonoids and coumarins [24]. Phenanthroindolizidine alkaloids (a general group for the genus), including specific compounds like Dihydrovallesiachotamine and Voacristine hydroxyindolenine from seeds was reported. The relationship is largely synergistic: climate factors (like extreme weather and temperature changes) can severely compromise water safety and sanitation, leading directly to a rise in infectious digestive diseases like diarrhea, cholera, and dysentery in a county. Moreover, chronic changes in climate may impact food security and nutritional content of crops, which can affect long-term gut health and susceptibility to illness.

Safa *et al* (2013) reported that There was high compliance in the use of plants in painful disorders, gastrointestinal, and dermatological diseases in Hormozgan province. The finding demonstrated that 150 Plant specimens were belonging to 53 families and the most representative families were Lamiaceae and Compositae with 18 and 17 species, respectively, followed by Papilionaceae, Solanaceae, Asclepiadaceae and Umbelliferae, each with less than ten species.

Table 2 Recent studies on the primary phytochemicals, pharmacological activities, and uses of prominent species.

Species Name	Primary Phytochemicals	Pharmacological Activities & Uses	Representative Research Reference
Cynanchum acutum	Coumarins (Scopoletin, Scoparone), Flavonoids, Terpenes (e.g., D-Carvone, Carveol), Sterols (beta-sitosterol, Lupeol).	Antioxidant, Anti-inflammatory, Antibiofilm (effective against *Staphylococcus aureus*), Antipyretic, Analgesic.	[24], [25]
Cymbopogon iwarancusa (Jwarankush Grass)	Essential Oil (rich in Monoterpenoids): Piperitone (often the major component), Delta-Carene, Sesquiterpenes.	Antimicrobial (strong antibacterial against MRSA), Antipyretic (traditional "fever-breaker"), Diuretic, Antirheumatic.	[26]
Matricaria aurea (Golden Chamomile)	Flavonoids (Apigenin, Luteolin, Quercetin), Essential Oil components (alpha-Bisabolol, Bisabolol oxides, Azulenes), Phenolic acids.	Anti-inflammatory, Antimicrobial, Antioxidant, Antispasmodic, Sedative, used for inflammatory diseases.	[27]
Malva neglecta (Dwarf Mallow)	Mucilages (Polysaccharides), Flavonoids, Polyphenols, Tannins, Coumarins.	Emollient and Lenitive (soothing), Anti-inflammatory, Antioxidant, Laxative, traditionally used for respiratory and digestive issues.	[28], [29]
Lawsonia species (Henna, L. inermis)	Naphthoquinones (Lawsone is the main coloring agent), Flavonoids, Tannins and Phenolic compounds, Xanthones.	Antimicrobial (Antibacterial, Antifungal, Antiviral), Anti-inflammatory, Wound Healing, Antioxidant, Hepatoprotective.	[30], [29]

Preparation Method

No single method is universally "best"; their popularity and usefulness depend entirely on the plant part being used and the desired therapeutic compound. According to results the near-equal prevalence of decoction 19.88 %, poultice 18.71%, and infusion 16.9% as medicinal plant preparation methods highlights several key scientific and practical implications. This dominance reflects a traditional understanding of compound specificity, where boiling (decoction) is used for thermostable compounds in tough materials like bark, while steeping (infusion) preserves delicate, volatile compounds often found in leaves and flowers. The balance between internal methods (decoction and infusion) and external application (poultice) demonstrates a holistic approach to treating both systemic and localized ailments. Critically, the popularity of these low-tech, water-based methods underscores their accessibility and practicality in resource-limited settings. However, these frequency results only indicate usage, necessitating further pharmacological and toxicological research to validate the clinical efficacy and safety of the resulting extracts.

DISCUSSION

The Bandar tribes in Hormozgan Province, particularly in the counties of Minab, Rudan, and Bandar Abbas, have a long-standing tradition of using medicinal plants. This practice forms an integral part of their cultural identity and traditional healthcare system, which still holds an important place in their daily lives. There are 900 plant species in the province that too many of them are medicinal. Different climate conditions result in growing of specific plants such as special marine plants and mangrove (*Avicennia marina*) forests which are very rare [10]. The use of medicinal plants in and around Minab and Rudan reserves is similar to many parts of the country. As seen in other communities, traditional healing is practiced by both men and women. The transfer of knowledge of medicinal plants from one generation to another that was mentioned in this study had been noted also by other researchers. In our previous study in Jahrom county from Fars province (as a neighbor of current study area), Lamiaceae, Asteraceae, and Apiaceae scored the main utilized plant families. The highly applied plant species with the highest use report were *Phoenix dactylifera* (UR: 323), *Prunus scoparia* (UR: 176), *Cuscuta epithymum* (UR: 148), and *Tribulus terrestris* (UR=122). Dermatological, neurological, and gastrointestinal disorders were scored the highest ICF [6]. The most dominant medicinally utilized plant species in this study were identified as *Cynanchum acutum*, *Cymbopogon iwarancusa*, *Matricaria aurea*, *Malva neglecta*, and *Lawsonia inermis*, respectively. This difference could be due to the unsimilar geographical, climatic and cultural conditions. From the results of [20], the study demonstrates that there is low ethnocultural similarity in the use of medicinal plants between the two communities although they are located along the Makran coasts. However, Sadeghi *et al* (2025) recorded the high number of plant species in Makran coastline of Sistan and Baluchestan Province. A total of 74 potential medicinal plants belonging to 41 families have been identified to be traditionally used for remedial measures against special diseases. The inventory of medicinal plants showed that Fabaceae, Solanaceae, and Malvaceae dominated plant families. The results of Sadeghi *et al*. study showed that musculoskeletal, digestive, and respiratory diseases have high ICF (>0.90) [31]. The most dominant medicinally utilized plant species in Makran coastline were identified as *Withania coagulans* (118 UR), *Calotropis procera* (116 UR), *Thymus fedtschenkoi* (113 UR), *Papaver somniferum* (113 UR), *Ziziphus spina-christi* (110 UR), and *Mangifera indica* (110 UR). Plants like *Calotropis procera, Thymus daenens subsp. Lancifolius, Ziziphus spina-christi, Mangifera indica, Lawsonia inermis, and Avicennia marina* are used for medicinal purposes by the peoples of the south and southeast regions of the country along the Makran coast. This shows the cultural importance of these plants to Bandari and Baluch communities. For example, Henna (*L. inermis*) is one of the most widely used plants in the Makran region and has three special uses among southern (Bandari and Baluch) women: medical, cosmetic, and ritual or Istabarq *(C. procera)* is a valuable medicinal plant in south and south east of Iran that is used in the treatment of many diseases such as scorpion stings, wound healing, and burn swelling.

