Indigenous Knowledge and Medicinal Significance of Seasonal Weeds of District Gujrat, Punjab, Pakistan

Abdur Rehman, Khalid Hussain, Khalid Nawaz, Noshia Arshad, Iqra Iqbal, Syed Saqib Ali, Arifa Nazeer, Zobia Bashir, Sana Jafar and Usman Arif

Databased and Inventories

Abstract

Background: Most of the medicinal plants are available as wild or weeds in the world including Pakistan. It was reported by many researchers that Pakistan is rich with medicinal flora based upon the surveys conducted in the Northern areas but still there are some areas other than Northern parts in Pakistan that has not been studied so far. There is a need to explore the medicinal flora from neglected area where most of the people still rely on local medicinal plants to cure their diseases by means of indigenous knowledge. District Gujrat is among those area that has not been explored to study the medicinal flora.

Methods: Surveys were conducted to collect the indigenous knowledge and medicinal significance of seasonal weeds in Gujrat, Punjab, Pakistan in winter 2018 and summer 2019. Information collected through questionnaire and interviews.

Results: Weeds have much importance among local inhabitants to cure many diseases as respiratory disorders, kidney and liver disorders, muscle and skeletal disorders, ear, nose and throat problems, dermatological disorders, fever, diabetes, cancer etc. The plant parts and its percentage used by local inhabitants were leaves (58%), fruits (36%), seeds (25%), whole plant (34%), roots (32%), milky latex (1%), flowers (8%) and stem (3%). The most important families were Asteraceae, Poaceae, Fabaceae, Polygonaceae and Solanaceae. *Cichorium intybus* L. (Asteraceae) had 100% Fidelity Level (FL) value as liver tonic and blood purifier. Highest 0.76 Informant Consensus Factor (ICF) values were noted against stomach, gastric, intestinal and digestive problems. *Achyranthes aspera* L. (Amaranthaceae) showed the highest Fidelity Level (FL) values that was 93% used gastrointestinal disorders and menstrual pain.

Conclusions: It was concluded that the area of Gujrat, Punjab, Pakistan is a rich source of important medicinal weeds that needs to be utilized for useful medicinal purpose. There is need to create awareness among the farmers and local people about the efficacy of weeds.

Keywords: Gujrat, medicine, ethnobotany, weeds, survey

Correspondence

Abdur Rehman[1], Khalid Hussain[1*], Khalid Nawaz[1], Noshia Arshad[1], Iqra Iqbal[1], Syed Saqib Ali[1], Arifa Nazeer[1], Zobia Bashir[1], Sana Jafar[1] and Usman Arif[1]

[1]University of Gujrat, Gujrat, Pakistan

[*]Corresponding Author: khalid.hussain@uog.edu.pk

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Background

District Gujrat, Punjab, Pakistan is located in between two rivers; the Jhelum and Chenab and Gujrat is an old region. Area of Gujrat is spread over a land of 3,192 square kilometer. Gujrat consists of 3 Tehsils (districts) (Sarai Alamgir, Kharian and Gujrat). It has extreme climatic conditions which is hot in summer and cold in winter. When summer is

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at peak, the day temperature rises up to 45^0C, however the hot spells are relatively shorter because of closeness to Azad Kashmir Mountains (Hussain et al., 2010).

Most of the medicinal plants are available as wild or weeds in the world including Pakistan. That are collected and used in medicinal purposes. There are some areas in Pakistan which need to explore it flora and to create awareness among the local community. Herbal medicines currently have much more importance in the Western society (Shinwari and Gilani, 2003). All over the World about 50,000 plants are used for medicinal purpose (Cunningham, 2014). Tang et al. (2012) studied 100 methanolic plant extracts which were used for antiviral activity, 12 extracts were found active from total 100 extracts. Shinwari and Khan (2000) recorded fifty species of herbs belonging from 27 families used medicinally by peoples native to Margalla Hills of National Park Islamabad. From the total 50 species only 10 species were being sold in local market. Masika et al. (2003) reported plant species which were commonly used in curatives against several diseases of farm animals; he reported over 38 plant species belonging from 31 families used for this purpose. From total 38 plant species 21 plant species belonging from 17 families were used to create gall-sickness while 13 plant species belonging to 1 family were used to treat red-water disease. Vishwanathan et al. (2010) studied 156 medicinally important plant species and from 156 medicinally important plant species 22 plant species were used to cure livestock diseases. Ahmad et al. (2009) studied 6 important plant species having medicinal importance. *Achyranthes aspera* L. was used as purgative, laxative, diuretic, antiviral and styptic agent.

Hussain et al. (2008) reported 40 plant species from 39 genera and 32 families having medicinal properties. Important plant species and their uses were *Acacia arabica* var. *nilotica* (L.) Benth. (Fabaceae) was used as astringent, tonic, antiseptic and purgative. Habiba et al. (2016) collected 10 medicinally important plants which have different ethnobotanical uses. *Aerva javanica* (Burm.f.) Juss Shult. (Amaranthaceae) was useful to cure inflammations, abdominal worms and skin infections. Bano et al. (2013) Studied 148 plant species out of these 140 plant species were used for medicinal purpose. Ishtiaq et al. (2006) observed some medicinally important plants, *Acacia modesta* Wall. (Fabaceae) was useful to release placenta soon. *Achyranthus aspera* L. was useful to remove parasites from skin of animals. Matin et al. (2001) studied 77 species of herbs, 12 species of shrubs and 18 species of trees which were used for medicinal purpose. Khan et al. (2014) reported some plants having medicinal values *Calotropis procera* L. (Apocynaceae) were useful to cure cough, rheumatism and skin infection. Ahmad (2006) collected 75 plant species belonging from 43 families having medicinal values. From total 75 plant species 70 were dicots 2 were monocots 3 species were gymnosperms.

Shah et al. (2013) collected 131 plant species belonging from 48 families, important plant species of this research were *Adiantum capillus-veneris* L. (Pteridaceae) useful to cure spleen stones and bronchial problems. Arshad et al. (2011) reported 48 plant species having medicinal importance. Mahmood et al. (2012) observed 25 medicinal plants belonging from 14 families. Sher et al. (2015) collected 87 plant species belonging from 58 families having medicinal importance. Mahmood et al. (2011) studied 29 ethnobotanical important plants belonging from 20 families having medicinal values. Khan et al. (2011) collected 43 plant species belonging from 40 genera and 28 families having medicinal values. Qureshi et al. (2010) reported 63 herbs belonging from 50 genera and 29 families having medicinal importance. Qureshi et al. (2011) collected 48 plant species belonging from 45 genera and 32 families having medicinal values. Ahmad et al. (2009) reported 40 medicinally important plant species belonging from 18 families were recorded having medicinal importance.

In the light of above information and importance of medicinal plants, this study was designed to explore this ignored flora of district Gujrat, Punjab, Pakistan and to collect the information about weeds based upon local community knowledge. This area was selected because it consists of variety of seasonal weeds and so far, it has not been studied for its Ethnomedicinal significance.