CONCLUSION

Ethnobotanical studies in the region under investigation have not only documented the traditional uses of plants, but also emphasized their importance in biodiversity conservation and sustainable development. Preservation of traditional knowledge is essential for preventing the loss of valuable insights into medicinal and edible plants. More than 90% of medicinal plants used are native to the study region, while the rest of these plants were provided from other parts of Hormozgan province. As demographic data showed local and middle-aged people (40-60 years old) were our main informants. Efforts are needed to increase awareness among young informants about the risks, side effects, and efficacy of complementary and alternative therapies utilized by the people. The training of young personnel will strongly support the sustainable medicinal development of less developed areas and is also a very important approach to the conservation of traditional medicinal knowledge. Thus, urgent action is needed to maintain biocultural diversity that is threatened with extinction if tribal livelihoods disappear. This knowledge serves as a source of new scientific research by transforming indigenous practices into modern studies in pharmacy and agriculture. Furthermore, natural resource management requires the sustainable use of plants to avoid ecosystem degradation. Finally, the connection between culture and nature displays that the culture of the Hormozgan's people is deeply intertwined with native plants.

Table 3 Medicinal plants used by local communities in the Rudan and Minab counties, Hormozgan province.

Family	Scientific name	Local name	Uses	UR	Plant(s) part	Preparation	Mode of application	ICPC
Acanthaceae	*Blepharis ciliaris* (L.) B.L.Burtt	Joojadoo	Gastrointestinal disorders (2)	2	Leaf, Seed, Root	Decoction	Oral	GAS-D
Amaranthaceae	*Aerva javanica* (Burm.fil.) Juss.	Mangoo	Infectious wound (1)	2	Leaf	Poultice	Topical	DER-S
	Chenopodium album L.	Gostagh	Gastrointestinal disorders (3)	3	Leaf	Spice	Oral	GAS-D
	Chenopodium murale L.	Gostaeh	Gastrointestinal disorders (1)	1	Leaf	Spice	Oral	GAS-D
	Haloxylon salicornicum (Moq.) Bunge ex Boiss.	Rems, Jaroo	Fever (1), Wound healing (1), Skin sensitivity (1)	3	Leaf, Stem	Poultice, Decoction	Topical, Oral	OTH-A, DER-S, DER-S
	Suaeda aegyptiaca (Hasselq.) Zohary	Somsil	Stomach tonic (9)	9	Young branches	Vegetable	Oral	GAS-D
Amaryllidaceae	*Allium iranicum* (Wendelbo) Wendelbo	Gandena	Gastrointestinal disorders (10)	10	Leaf, Stem	Infusion, Vegetable	Oral	GAS-D
Anacardiaceae	*Pistacia atlantica* Desf.	Baneh	Fatty liver (15), Body tonic (11)	26	Seed, Gum	Nut	Oral	GAS-D, OTH-A
	Pistacia khinjuk Stocks	Kasoor	Wound healing (4), Gingival tonic (3), Women infection (2), Vaginal constrictor (19)	28	Leaf, Root, Seed	Decoction, Nut,	Oral, Topical	DER-S, GAS-D, GYN-X, GYN-X
	Mangifera indica L.	Anbe	Anti-diarrhea (2), Blood sugar (4), Stomachache (2)	8	Fruit core, Leaf	Powder, Infusion	Oral	GAS-D, MET-T, GAS-D
Apiaceae	*Elwendia persica (Boiss.) Pimenov & Kljuykov*	Zireh	Gastrointestinal disorders (11)	11	Seed	Infusion, Flavoring	Oral	GAS-D
	Ducrosia anethifolia (DC.) Boiss.	Meshkak	Anemia (4), Carminative (6)	10	Leaf, Fruit	Decoction	Oral	Blood-B, GAS-D
	Daucus carota L.	Hvij-e vahshi	Anemia (4)	4	Root, Seed, Leaf, Flower	Powder, Spice	Oral	Blood-B
	Ferula assa-foetida L.	Anemia	Emmenagogue (5), Bites (8), Toothache (9), Incrising sexual desire (2)	24	Gum	Poultice, Nut	Oral, Topical	GYN-X, OTH-A, GAS-D, PRE-W
	Foeniculum vulgare Mill.	Badeyan	Carminative (9)	9	Seed	Decoction	Oral	GAS-D
	Trachyspermum ammi (L.) Sprague	Zenyan	Diarrhea and vomit (7)	7	Leaf	Decoction, Powder	Oral	GAS-D
Apocynaceae	*Calotropis procera* (Aiton) W.T.Aiton	Kark	Wart (14), Medical cushion (6), Anti-rheumatism (7)	27	Leaf, Flower, Latex	Poultice	Topical	DER-S, OTH-A, DER-S
	Cynanchum acutum L.	Nagarz	Women infectious (9), Sinusitis (21), Alzheimer (4), Brain tonic (5)	39	Root, Stem, Aerial parts	Decoction, Vapor, Infusion	Topical	GYN-X, RES-R,
	Nerium oleander L.	Kharzahre	Bites (6), Joint pains (7)	13	Leaf	Poultice, Vapor	Oral, Topical	NER-N, OTH-A
	Periploca aphylla Decne.	Geshniz	Gastrointestinal disorders (6)	6	Flower	Flavoring	Oral	GAS-D
	Pergularia tomentosa L.	Keshtoo	Wart (6)	5	Leaf	Poultice	Topical	DER-S
	Rhazya stricta Decne.	Gishbarg	Joint and waist pain (16)	16	Aerial parts	Indirect heating	Topical	SKE-L
Arecaceae	*Phoenix dactylifera* L.	Khorma	Anti-diarrhea (3), Body tonic (5), Anemia (3), Sexual disorders (12)	23	Core fruit, Pollen	Powder, Mixed with food	Oral	GAS-D, OTH-A, Blood-B, PRE-W
Asphodelaceae	*Aloe vera* (L.) Burm.f.	Aloe vera	Gastrointestinal ulcer (8)	8	Latex	Powder, Mixed with food	Oral	GAS-D
Asteraceae	*Artemisia annua* L.	Dermeneh	Stomachache (3), Anti-diarrhea and vomit (2)	29	Leaf and Flower	Decoction	Oral	GAS-D, GAS-D
	Artemisia aucheri Boiss.	Dermeneh	Stomach ache (4), Anti-diarrhea (3)	7	Leaf and flower	Aromatic water	Oral	GAS-D, GAS-D
	Artemisia sieberi Besser	Derim	Bruise (2), Stomach ache (18), Colds (6), Gastrointestinal parasite (7)	31	Leaf and flower	Aromatic water	Oral	DER-S, GAS-D, RES-R, GAS-D
	Astragalus fasciculifolius Boiss.	Gojen	Bone fracture (22), Laxative (5)	27	Gum, Flower	Powder, Poultice	Oral, Topical	SKE-L, GAS-D
	Carthamus oxyacanthus M.Bieb.	Hask	Kidney pain (8)	8	Leaf	Extract	Oral	URO-U
	Carthamus tinctorius L.	Golrang	Gastrointestinal disorders (3)	3	Flower	Extract	Oral	GAS-D
	Cichorium intybus L.	Kasni	Malaria (6), Fever (4)	10	Leaf and flower	Maceration, Aromatic water	Oral	GAS-D, OTH-A
	Iphiona aucheri (Boiss.) Anderb.	Halamook	Bites (2)	2	Leaf	Poultice	Topical	OTH-A
	Scorzonera paradoxa Fisch. & C.A.Mey.	Kambolo	Constipation (2), Laxative (2)	1	Aerial parts	Decoction	Oral	GAS-D, GAS-D
	Matricaria aurea (Loefl.) Sch.Bip.	Babooneh	Emmenagogue (11), Diuretic (8), Relaxing (16)	35	Leaf and flower	Decoction	Oral	GYN-X, URO-U, NER-N
	Achillea wilhelmsii K. Koch	Sarzard	Anti-diarrhea (2), Relaxing (3), Painful menstruation (5)	10	Leaf, flower	Decoction	Oral	GAS-D, NER-N, GYN-X
Boraginaceae	*Anchusa strigosa* Banks & Sol.	Gol-e gavzaban	Relaxing (14), Stomach ache (2)	16	Leaf, flower	Infusion	Oral	NER-N, GAS-D
	Trichodesma africanum (L.) R.Br.	Charmahang	Stomach ache (5), Infant cough (5), Gastrointestinal disorders (4), Waist ache (2)	22	Leaf, Root	Decoction	Oral	GAS-D, RES-R, GAS-D, GAS-D, SKE-L
Brassicaceae	*Isatis tinctoria* L.	Nil	Wound healing (4), Hair color (8), Hair tonic (8)	20	Leaf	Maceration	Topical	DER-S, DER-S
	Eruca sativa Hill	Kahak	Pain relief (2), Body tonic (3),	5	Whole plant	Vegetable	Oral	GAS-D, OTH-A