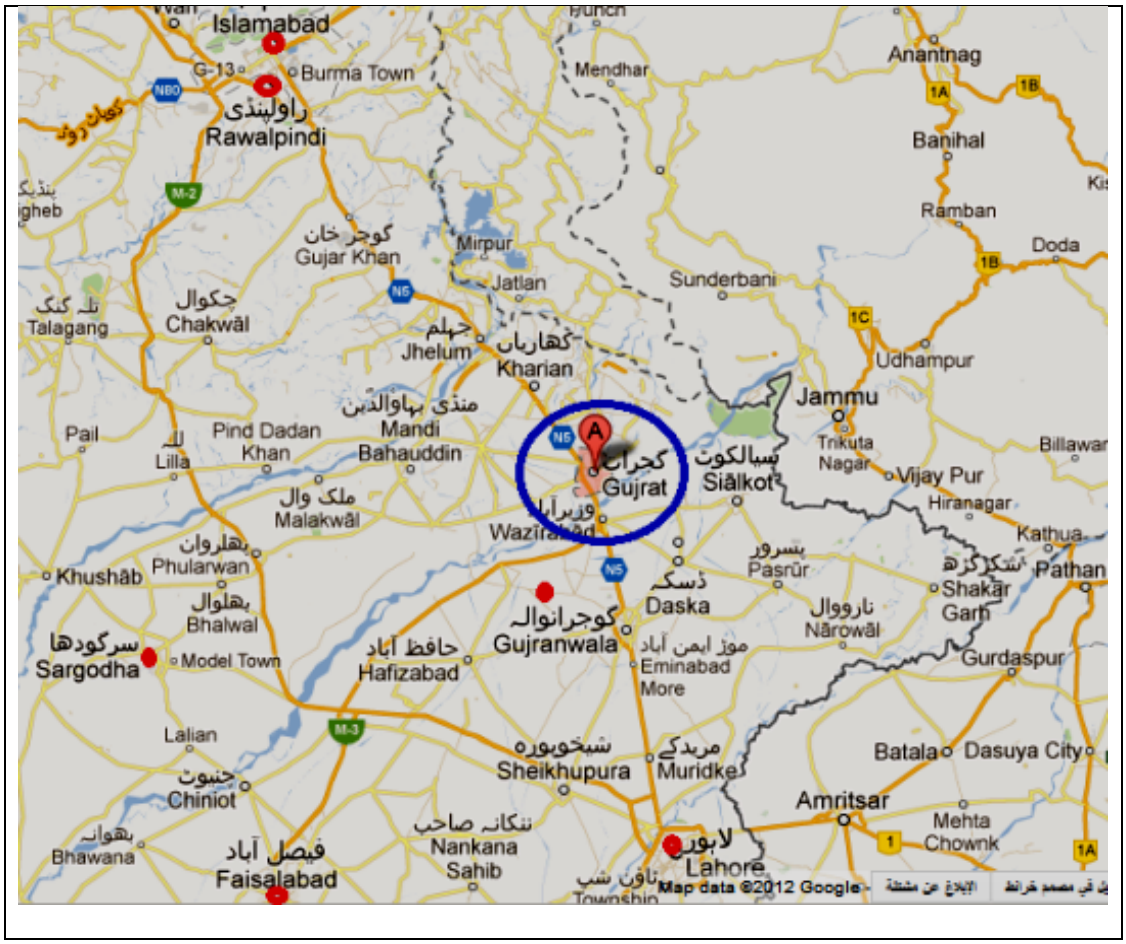
Materials and Methods

Description of study site

The survey was conducted in three Tehsils of District Gujrat, Punjab Pakistan (Sarai Alamgir, Kharian and Gujrat) during 2018-2019. Gujrat, Punjab, Pakistan is located at *Pakistan* country in the *Cities* place category with the GPS coordinates of 32° 34' 16.1184" N and 74° 4' 30.0180" E (Figure 1).

Description of materials

The area was visited several times during winter and summer seasons and plant specimens were collected. The plant samples were gathered dried to mount on herbarium sheets and were identified with distinctive field guiders with their local names. Pencil, notebook, paper for plant drying, polythene bags, knife seizer and camera were used to collect the information.



Reference: https://gujratcafe.wordpress.com/2012/07/09/gujrat-a-city-blessed-in-its-own-way

Figure 1. May of district Gujrat, Pakistan (showing study area)

Field data collection

Information about vernacular name of the weed and part used to treat the specific disease were collected through questionnaires and interviews. The age of informants is from 25-80 years which include male, female and neighborhood hakims. There were 150 respondents including agriculturists, hakims and housewives. Questionnaire was prepared to gather the information. Respondents were asked about the vernacular name of the weed and part used to treat the specific disease. Then these plants were correctly identified with the help of reference materials present at herbarium, Department of Botany, University of Gujrat Pakistan and the collected plants specimens have been deposited in this existing herbarium and further is cross verified through flora of Pakistan (Nasir and Ali, 1983).

Data analysis

The parts of plants were ordered into various categories root, shoot, leaf and flower and following data analysis was conducted:

Use Value (UV)

Use Value (UV) was determine the relative importance of given species collected from the area. It was calculated by following formula:

$$UV = \sum U/N$$

In this formula, U refers to the number of citations per specific plant and N represents the number of informants.

Informant Consensus Factor (ICF)

Information of related homogeneity mixture of disease category obtained from informants was calculated by this formula:

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

Where, Nur describes he number of use citations from informants for a particular plant-use category and Nt represents the number of species or taxa

utilized by all the informants for that specific plant use category. ICF had range between 0 to 1, where ICF value 1 indicated highest level of informant consent and 0 was the lowest value

Fidelity Level (FL)
The fidelity level was used to search out the important advance species related to medicines.

$$FL(\%) = \frac{Np}{N} x100$$

Where, Np for the number of species that are present in specific category. For accurate sum consumption for particular species symbol N was used.

Relative Frequency of Citation (RFC)
RFC was calculated by the given formula:

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

In this formula, FC was the number of informants for the use of that species and the N represents the total number of informants in the survey.

Results

During the ethnobotanical survey from 150 local informants were interviewed having knowledge about folk medicinal uses of weeds.

Identification of weeds
The collected weeds belong to different 33 families i.e. Asteraceae, Poaceae, Fabaceae, Polygonaceae, Amaranthaceae, Euphorbiaceae, Solanaceae, Brassicaceae, Gentianaceae, Lamiaceae and Verbenaceae (Table 1). The major families Asteraceae, Poaceae, Fabaceae and Polygonaceae had 11, 11, 8 and 6 plant species, respectively (Figure 2). Families Amaranthaceae, Euphorbiaceae, Solanaceae, Brassicaceae, Gentianaceae, Lamiaceae and had 3-5 plant species, while other families identified had 3,2 and 1 plant species (Table 1).

Medicinal parts of weeds
Different parts of the weeds like leaves, roots, stem, milky latex, seeds etc. were used for different medicinal purposes by the local peoples. Crude drugs were prepared from the weeds in the form of infusion, extraction, paste powder, decoction etc. leaves were used about 58%, fruits 36%, seeds 25%, whole plant 23%, roots 22%, stem 8% and milky latex about 1% (Figure 3).

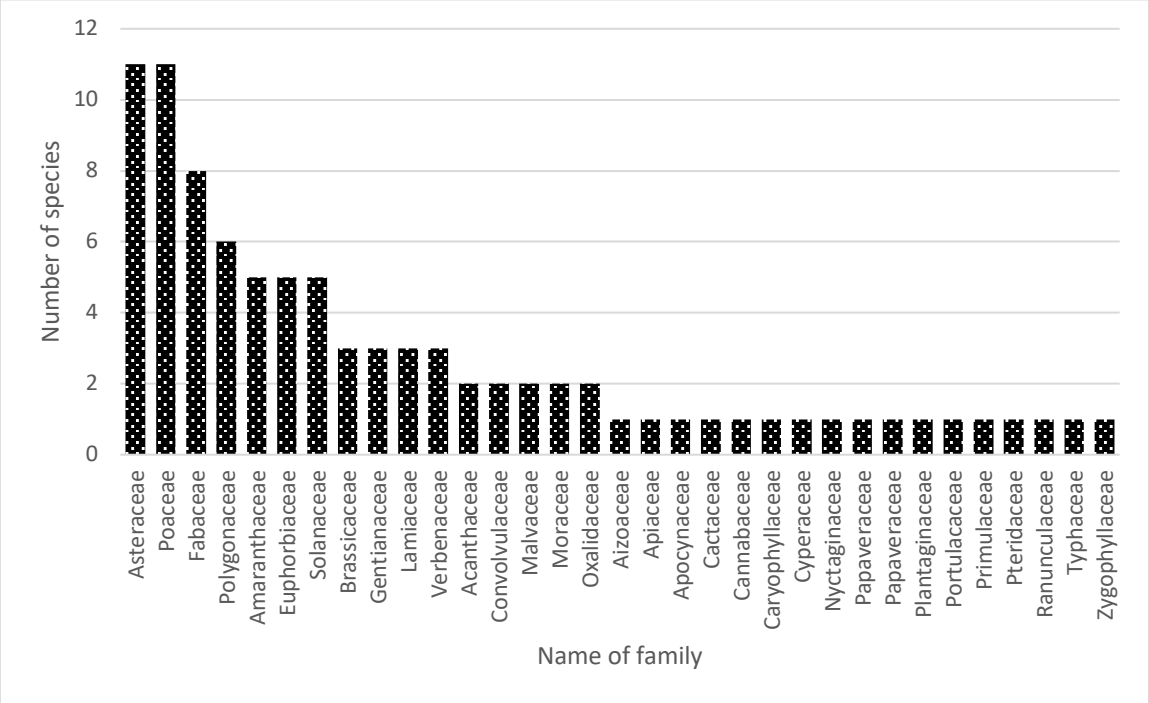


Figure 2 Family index base upon highest number of species in the study area

Table 1 Family index based upon number of species in the study area

Family	No. of species	Ranking
Asteraceae	11	1st
Poaceae	11	1st
Fabaceae	8	2nd
Polygonaceae	6	3rd
Amaranthaceae	5	4th
Euphorbiaceae	5	4th
Solanaceae	5	4th
Brassicaceae	3	5th
Gentianaceae	3	5th
Lamiaceae	3	5th
Verbenaceae	3	5th
Acanthaceae	2	6th
Convolvulaceae	2	6th
Malvaceae	2	6th
Moraceae	2	6th
Oxalidaceae	2	6th
Aizoaceae	1	7th
Apiaceae	1	7th
Apocynaceae	1	7th
Cactaceae	1	7th
Cannabaceae	1	7th
Caryophyllaceae	1	7th
Cyperaceae	1	7th
Nyctaginaceae	1	7th
Papaveraceae	1	7th
Papaveraceae	1	7th
Plantaginaceae	1	7th
Portulacaceae	1	7th
Primulaceae	1	7th
Pteridaceae	1	7th
Ranunculaceae	1	7th
Typhaceae	1	7th
Zygophyllaceae	1	7th

Pharmacological and derivative analysis

The Use Value (UV) and Relative Frequency of Citation (RFC) were used to demonstrate that which weed can further used for pharmacological study and can help in drug improvement (Table 2). In the RFC of the reported weeds has been shown in Table 2. Weeds having highest RFC value were reported by maximum number of people in the study area. The Use Value Index determined the relative importance of specie in a population as described by Vendruscolo and Mentz (2006). The Fidelity Level (FL) of 22 important weeds ranged from 27-100%. *Cichorium intybus* L. (Asteraceae) had 100% FL value against liver problem and blood purifier respectively. Informant Consensus Factor (ICF) is given in Table 3 which shoed ICF values based upon the uses of weeds in various disease (Figure 4). Highest ICF values were noted against stomach problems, gastric problems, intestinal problem, digestive problems that was 0.76. Fidelity Level (FL) value of most reported medicinal plants have been described in Table 4. *Achyranthes aspera* L. showed the highest FL values that was 93% that had uses in gastrointestinal disorders and menstrual pain.

Weeds collected had various medicinal uses that has been given in Table 2. The important uses were such as *Achyranthes aspera* L. used to cure asthma, toothache and cough, *Adiantum capillus-veneris* L. was useful as antimicrobial activity, *Amaranthus viridis* L. (Primulaceae) was used to cure malaria, urinary tract infections and snake bites, *Anagallis arvensis* L. was used as wound healing and antioxidant properties, *Anethum graveolens* L. (Apiaceae) to cure constipation, heartburn, treat diarrhea, treatment of cold, flue, asthma and urinary tract infections.