Capparidaaceae	*Capparis cartilaginea* Decne.	Koorzeh	Blood sugar (8)	8	Leaf, Fruit	Infusion	Oral	MET-T
	Capparis spinosa L.	Dehak	Liver and gastric tonic (2)	2	Root and Fruit	Infusion, Pickle		GAS-D
Cucurbitaceae	*Citrullus colocynthis* L.	Gelgenjak	Joint pains (4), Bites (6), Blood sugar (11)	21	Fruit	Powder, Capsule, Poultice	Oral, Topical	SKE-L, OTH-A, MET-T
Cupressaceae	*Juniperus excelsa* M.-Bieb.	Avors	Anti-diarrhea (2), Joint pans (3), Skin allergy (9), Earache (3)	17	Leaf, Fruit	Powder, Poultice	Oral, Topical	GAS-D, SKE-L, DER-S, Ear-H
Cyperaceae	*Scirpus microcarpus* J.Presl & C.Presl	Pzerk	Parasite repellent (2)	2	Root, Stem	Decoction	Oral	GAS-D
Convolvulaceae	*Convolvulus acanthocladus* Boiss. & Kotschy	Kelatoo	Gastric disorders (4)	4	Leaf, Root	Decoction	Oral	GAS-D
	Convolvulus spinosus Burm.fil.	Oral	Gastric disorders (3)	3	Aerial parts	Decoction	Oral	GAS-D
	Cressa cretica L.	Soorghoo	Respiratory disorders (2), Gastric disorders (1), Skin disorders (2)	5	Aerial parts	Infusion	Oral	RES-R, GAS-D, DER-S
Cordiaceae	*Cordia myxa* L.	Pohil	Respiratory disorders (7), Throat ache (8), Expectorant (6)	21	Fruit	Nut, Infusion, Decoction	Oral	RES-R, RES-R, RES-R
Ephedraceae	*Ephedra pachyclada* Boiss.	Jaf	Pain relief (6), Mouth diseases (5)	11	Stem, Leaf	Powder, Poultice	Topical	NER-N, GAS-D
Euphorbiaceae	*Euphorbia indica* Lam.	Kika	Skin disorders (8)	8	Stem, Leaf	Poultice	Topical	DER-S
	Euphorbia larica Boiss.	Parakh	Skin disorders (9)	9	Latex	Poultice	Topical	DER-S
	Ricinus communis L.	Karchak	purgative (7)	7	Fruit	Maceration	Oral	GAS-D
Fabaceae	*Alhagi maurorum* Medik.	Kharshotor	Kidney pain (9), Kidney stone (9), Liver tonic (2)	20	Root, Gum	Infusion	Oral	URO-U, URO-U, URO-U
	Astragalus fasciculifolius Boiss.	Goejen	Bone fracture (18), Laxative (5)	23	Root, Gum	Nut, Bandage	Oral, Topical	URO-U, GAS-D
	Glycyrrhiza glabra L.	Mahkoot	Stomach tonic (5), Blood fat (3), Blood sugar (4)	12	Root	Decoction	Oral	GAS-D, Blood-B, MET-T
	Senna italica Mill.	Sana	Blood sugar (3), Colds (4), Constipation (7)	14	Leaf	Infusion	Oral	MET-T, RES-R, GAS-D
	Medicago sativa L	Dooni	Gastric inflammation (4)	4	Leaf	Infusion	Oral	GAS-D
	Prosopis farcta (Banks & Sol.) J.F. Macbr.	Kahoorak	Wombs tonic (6)	6	Root	Decoction	Oral	PRE-W
	Prosopis cineraria (L.) Druce	Kahoor	Wound healing (7), Body bath (4)	11	Stem, Leaf, Flower, Gum	Gum, Poultice	Topical, Bath	DER-S, OTH-A
	Prosopis juliflora (Sw.) DC.	Kahoor	Wound healing (7), Body bath (4)	11	Leaf	Poultice, Maceration	Topical, Bath	DER-S, OTH-A
	Tephrosia persica Boiss.	Madking	Bites (11), Wound healing (5)	16	Leaf	Poultice	Topical	OTH-A, DER-S, OTH-A
Fumariaceae	*Fumaria parviflora Lam.*	Shatareh	Gastric and liver disorders (5)	5	Leaf, Stem	Aromatic water	Oral	GAS-D
Lamiaceae	*Lavandula coronopifolia* Poir.	Ostokhodoos	Joint pains (2), Influenza (3), Stomach ache (3)	8	Leaf, Flower, Stem	Infusion, Poultice	Oral, Topical	SKE-L, RES-R, GAS-D
	Salvia aegyptiaca L.	Sharbati	Carminative (4), Wound healing (4), Laxative (5), Eye bath (3)	16	Seed	Infusion	Oral	GAS-D, DER-S, GAS-D, EYE-F
	Salvia mirzayanii Rech.f. & Esfand.	Mewr talkh	Gastrointestinal tonic (7), Anti-diarrhea (4)	11	Leaf	Decoction	Oral	GAS-D, GAS-D
	Salvia sharifii Rech.f. & Esfand.	Borooz	Wound healing (3), Anti-diarrhea (4), Throat ache (1), Laxative (2)	8	Aerial parts	Aromatic water, Poultice	Oral, Topical	DER-S, GAS-D, RES-R, GAS-D
	Stachys inflata Benth.	Mewr	Laxative (4)	4	Leaf, Flower	Infusion	Oral	GAS-D
	Teucrium polium L.	Kalpooreh	Blood sugar (7), Anti- diarrhea and vomit (11), Gastrointestinal infection (4), Eczema (3), Anti-malaria (4)	29	Flower, Leaf	Aromatic water, Poultice	Oral, Topical	MET-T, GAS-D, GAS-D, DER-S, GAS-D
	Teucrium orientale L.	Gol-e mash	Anti- diarrhea and vomit (6), Gastrointestinal infection (3)	9	Flower, Leaf	Aromatic water	Oral	GAS-D, GAS-D
	Teucrium stocksianum Boiss.	Kerishak-e Azad	Carminative (2), Anti-poisoning (1), Stomach ache (5)	8	Young aerial parts	Aromatic water	Oral	GAS-D, OTH-A, GAS-D
	Thymus daenensis subsp. *lancifolius* (Čelak.) Jalas	Avishan	Colds (11), Throat ache (11)	22	Leaf and Flower	Infusion	Oral	RES-R, RES-R
	Ocimum basilicum L.	Tokhm sharbati	Laxative (9)	9	Seed	Maceration	Oral	GAS-D
	Mentha longifolia (L.) L.	Pooden	Stomach ache (10), Anti-inflammation (2), Disinfectant (4)	16	Leaf and Flower	Poultice, Aromatic water, Infusion	Oral, Topical	GAS-D, SKE-L, OTH-A
	Mentha mozaffarianii Jamzad	Pooden-e Koohi	Stomach ache (11), Anti-inflammation (2), Disinfectant (4)	17	Leaf, Foliage, Stem	Aromatic water, Infusion	Oral	GAS-D, SKE-L, OTH-A
	Rydingia persica (Burm.f.) Scheen & V.A.Albert	Goldar	Constipation (5), Fever (5), Bone ache (6), Head ache (5), Cough (2)	23	Flower, Leaf, Thorn	Infusion	Oral	GAS-D, OTH-A, SKE-L, NER-N, RES-R
	Zhumeria majdae Wendelbo	Movrkhosh	Stomach ache (2), Anti-diarrhea (2), Parasite repellent (3), Head ache (2), Laxative (4), Wound healing (5)	18	Leaf, Flower, Young stems	Maceration, Decoction	Oral, Topical	GAS-D, GAS-D, GAS-D, NER-N, GAS-D, DER-S
Lytraceae	*Lawsonia inermis* L.	Hana	Disinfectant (4), Wound healing (16), Burn healing (13)	33	Leaf	Poultice	Topical	OTH-A, DER-S, DER-S
Liliaceae	*Asphodelus tenuifolius Cav.*	Pimawook	Fever (2), Wound healing (2)	2	Seed	Poultice	Topical	OTH-A, DER-S
Malvaceae	*Alcea aucheri (Boiss.) Alef.*	Khatmi-e sefis	Hoarseness healing (5), Colds (3)	8	Flower	Infusion	Oral	RES-R, RES-R
	Abutilon fruticosum Guill. & Perr.	Garashm	Colds (2), Bronchitis (2), Wound healing (1)	5	Leaf, Flower, seed	Decoction, Poultice	Oral, Topical	RES-R, RES-R, DER-S
	Althaea officinalis L.	Khatmi	Hoarseness healing (4), Colds (3)	7	Flower	Infusion	Oral	RES-R, RES-R

	Malva neglecta Wallr.	Sholak	Laxative (3), Throat ache (8), Colds 5), Anemia (12), Constipation (7)	35	Leaf	Decoction, cocked with food	Oral	GAS-D, RES-R, RES-R, Blood-B, GAS-D
	Malva parviflora L.	Sholak	Anemia (8)	8	Seed	Decoction, Cocked with food	Oral	Blood-B
	Hibiscus sabdariffa L.	Chay torsh	Anti-hypertension (3)	3	Flower	Infusion	Oral	CAR-K
Moraceae	*Ficus carica* L.	Anjir	Anemia (5), Bone tonic (7)	12	Fruit	Nut	Oral	Blood-B, SKE-L
Myrtaceae	*Syzygium cumini (L.) Skeels*	Jam	Colds (2), Constipation (1), Gastric disorders (2)	7	Fruit, Fruit core	Infusion, Powder	Oral	RES-R, GAS-D, GAS-D, GAS-D
	Myrtus communis L.	Moord	Colds (4), Gastrointestinal tonic (5)	9	Leaf	Infusion	Oral	RES-R, GAS-D
Papaveraceae	*Glaucium flavum Crantz*	Shagayeg	Blood sugar (4)	4	Seed	Nut	Oral	Blood-B
	Papaver somniferum L.	Khashkhash	Body tonic (7), Exhilarating (2)	9	Seed	Nut	Oral	OTH-A, OTH-A
Plantaginaceae	*Plantago major* L.	Barhang	Stomach tonic (5), Gastric disorders (9)	14	Leaf, Seed	Infusion	Oral	GAS-D, GAS-D
Platanaceae	*Platanus orientalis L.*	Chenar	Vitiligo (3)	3	root	Poultice	Topical	DER-S
Portulacaceae	*Portulaca oleracea* L.	Khorfeh	Laxative (1), Purgation (3), Period trigger (2), Body tonic (4), Liver tonic (2)	12	Leaf, Seed	Decoction, Cocked with food	Oral	GAS-D, GAS-D, GYN-X, OTH-A, GAS-D
Poaceae	*Cymbopogon citratus* (DC.) Stapf	Limoo gras	Relaxing (24)	24	Leaf	Infusion	Oral	NER-N
	Cymbopogon iwarancusa subsp. olivieri (Boiss.) Soenarko	Ngard	Gastric disorders (14), Stomach ache (5), Colds (20)	37	Leaf	Aromatic water	Oral	GAS-D, GAS-D, RES-R
	Cynodon dactylon (L.) Pers.	Mewr	Relaxing (1)	1	Whole plant	Decoction	Oral	NER-N
Polygonaceae	*Rheum ribes* L.	Esperak	Jaundice (4), Laxative (3)	7	Petiole	Aromatic water	Oral	GAS-D, GAS-D
	Rumex vesicarius L.	Torshak	Laxative (6)	6	Leaf, Fruit	Aromatic water, Vegetable	Oral	GAS-D
Pteridaceae	*Adianthum capillus-veneris* L.	Gis pari	Colds (12), Expectorant (8)	20	Leaf, Stem	Infusion	Oral	RES-R, RES-R
Rhamnaceae	*Sageretia thea* (Osbeck) M.C.Johnst.	Gilas-e Koohi	Anemia (2)	2	Fruit	Fruit	Oral	Blood-B
	Ziziphus nummularia (Burm.fil.) Wight & Arn.	Konar	Wound healing (2), Anti-poisoning (2), Anti-diarrhea (3), Stomach cramp (1), Anti-stomach acid (3)	11	Fruit, Leaf	Decoction	Oral	DER-S, OTH-A, GAS-D, GAS-D, GAS-D
	Ziziphus spina-christi (L.) Desf.	Konar	Wound healing (2), Anti-poisoning (2), Anti-diarrhea (3), Stomach cramp (1), Anti-stomach acid (3)	11	Fruit, Leaf	Decoction	Oral	DER-S, OTH-A, GAS-D, GAS-D, GAS-D
Resedaceae	*Ochradenus baccatus* Delile	Sham	Throat ache (2)	2	Flower	Cocked with food	Oral	RES-R
	Reseda aucheri Boiss.	Goroozoo	Insecticidal (2), Bites (2)	4	Aerial parts	Poultice	Topical	OTH-A, OTH-A
Rosaceae	*Prunus lycioides* (Spach) C.K.Schneid.	Komoz	Head ache (6), Burn healing (8)	14	Leaf, Root	Poultice	Topical	NER-N, DER-S
	*Prunus scoparia (*Spach) C.K.Schneid.	Alook	Skin tonic (5), Improvement dryness of skin and hair (9)	14	Foliage, Gum, Seed oil	Nut, Poultice		DER-S, DER-S
	Cotoneaster kotschyi G.Klotz	Shirkhesht	Stomach tonic (6), Constipation (9)	15	Fruit, Gum	Nut	Oral	GAS-D, GAS-D
Salvadoraceae	*Salvadora persica* L.	Chooch	Headache (1), Joint pain (2), Gum tonic (13)	16	Stem skin, Leaf	Poultice, Chewing gum	Oral, Topical	NER-N, SKE-L, GAS-D
Solanaceae	*Lycium shawii* Roem. & Schult.	Zirak	Pain relief (1), Gastric disorders (2)	3	Foliage, Leaf, Fruit	Poultice, Crude fruit	Oral, Topical	NER-N, GAS-D
	Nicotiana tabacum L.	Tanbacoo	Earache (4)	4	Leaf	Decoction, Poultice	Topical	Ear-H
	Alkekengi officinarum Moench	Aroosak-e posht-e parde	Menstrual ache (3)	3	Fruit	Vegetable	Oral	GYN-X
	Solanum nigrum L.	Rozak	Fever (4)	4	Fruit, Leaf	Powder	Topical	OTH-A
	Withania somnifera (L.) Dunal	Panirbad	Anti-stress (3), Energetic (4)	7	Fruit	Nut	Oral	NER-N, OTH-A
Tamaricaceae	*Tamarix mascatensis* Bunge	Shah gaz	Jiont pain (2)	2	Fruit, Stem, Leaf	Powder, Poultice	Topical	SKE-L
Thymelaeaceae	*Daphne mucronata* Royle	Terbit	Skin rash (2)	2	Stem skin, Leaf	Powder, Poultice	Topical	DER-S
Rutaceae	*Haplophyllum tuberculatum* (Forssk.) A.Juss.	Hedoo	Headache (1), Earache (1), Stomachache (2), Joint pains (2), Fever (1)	7	Leaf, Stem, Flower	Decoction	Oral	NER-N, Ear-H, GAS-D, SKE-L, OTH-A
Violaceae	*Viola odorata* L.	Banafsheh	Stomach tonic (60, Migraine headache (8), Fever and malaria (4)	18	Leaf and flower	Aromatic water, Vapor	Oral, Topical	GAS-D, NER-N, OTH-A
Zygophyllaceae	*Fagonia bruguieri* DC.	Kal ka,gh koohi	Anti-bacterial (1), Air disinfectant (16)	21	Aerial parts	Burn, Smoke	Oral	OTH-A, OTH-A
	Tribulus terrestris L.	Kharkhesak	Kidney pain (15), Kidney stone (16)	31	Aerial parts	Decoction	Oral	URO-U, URO-U