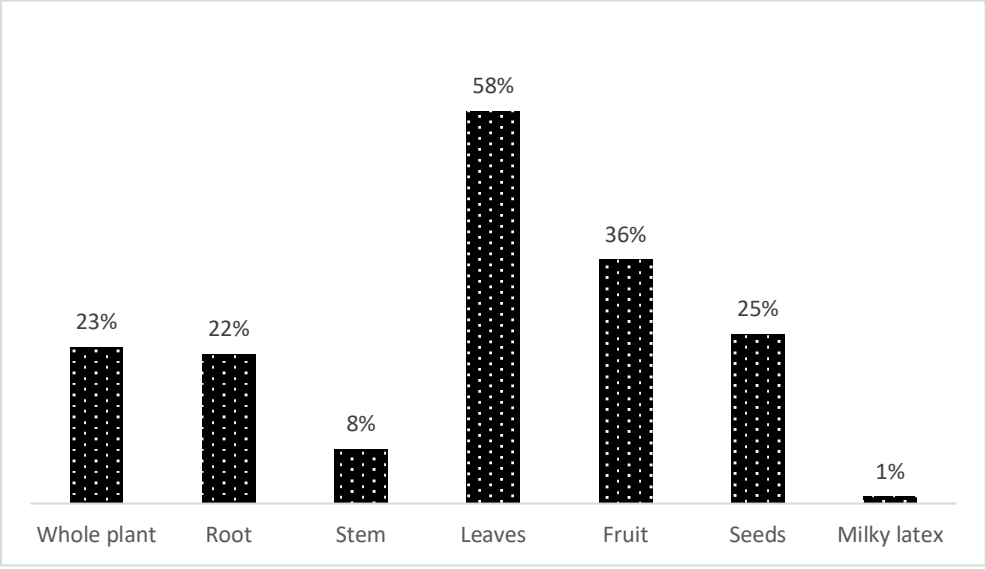


Figure 3. Percentage of plant parts used for medicinal purpose by local community

Table 2. Identification of weeds with uses, method and prescription

Species	Family	Voucher no.	UV	RFC	Local uses	Method of use	Form of use	Time of use	Part used
Achyranthes aspera L.	Amaranthaceae	Ama-12/19	0.85	0.088	Asthma, toothache, cough	Its leaves and honey bee to make tablets	Oral use	3 time par day	Fresh leaves
Adiantum capillus-veneris L.	Pteridaceae	Pte-02/19	0.23	0.073	Antimicrobial activity	Whole plant (aerial parts) as decoction	Oral use	3 time par day	Fresh leaves
Amaranthus viridis L.	Amaranthaceae	Ama-13/19	0.37	0.051	Malaria, urinary tract infections and snake bites.	Take Seeds and then Grind with rice and water to make tablets	Oral use	1 time par day	Fresh leaves
Anagallis arvensis L.	Primulaceae	Pri-01/18	0.27	0.08	Wound healing and antioxidant properties.	Use its leaves to make poultice	External use	2 time par day	Fresh as well as dry form
Anethum graveolens L.	Apiaceae	Api-17/19	0.58	0.04	Constipation, heartburn, treat diarrhea, treatment of cold, flue, asthma and urinary tract infections	Seed of this plant mix with ajwain and use for diabetic patients	Internal use	1 time par day	Dry form
Avena sativa L.	Poaceae	Poa-27/18	0.62	0.07	Curing constipation, and have wound healing properties. Have antibacterial, antimicrobial and antidiabetic properties.	Take seed water and sugar to grind them	Oral use	I time par day	Dry form
Boerhavia diffusa L.	Nyctaginaceae	Ncy-01/19	0.57	0.048	Snakebites, kidney problems, and helpful in curing cough and flue. Useful for curing abdominal pain and abdominal tumors	Grind its roots and added honey bee	Oral use	2 time par day	Dry form
Brassica rapa L.	Brassicaceae	Bra-13/19	0.46	0.13	Cure gynological disorders and hepatitis A,B and C.	Take its leaf, seed and then grind it to make powder.	Internal use	Two time per week	Dry plus fresh form
Calotropis procera (Aiton) Dryand.	Apocynaceae	Apo-04/19	0.92	0.17	Cure snake bite, respiratory problems, body pain and heal wounds.	Mustard oil is mixed with leaf of akk plant and rubbed.	External use	3 to 4 time	Dry form
Cannabis sativa L.	Cannabaceae	Can-04/18	0.34	0.08	Diarrhea, constipation, snake bite.	Take its Seeds and leaves to make poultice	External use	1 time par day	Dry form
Carthamus tinctorius L.	Asteraceae	Ast-32/19	0.42	0.12	Treat ulcer, jaundice, and anti-inflammatory and wound healing property, improves male fertility.	Seed oil is used as tonic	External use	2 time par day	For lungs problem
Centaurium pulchellum (Sw.) Druce	Gentianaceae	Gen-01/18	0.21	0.08	Treat injuries and have anti-viral property.	Make a poultice	External use	1 time par day	Dry form
Chenopodiastrum murale (L.) S. Fuentes, Uotila & Borsch	Amaranthaceae	Ama-15/19	0.76	0.086	Cough, constipation, pulmonary obstruction, and inflammation.	Whole plant part are recommended for	External use	2 time par day	Dry and fresh form

						cough and fever control			
Chenopodium album L.	Amaranthaceae	Ama-14/19	0.78	0.156	Cure gastric, hepatic and urinary disorders, treat constipation, diarrhea and headache.	Leaves mix with water for kidney disorder	Internal use	Twice a day	Fresh form
Chrozophora tinctoria (L.) A.Juss.	Euphorbiaceae	Eup-14/18	0.31	0.09	Antimicrobial, antibacterial and antioxidant properties.	Take its roots to make syrup for child cough	Internal use	3 time par day	Dry part
Cichorium intybus L.	Asteraceae	Ast-33/19	0.74	0.132	Cure kidney and liver problems.	Use this plant leaves to make herbal tea	Oral use	Twice a day	Fresh part
Cirsium arvense (L.) Scop.	Asteraceae	Ast-34/19	0.38	0.13	Cure indigestion and have antimicrobial activity.	Make decoction of roots and used for child worms	Oral use	Trice a day	Dry form
Convolvulus arvensis L.	Convolvulaceae	Con-03/19	0.54	0.08	Cure urinary tract infections and ulcers.	Make juice of roots to control fever	Internal use	Twice a day	Dry form
Croton bonplandianum Baill.	Euphorbiaceae	Eup-17/19	0.25	0.08	Have wound healing property and cure paralysis.	Take its seed, grind them to make powder	Oral use	1 time par day	Dry form
Cynodon dactylon (L.) Pers.	Poaceae	Poa-28/18	0.58	0.10	Anti-diabetic effect, useful as blood purifier and control nose bleeds, useful to cure vomiting.	Paste of this plant is useful for wounds	External use	2 to 3 time par day	Fresh part
Cyperus rotundus L.	Cyperaceae	Cyp-02/18	0.28	0.07	Anti-bacterial, antioxidant, anti-diabetic, anti-pyretic, anti-inflammatory and antimalarial properties. Cure pain, fever, wounds, constipation, gastrointestinal and skin problems.	Take its rhizome that is consider as tonic	Oral use	1 time par day	Dry form
Dactyloctenium aegyptium (L.) Willd.	Poaceae	Poa-29/18	0.32	0.09	Antipyretic and antimicrobial properties. Useful for curing diarrhea and asthma.	Take its seeds to make decoction	Oral use	1 time par day	Dry seed
Datura metel L.	Solanaceae	Sol-11/18	0.48	0.21	Curing paralyzed portion of the body. Relieve snake bite and have antidote to poison. Cure arthritis and have antimicrobial properties.	Take its leaves, drink them. Add sugar and water to make syrup	Oral use	2 time par day	Fresh form
Dichanthium annulatum (Forssk.) Stapf	Poaceae	Poa-39/19	0.37	0.19	Antioxidant and antimicrobial and also useful for curing dysentery.	Grinded seed mix with musli safeed and use to control dysentery	Internal use	1 time par day	Dry from
Digitaria bicornis (Lam.) Roem. & Schult.	Poaceae	Poa-40/19	0.42	0.15	Useful to kill microbes.	Take its leaves and then mix with grinded seeds to make poultice	External use	1 time par day	Dry and fresh form