Table 4 20 top species based on the quantitative ethnobotanical indices in Minab and Rudan counties

Row	Plant species	UR	CI	RFC
1	*Cynanchum acutum* L.	39	1.5	0.90
2	*Cymbopogon iwarancusa subsp. olivieri* (Boiss.) Soenarko	37	1.42	0.90
3	*Matricaria aurea* (Loefl.) Sch.Bip.	35	1.34	0.89
4	*Malva neglecta* Wallr.	35	1.34	0.89
5	*Lawsonia inermis* L.	33	1.26	0.88
6	*Tribulus terrestris* L.	31	1.19	0.82
7	*Artemisia sieberi* Besser	31	1.19	0.78
8	*Teucrium polium* L.	29	1.11	0.75
9	*Artemisia annua* L.	29	1.11	0.75
10	*Pistacia khinjuk* Stocks	28	1.07	0.72
11	*Astragalus fasciculifolius* Boiss.	27	1.03	0.73
12	*Calotropis procera* (Aiton) W.T.Aiton	27	1.03	1.74
13	*Pistacia atlantica* Desf.	26	1.00	0.68
14	*Ferula assa-foetida* L.	24	0.92	0.61
15	*Cymbopogon citratus* (DC.) Stapf	24	0.92	0.61
16	*Rydingia persica* (Burm.f.) Scheen & V.A.Albert	23	0.88	0.60
17	*Astragalus fasciculifolius* Boiss.	23	0.88	0.89
18	*Phoenix dactylifera* L.	23	0.88	0.55
19	*Trichodesma africanum* (L.) R.Br.	22	0.84	0.51
20	*Thymus daenensis* subsp. *lancifolius* (Čelak.) Jalas	22	0.84	0.52

Table 5 Informant consensus agreement for diseases categories in the Minab and Rudan counties

ICPC categories	Recorded ailments	ICPC categories	Nt*	Nur**	ICF value***
1	General and Unspecified (OTH-A)	Bites (2, 8, 6, 6, 2, 2), Fever (1, 1, 4, 2, 5, 4), Body tonic (11, 5, 3, 7, 2, 2, 4), Plant cushion (6, 6), Malaria (4, 4, 6), Body bath (4, 4), Anti-toxic (1, 2), Disinfectant (4, 4, 4, 16), Anti-bacterial (5)	29	147	0.80
2	Digestive (GAS-D)	Gastrointestinal disorders (2, 3, 1, 10, 11, 6, 3, 4, 4, 3, 1, 4, 5, 2, 9, 14, 2, 4, 3), Stomach tonic (9, 2, 5, 7, 4, 5, 5, 6, 6), Fatty liver (15), Gingiva tonic (13, 3), Anti-diarrhea (2, 3, 2, 2, 7), Stomachache (2, 3, 4, 18, 2, 5, 2, 5, 10, 11, 2, 2, 5, 2), Carminative (2, 4, 9, 6), Toothache (9), Vomit (7, 3, 2, 11, 6, 2, 3), Stomach ulcer (8), Anti-parasite (3, 3, 7), Laxative (5, 2, 2, 5, 5, 2, 4, 4, 3, 3, 3, 6), Constipation (2, 7, 5, 1, 9), Stomach cramp (1, 4, 6), Mouth diseases (5), Purgative (1, 7), Liver tonic (2, 2), Jaundice (4), Stomach tonic (3)	60	458	0.87
3	Ophthalmological (EYE-F)	Eye diseases (3)	2	3	0.50
4	Ear (Ear-H)	Ear ache (1, 4, 3)	4	8	0.57
5	Cardiovascular (CAR-K)	Anti-hypertension (3)	2	3	0.50
6	Blood, Blood Forming Organs and Immune Mechanism (Blood-B)	Anemia (4, 4, 3, 12, 8, 5, 2), Blood fat (3)	10	41	0.77
7	Musculoskeletal (SKE-L)	Joint pain (7, 4, 3, 2, 2, 2,), Waist pain (2, 16), Bruise (2), Fracture (22, 18, 7), Anti-inflammation (2, 2), Skeletal pain (6)	18	99	0.82
8	Neurological (NER-N)	Sinusitis (21), Anti-Alzheimer (4), Relaxing (16, 2, 14, 24, 1), Anti-pain (1, 2, 6), Headache (1, 1, 6, 2), Anti-esters (3), Migraine headache (8)	21	120	0.83
9	Respiratory (RES-R)	Colds (6, 4, 22, 3, 2, 3, 5, 2, 4, 20, 12), Cough (5, 2), Respiratory disorders (7, 2, 3), Through ache (8, 1, 8, 2), Expectorant (8, 6), Hoarseness (5, 4), Bronchitis (2)	19	146	0.87
10	Skin (DER-S)	Wound healing (1, 1, 4, 7, 7, 4, 3, 5, 16, 4, 1, 4), Burn (1. 9, 2), Warts (14, 5, 14), Anti-rheumatism (7, 7), Hair tonic (16), Skin disorders (9, 8, 2), Eczema (3, 3), Skin tonic (5), Anti-dandruff (9)	21	194	0.89
11	Endocrine/ Metabolic and Nutritional (MET-T)	Blood sugar (4, 7, 3, 4, 11, 8, 4)	9	41	0.80
12	Urological (URO-U)	Kidney disorders (8, 18, 5), Kidney stone (16, 9), Diuretic (9)	11	64	0.84
13	Pregnancy, Childbearing, Family Planning (PRE-W)	Increasing sexual desire (2), Sexual disorders (12), Abortion (6)	5	20	0.78
14	Female Genital (GYN-X)	Menstrual pains (3)	3	3	0

REFERENCES

1. Organization W.H. WHO traditional medicine strategy 2002-2005: World Health Organization. 2002.
2. Hosseini S.H., Bibak H., Ghara A.R., Sahebkar A., Shakeri A. Ethnobotany of the medicinal plants used by the ethnic communities of Kerman province, Southeast Iran. Journal of Ethnobiology and Ethnomedicine. 2021;17(1):31.
3. Hosseini S.H., Sadeghi Z., Hosseini S.V., Bussmann R.W. Ethnopharmacological study of medicinal plants in Sarvabad, Kurdistan province, Iran. Journal of Ethnopharmacology. 2022;288:114985.
4. Larti M., Mehrabian A., Arabsalmani K., Sarvi A., Alaeifar M. Ethnobotany, conservation and sustainable development. Ethnobiology and Biodiversity Conservation. 2024;1(1):10–20.