Dysphania ambrosioides (L.) Mosyakin & Clemants	Amaranthaceae	Ama-16/19	0.34	0.09	Cure inflammation and have antibacterial properties.	Herbal tea	Internal use	2 time par day	Fresh extract
Eclipta prostrata (L.) L.	Asteraceae	Ast-35/19	0.38	0.16	Useful for curing snake bite. Act as anti-bacterial and anti-oxidant.	Plant part mixed with olive oil and use for jaundice	Internal use	1 time par day	Fresh part
Eleusine indica (L.) Gaertn.	Poaceae	Poa-41/19	0.75	0.2	Prolapse uterus and treat menstruation if it takes long time. Useful for curing gynecological problems, liver disorders, febrifuge and blood dysentery.	Dry form of leaves use with milk	Internal use	3 time par day	Fresh form
Erigeron canadensis L.	Asteraceae	Ast-36/19	0.59	0.11	Treat pimples and have antibacterial and antimicrobial property.	Whole plant is recommended as herbal tea to control gout and diuretic	Oral use	1 time par day	Fresh also dry form
Euphorbia helioscopia L.	Euphorbiaceae	Eup-18/19		0.13	Cure constipation, athlete's foot and intestinal problems. Also useful for the treatment of cholera.	Take its leaves as herbal tea	Internal use	3 time par day	Fresh part
Euphorbia prostrate Aiton	Euphorbiaceae	Eup-15/18	0.85	0.24	Useful for curing jaundice, fever and kill intestinal worms. Act as anti-inflammatory and anti-bacterial.	Plant part that grow above the ground use to make medicine	Oral use	2 time par day	Fresh part
Fumaria indica (Hausskn.) Pugsley	Papaveraceae	Pap-06/18	0.91	0.21	Used in pains, fever, liver problems and diarrhea. Control vomiting and joint swellings.	Make decoction of leaves with water	Internal use	2time par day	Fresh and dry part
Geranium dalmaticum (Beck) Rech.f.	Geraniaceae	Gen-03/19	0.53	0.18	Cure internal wounds, swellings, inflammations, tumor and bleeding.	Herbal tea and root decoction are used to control inflammation and bleeding	Oral use	1 time par day	Dry also fresh form
Geranium rotundifolium L.	Geraniaceae	Gen-02/19	0.47	0.16	Cure constipation, joint pains and blockage of urine.	This plant is used as astringent and diuretic	Internal use	1 time par day	Fresh form
Inula hirta L.	Asteraceae	Ast-37/19	0.31	0.07	Treat wounds, Cure respiratory disorders and have antimicrobial properties.	Take its flowers and 3 leaves of *Adhatoda vasica* are cooked carefully and taken with a handful of Boiled rice, which is still warm	Internal use	7 days in the morning	Fresh form
Ipomoea cairica (L.) Sweet	Convolvulaceae	Con-03/18	0.93	0.12	Useful for the treatment of rheumatism and inflammation and	Young plant part is macerated and 4-5 teaspoons of juice	Oral use	Twice a day for 7 days	Fresh

					have antimicrobial and anti-cancer properties.	obtained from macerated mixture			
Justicia adhatoda L.	Acanthaceae	Aca-09/19	0.94	0.11	Cure respiratory problems, cough, bronchitis, asthma, jaundice, diabetes, leprosy, tuberculosis problems and frequent thirst.	Liquid abstract of the plant is used in many medicinal formulations as an expectorant	Internal use	Twice a day	Fresh form
Lactuca serriola L.	Asteraceae	Ast-38/19	0.49	0.082	Lettuce is used for asthma, cough, sleeping problems and joint pain.	Take whole plant and sue to make poultice that apply on the wounds	External use	1 time par day	Dry form
Lantana camara L.	Verbenaceae	Ver-04/18	0.35	0.13	Useful as anti-pyretic, anti-microbial and anti-mutagenic.	Take Lantana camera leaves and sue to make decoction	Internal use	1 time par day	Fresh form
Lathyrus aphaca L.	Fabaceae	Fab-23/18	0.12	0.04	Useful to cure snake bite.	Take 2 spoon of seed and mix with water	Internal use	1 time par day	Dry form
Lepidium didymium L.	Brassicaceae	Bra-14/19	0.98	0.22	Useful for the treatment of headache, constipation, skin diseases and diabetes, useful for the treatment of gastrointestinal ulcers and heartburns, have anti-inflammatory activity.	Poultice of the leaves was used to applied on the treatment of croup	External use	2 time par day	Dry form
Leucas aspera (Willd.) Link	Lamiaceae	Lam-16/18	0.87	0.21	Useful to cure headache, have antimicrobial activity, relieve chronic headache, cure dental pain, treat snake bite and insect stings, treat asthma and bone fractures.	Its leaves are recommended for scorpion bites	External use	1 time par day	Fresh form
Malva parviflora L.	Malvaceae	Mal-18/19	0.16	0.06	Have antimicrobial, antibacterial and anti-inflammatory properties.	Leave are boiled in 3-4 cup water to make 1 cup. The mixture is then filtered. 2-4 teaspoons of the solution mixed with cow milk	Oral use	Daily in the evening	Fresh form
Malvastrum coromandelianum (L.) Garcke	Malvaceae	Mal-19/19	0.65	0.2	Cure blisters, wounds, injuries and relieve pain. Have antimicrobial and irritant activity.	Seed oil is used to control body pain	External use	1 time par day	Dry form
Medicago polymorpha L.	Fabaceae	Fab-23/18	0.97	0.23	Have anti-fungal, antibacterial, antimicrobial and anti-inflammatory properties. Cure kidney, intestinal and bladder infections.	Seed can be parched, ground into a powder and mixed with water to make a mush	Internal use	2 time par day	Dry form