5. Jahantab E., Hosseini S.H., Sadeghi Z. Ethnobotanical study of medicinal plants, Fasa County, Iran. Journal of Medicinal Plants. 2023;22(86):88–112.
6. Hosseini H., Katebi F. Agricultural and weed plants as the main ethnobotanical sources in the Jahrom County, Fars Province, Iran. Journal of Medicinal plants and By-Products. 2023.
7. Mojtahedzadeh, pirouz. A look at the historical geography of the Persian Gulf; Iranians in the Persian Gulf. Political and Economic Information. 1994;79.
8. Soltanipoor M., Babakhanlou P. Introduction and ecological investigation of aromatic plants of Hormozgan Province. 2006.
9. Teka A., Asfaw Z., Demissew S., Van Damme P. Medicinal plant use practice in four ethnic communities (Gurage, Mareqo, Qebena, and Silti), south central Ethiopia. Journal of Ethnobiology and Ethnomedicine. 2020;16(1):27.
10. Safa O., Soltanipoor M.A., Rastegar S., Kazemi M., Dehkordi K.N., Ghannadi A. An ethnobotanical survey on hormozgan province, Iran. Avicenna Journal of Phytomedicine. 2013;3(1):64.
11. Khatibi R., Saberi M. Bio-climatic classification of Iran by multivariate statistical methods. SN Applied Sciences. 2020;2(10):1694.
12. Forman L., Bridson D. The herbarium handbook: Royal Botanic Gardens Kew. 1989;
13. Gómez-Bellver C., Ibáñez N., López-Pujol J., Nualart N., Susanna A. How photographs can be a complement of herbarium vouchers: A proposal of standardization. Taxon. 2019;68(6):1321–26.
14. Heberling J.M., Prather L.A., Tonsor S.J. The changing uses of herbarium data in an era of global change: an overview using automated content analysis. BioScience. 2019;69(10):812–22.
15. Davis P. Flora of Turkey and The East Aegean Islands, 1988. 1988;10.
16. Ghahreman A. Flora of Iran. Research Institute of Forests and Rangelands. 1975;1.
17. Rechinger K.H.E. Flora Iranica. Labiatae. Akademische Druck- u. Verlagsanstalt. 1982;150.
18. Alexiades M.N. Collecting ethnobotanical data: an introduction to basic concepts and techniques. Advances in Economic Botany. 1996;10:53–94.
19. Martin G.J. Ethnobotany: a methods manual: Routledge. 2010;
20. Sadeghi Z., Kuhestani K., Abdollahi V., Mahmood A. Ethnopharmacological studies of indigenous medicinal plants of Saravan region, Baluchistan, Iran. Journal of Ethnopharmacology. 2014;153(1):111–18.
21. Staub P.O., Geck M.S., Weckerle C.S., Casu L., Leonti M. Classifying diseases and remedies in ethnomedicine and ethnopharmacology. Journal of Ethnopharmacology. 2015;174:514–19.
22. Trotter R.T., II, & Logan, M. H. Informant consensus: A new approach for identifying potentially effective medicinal plants. In N. L. Etkin (Ed.). Plants in indigenous medicine and diet: Biobehavioral Approaches. 1986:91–112.
23. Tardío J., Pardo-de-Santayana M. Cultural importance indices: a comparative analysis based on the useful wild plants of Southern Cantabria (Northern Spain). Economic botany. 2008;62(1):24–39.
24. Abdelhameed R.F., Ibrahim A.K., Elfaky M.A., Habib E.S., Mahamed M.I., Mehanna E.T., Darwish K.M., Khodeer D.M., Ahmed S.A., Elhady S.S. Antioxidant and anti-inflammatory activity of Cynanchum acutum L. isolated flavonoids using experimentally induced type 2 diabetes mellitus: Biological and in silico investigation for nf-κb pathway/mir-146a expression modulation. Antioxidants. 2021;10(11):1713.
25. Kadhim M.J., Saadedin S.M. Anti-biofilm activity of cynanchum acutum leaves extract and assessing their effect against the virulence gene seg of staphylococcus aureus bacteria. Romanian Journal of Diabetes, Nutrition and Metabolic Diseases. 2024;31(1):246–57.
26. Prasad C., Singh D., Shukla O., Singh U. Cymbopogon jwarancusa-An important medicinal plant: A review. Pharm Innov Journal. 2014;3(6):13–9.
27. Yousefbeyk F., Hemmati G., Gholipour Z., Ghasemi S., Evazalipour M., Schubert C., Koohi D.E., Boehm V. Phytochemical analysis, antioxidant, cytotoxic, and antimicrobial activities of golden chamomile (Matricaria aurea (Loefl.) Schultz Bip). Zeitschrift für Naturforschung C. 2022;77(7-8):331–42.
28. Akkol E.K., Karpuz B., Türkcanoğlu G., Coşgunçelebi F.G., Taştan H., Aschner M., Khatkar A., Sobarzo-Sánchez E. The phytochemical profile and biological activity of Malva neglecta Wallr. in surgically induced endometriosis model in rats. Molecules. 2022;27(22):7869.
29. Al-Snafi A.E. A review on Lawsonia inermis: A potential medicinal plant. International Journal of Current Pharmaceutical Research. 2019;11(5):1–13.
30. Batiha G.E.-S., Teibo J.O., Shaheen H.M., Babalola B.A., Teibo T.K.A., Al-Kuraishy H.M., Al-Garbeeb A.I., Alexiou A., Papadakis M. Therapeutic potential of Lawsonia inermis Linn: a comprehensive overview. Naunyn-Schmiedeberg's archives of Pharmacology. 2024;397(6):3525–40.
31. Tugume P., Kakudidi E.K., Buyinza M., Namaalwa J., Kamatenesi M., Mucunguzi P., Kalema J. Ethnobotanical survey of medicinal plant species used by communities around Mabira Central Forest Reserve, Uganda. Journal of Ethnobiology and Ethnomedicine. 2016;12(1):5.