Medicago sativa L.	Fabaceae	Fab-33/19	0.86	0.18	Enhance metabolism and increase milk production in livestock.	Take ginsing, oat, alfalfa to make syrup	Internal use	Adult take twice a day	Fresh part
Melilotus indicus (L.) All.	Fabaceae	Fab-24/18	0.54	0.24	Cure swellings, diarrhea and bowl complaints. Useful for the treatment of intestinal problems.	Seed is used to make gruel and cure bowl problems	Internal use	1 time par day	Dry form
Morus alba L.	Moraceae	Mor-03/18	0.24	0.06	Useful for treatment of hepatitis.	Root and leaves of *Morus alba* are used to treat dizziness	Oral use	1 time par day	Dry form
Morus nigra L.	Moraceae	Mor-04/18	0.47	0.12	Used for sore throat	Washing the mouth and then swallowing a molasses made from black mulberry seems to reduce mouth sores during cancer treatment.	Oral use	2 time par day	Fresh form
Nasturtium officinale R.Br.	Brassicacea e	Bra-15/19	0.65	0.09	Useful to cure asthma, bronchitis, cough and fever.	1 teaspoon juice of *Zingiber officinale* is mixed with 2 teaspoons juice of *Nasturtium officinales*	Internal use	Thrice a day	Dry form
Ocimum basilicum L.	Lamiaceae	Lam-20/19	0.95	0.23	Have antimicrobial, antibacterial and wound healing properties. Cure urinary tract infections, fever, cough, pneumonia, asthma and skin problems.	1 teaspoon juice of *Ocimum* leaves and 1 teaspoon honey. It is taken twice daily for 3 days	Oral use	Twice a day	Fresh form
Opuntia robusta J.C.Wendl.	Cactaceae	Cac-19/19	0.97	0.21	Useful for the treatment of diabetes, cardiac and renal diseases. Useful for maintaining health and mental strength.	Paste of leaves or dry power of leaves	Oral use	1 time par day	Fresh part
Oxalis corniculata L.	Oxalidaceae	Oxa-04/18	0.94	0.23	Useful for curing skin diseases, migraine, redness of eye and scurvy, have wound healing and anti-microbial activity. Useful to cure gastric troubles.	Dry leaves to make powder	Oral use	2 time par day	Fresh plus dry form
Oxalis latifolia Kunth	Oxalidaceae	Oxa-03/18	0.65	0.15	Cure jaundice, hepatitis A, B, C, skin diseases stomach problems and bleeding wounds.	Leaves are used to make decoction for the treatment of fever	Oral use	3 time par day	Fresh leaves
Parthenium hysterophorus L.	Asteraceae	Ast-39/19	0.81	0.20	Have anti-bacterial activity, useful to kill pathogenic bacteria. Useful as tonic and febrifuge. Cure malaria and allergies.	Make herbal tea to cure pyrexia	Oral use	2 time par day	Fresh part

Persicaria longiseta (Bruijn) Kitagawa	Polygonaceae	Pol-05/18	0.13	0.08	Cure diabetes, cold and cough.	1 handful leaves of *this plant*, 1 nutmeg	Internal use	Twice a day	Fresh leaves
Persicaria odorata (Lour.) Soják	Polygonaceae	Pol-06/18	0.67	0.19	Have antibacterial, anti-inflammatory, antidiarrheal and antihemorrhage properties.	Its leaves are grinding to make poultice	External use	Twice a day	Fresh leaves
Phalaris minor Retz.	Poaceae	Poa-42/19	0.89	0.21	Cure cough, cold, asthma and dysentery, have antimicrobial, antioxidant and phytotoxic properties	It is use as fodder for animals but its leaves are also used to control respiratory problem	Internal use	One time par day for a week	Fresh form
Phyla nodiflora (L.) Greene	Verbenaceae	Ver-07/19	0.7	0.13	Cure skin diseases, after birth diseases in women's, swollen cervical glands and gastric problems.	Recommend for external body pain	External use	1 time par day	Dry form
Physalis minima L.	Solanaceae	Sol-12/18	0.61	0.13	Act as antioxidant, cure diseases and tooth diseases, usefull for the treatment of hypertension, diabetes and malaria. Act as anti-inflammatory, anti-tumor and anti-viral. Cure pain below naval and stimulate urine production.	Take its root and then grind them and then add honey bee and make decoction	Internal use	Twice a day	Dry form
Poa annua L.	Poaceae	Poa-30/18	0.13	0.07	Mainly useful as cattle fodder to improve digestion	This plant is use as fodder for animal	Internal use	2 time a day	Fresh
Portulaca oleracea L.	Portulacaceae	Por-03/19	0.96	0.21	Useful for the treatment of wounds, fever, ulcer, muscle spasm, skin problems and abnormal uterine bleeding. Have antimicrobial and antioxidant properties.	Plants part are used to make poultice	External use	1 time par day	Dry also fresh part
Ranunculus sceleratus L.	Ranunculaceae	Ran-06/18	0.99	0.22	Have antimicrobial and anti-inflammatory activity. Have wound healing property. Promote blood circulation by removing blood stasis. Cure cough, cold and malaria. Treat heart, liver and gall bladder diseases. Cure snake bite.	Its whole plant is recommended for anti- inflammatory and sedative purpose	Internal use	1 time par day at night	Fresh
Ricinus communis L.	Euphorbiaceae	Eup-19/19	0.94	0.19	Useful for curing rheumatic pain, joint pain, constipation, headache, inflammation, nervous disorders and paralysis. Have antioxidant and antimicrobial properties.	Take its root , grind them and add milk in it	Oral use	2 time par day	Dry form

Ruellia simplex C.Wright	Acanthaceae	Aca-10/19	0.57	0.14	Have antimicrobial activity and useful for the treatment of hypertension.	Plant part is use to make syrup that is helpful for cough problem	Internal use	3 time par day	Fresh
Rumex crispus L.	Polygonacea e	Pol-09/19	0.53	0.12	Antimicrobial, antioxidant and anti-inflammatory activity. Useful for curing edema.	Roots were used as remedy against intestinal problem	Internal use	1 time par day	Dry form
Rumex dentatus L.	Polygonacea e	Pol-10/19	0.86	0.18	Antioxidant, anti-inflammatory and antimicrobial activity. Act as appetizer, cure constipation, diarrhea, jaundice, skin, and liver and gall bladder disorders.	Take its leaves grind them and make its juice that use of body pain	External use	2 time par day	Dry form
Rumex hypogaeus T.M.Schust. & Reveal	Polygonacea e	Pol-11/19	0.38	0.16	Useful as antioxidant and cure skin disorders.	Its leaves are applied externally on swelling site of body	External use	Twice a day	Fresh form
Rumex obtusifolius L.	Polygonacea e	Pol-07/18	0.48	0.23	Have antimicrobial, antibacterial, antiviral and antiulcerogenic properties.	Leaves are often applied external as rustic remedy in the treatment of burn	External use	Day time	Fresh also dry form
Saccharum munja Roxb.	Poaceae	Poa-31/18	0.16	0.08	Medicinal herb used in birth control.	Plant parts are used in number of Ayurvedic formulations which are used in the treatment of dysuria	External use	Morning time	Fresh part
Senna occidentalis (L.) Link	Fabaceae	Fab-34/19	0.46	0.19	Control blood pressure and cholesterol level, cure short breathless and fever.	The seeds are dried, roasted then ground into a powder and used as a coffee substitute	Internal use	2 time par day	Dry form
Setaria pumila (Poir.) Roem. & Schult.	Poaceae	Poa-43/19	0.15	0.05	Useful for curing skin diseases.	It can be eaten as a sweet or savoury food in all the ways that rice is used, or ground into a powder and made into porridge, cakes, puddings	Oral use	1 time par day	Fresh form
Setaria viridis (L.) P. Beauv.	Poaceae	Poa-44/19	0.16	0.03	Act as diuretic, emollient and tonic.	It is used in the same ways as rice or millet, either boiled, roasted or ground into a flour	Oral use	2 time par day	Dry form

Solanum nigrum L.	Solanaceae	Sol-13/18	0.64	0.18	Prevent respiratory, hepatic and stomach problems. Cure eye problems, fever, piles and diabetes. Useful for the treatment of jaundice. Have antimicrobial, antioxidant, anticancer and anti-inflammatory activities.	5g leaves of *Solanum* mixed with 12 fruits of *Piper nigrum*, 24 g sugar candy are mixed and boiled in ½ liter water. It is done in a clay pot. When it form 1 cup it is then cooled and filtered	Oral use	Twice a day	Dry form
Solanum virginianum L.	Solanaceae	Sol-17/19	0.58	0.13	Cure degenerative and heart diseases.	5g leaves and 12 fruits of *Piper nigrum*, leaves of *Cinnamomum,* 2 fruits of *Piper longum*, 5-6 g bark of *Cinnamomum zeylanicum*, 5-6 g rock salt and 24 g sugar candy are mixed and boiled in 1 liter water.	Oral use	Twice a day	Dry form
Sonchus asper (L.) Hill	Asteraceae	Ast-40/19	0.28	0.12	Antimicrobial activity, paste is useful to cure wounds and boils. Antidote for insect bites.	seeds is soaked in 1 cup water for one night	External use	1 time par day	Fresh form
Sonchus oleraceus (L.) L	Asteraceae	Ast-41/19	0.48	0.14	Anti-inflammatory, antipyretic, antibacterial, anti-fungal and anti-oxidant properties. Relieve body pain.	Infusion has been used to bring on a tardy menstruation and to treat diarrhoea	Oral use	1 time par day	Fresh form
Stellaria media (L.) Vill.	Caryophyllaceae	Car-07/18	0.36	0.9	Cure broken bones and swellings. Useful for the treatment of epilepsy and convulsions.	Its leaves applied on skin surface	External use	3 time par day	Fresh form
Teucrium lamiifolium d'Urv.	Lamiaceae	Lam-17/18	0.41	0.13	Antioxidant, anti-depression, anti-inflammatory and anticoagulant properties.	Its herbal tea is recommended for common cold	Internal use	Twice a day	Fresh
Trianthema portulacastrum L.	Aizoaceae	Aiz-03/19	0.58	0.19	Useful for the treatment of constipation, asthma, dropsy, fever and cough. Effective for the treatment of liver, kidney and eye disorders.	extracts of the plant have demonstrated significant pharmacological activities, such as antioxidant, diuretic	Oral use	3 time par day	Fresh form
Tribulus terrestris L.	Zygophyllaceae	Zyg-02/18	0.63	0.19	Cure sexual disorders. Useful for the treatment of kidney stones and urinary tract infections.	Use its extract by mouth might reduce symptoms of angina	Internal use	One time	Fresh

					Increase muscle strength and sexual potency.				
Trifolium resupinatum L.	Fabaceae	Fab-26/18	0.48	0.14	Cure diabetes and skin diseases.	Leaves and young stems - cooked and eaten as a vegetable	Oral use	One time par week	Fresh
Typha angustifolia L.	Typhaceae	Typ-01/18	0.13	0.08	Useful for wound healing, have antimicrobial and anti-inflammatory properties.	Internally it is used for the treatment of Kidney stones	Oral use	Twice a day	Fresh
Verbena officinalis L.	Verbenaceae	Ver-05/18	0.51	0.2	Useful for curing malaria, rheumatic arthritis, epilepsy and convulsions also have antioxidant property.	Parts that grow above ground are used to make medicine. Verbena is used for sore throats and respiratory tract diseases such as asthma	Internal use	One time par day	Dry form
Veronica persica Poir.	Plantaginaceae	Pla-04/19	0.53	0.11	Have anti-inflammatory, anti genotoxic, anti-oxidant and anti-fungal properties. Cure hemorrhoids, rheumatism, kidney and stomach problems.	plants are traditionally used in medicine for wound healing	External use	One time	Dry part
Vicia sativa L.	Fabaceae	Fab-35/19	0.32	0.16	Useful as emollient and have anti-inflammatory and antioxidant properties.	Poultice is recommended for skin infection	External use	One time par day	Dry part
Withania somnifera (L.) Dunal	Solanaceae	Sol-18/19	0.49	0.17	Cure neurological disorders.	Roots of plant is directly used as herbal tea or dry powder	Internal use	1 time par day	Dry form
Xanthium strumarium L.	Asteraceae	Ast-42/19	0.51	0.13	It has anti-inflammatory, t and antibacterial properties, useful for skin treatment	Apply leaf paste	External use	Twice a day	Fresh form

Table 3. Informant Consensus Factor (ICF) by disease category reported in study area

Disease Category	No. of Use Reports (Nur)	No. of Species Used (Nt)	Nur-Nt	Nur-1	ICF
Respiratory diseases, Gastric problems, Hepatitis	24	10	14	23	0.60
Cardiovascular disorders and Urogenital problems	30	14	16	29	0.55
Kidney and liver disorders	31	13	18	30	0.60
Antiviral, Antifungal, Anticoagulant	34	12	22	33	0.66
Loose motion, Constipation	45	20	25	44	0.56
Fever, Cold, Cough, Asthma, Flue	67	37	30	66	0.45
Jaundice, Malaria, Bronchitis, Vomiting, Intestinal problems, Arthritis	27	15	12	26	0.46
Headache, Hypertension	17	7	10	16	0.62
Afterbirth problems, Gallbladder problems, Boils, Gynecological disorders	19	8	11	18	0.61
Malaria, Cancer, Paralysis, Tumor, Allergies	22	12	10	21	0.47
Prolapse uterus, Male infertility, Sexual disorders	19	6	12	18	0.66
Piles, Snake bite, Dropsy', Cholera, Toothache, Rheumatism	26	13	13	25	0.52
Wound healing, Ulcer, Skin diseases, Tonic	65	38	27	64	0.42
Stomach problems, Gastric problems, Intestinal problem, Digestive problems	35	9	26	34	0.76
Insect bite, Body pain, Epilepsy, Convulsion, Infections	19	6	13	18	0.72
Nervous disorders, Swellings, Pneumonia, Eye problems	15	9	6	14	0.42
Bone pain, Joint swellings, Jaundice	26	19	7	25	0.2
Diabetes	27	13	14	26	0.53
Antimicrobial, Antibacterial	87	52	35	86	0.40
Antioxidant, Anti-inflammatory	83	50	33	82	0.41

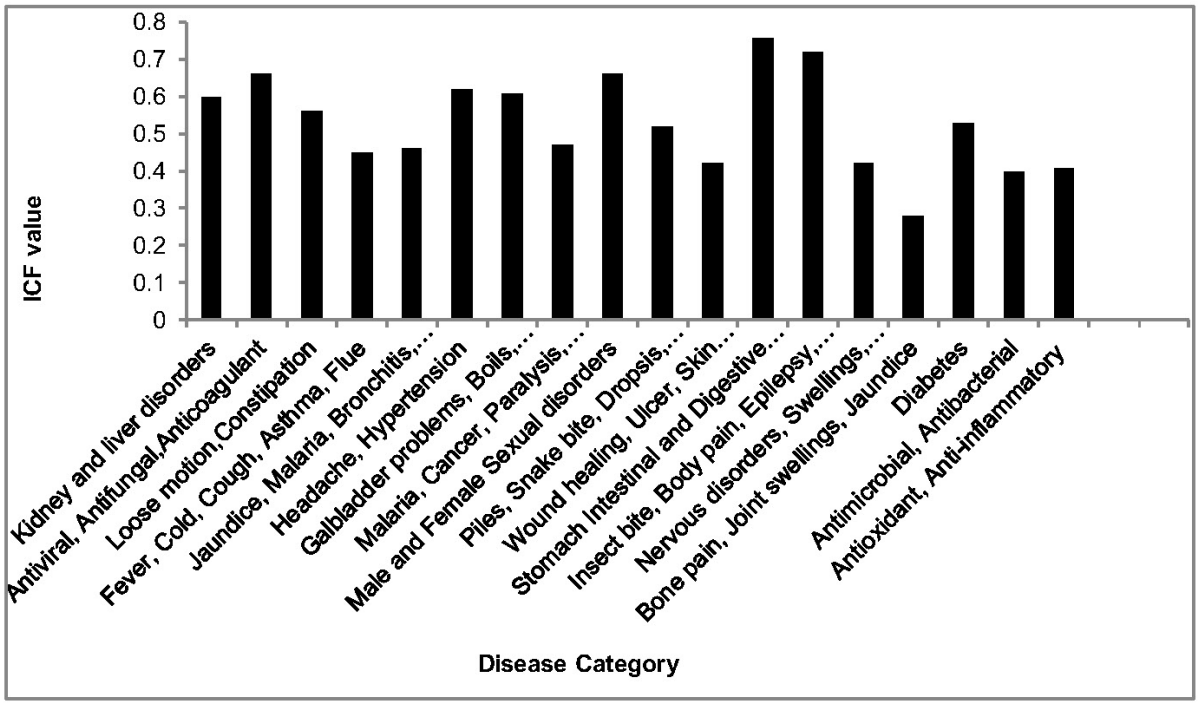


Figure 4. Informant Consensus Factor (ICF) by disease category

Table 4. Fidelity Level (FL) value of most reported medicinal weed

Scientific name	Common name	Major ailment	Fidelity level (FL) %
Achyranthes aspera L.	Putkanda	Gastrointestinal disorders and menstrual pain	93
Amaranthus viridis L.	Ghunar	Snake bite	68
Anagallis arvensis L.	Blue-scarlet pimpernel	Wound healing	72
Anethum graveolens L.	Soey	Digestive problems	27
Calotropis procera (Aiton) W.T.Aiton	Aak	Wound healing	73.6
Cannabis sativa L.	Bhang	Sedative	83
Chenopodium album L.	Bathu	Gastric problems	58
Cichorium intybus L.	Kasani	Liver problem, blood purifier	100
Croton bonplandianum Bail	Tulsi	Wound healing	67
Cynodon dactylon (L.) Pers.	Khabbal, talla ghas	Inflammation	54
Eclipta prostrate L.	False daisy	Snake bite	86
Fumaria indica (Haussk.) Pugsley	Shahtra	Fever	70
Justicia adhatoda L.	Vasaka	Respiratory problems	86
Lactuca serriola L.	Lettuce	Cough, asthma and stomach problems	74
Leucas aspera (Willd.) Link	thumbai	Chronic headache	65
Ranunculus sceleratus L.	Celery leaved buttercup	Inflammation and swellings	74
Rumex dentatus L.	Jangli palak	Constipation	63
Solanum nigrum L.	Kainch mainch	Stomach burn	67
Trianthema portulacastrum L.	Itsit	Constipation	76
Trifolium resupinatum L.	Bird eye clover	Cough and digestive disorders	64
Veronica persica Poir.	Bird eye speedwell	Inflammation	52
Vicia sativa L.	Vetch	Skin diseases	43

According to respondent, these weeds are also recommended in many other diseases include respiratory diseases, gastric problems, hepatitis, cardiovascular disorders and urogenital problem, kidney and liver disorders, diarrhea, constipation, fever, cold, cough, asthma, flu, bronchitis, vomiting, Intestinal problems, arthritis, headache, hypertension, afterbirth problems, gallbladder problems, boils, gynecological disorders, malaria, cancer, paralysis, tumor, allergies, prolapse uterus, male infertility, sexual disorders, piles, snake bite, dropsy, cholera, toothache, rheumatism, stomach problems, gastric problems, intestinal problem, digestive problems, insect bite, body pain, epilepsy, convulsion, infections, nervous disorders, swellings, pneumonia, eye problems, bone pain, joint swellings, jaundice and diabetes.

Discussion

During these surveys, it was noted that there are many plants considered as weeds by growers but according to local community there are useful medicinal plants. They claimed the efficacy of these weeds to cure many diseases using folk knowledge. Similarly, one part of the district Gujrat (Jalapur Jattan) was studied by Hussain et al. (2010). They reported that this area is a rich area with variety of flora that were used in many diseases based upon local community knowledge. Findings of the present study are in accordance with many researchers. Local community rely on these weeds based upon folk knowledge. It was reported by many researchers that the flora identified in the study area has medicinal importance in many other parts of the world. Saurabh et al. (2011) described that *Achyranthes aspera* L. is useful to cure asthma, piles, dropsy, snake bite, rheumatism and skin diseases. *Amaranthus viridis* L. (Amaranthaceae) was useful for the treatment of malaria, useful for prolapse of uterus, cure urinary tract infections, useful to cure snake bite (Butt et al., 2015). *Anagallis arvensis* L. (Primulaceae) is useful for wound healing and antioxidant properties. According to previous studies it was useful for veterinary uses (Viegi et al., 2003). *Anethum graveolens* L. (Apiaceae) is useful for wound healing, used as appetizer, remedy used for heart burns, useful for the treatment of cough, cold, flue, asthma, urinary tract infections and headache (Kumar, 2014).

During this study, it was noted that *Avena sativa* L. (Poaceae) is considered for having antioxidant and wound healing properties which in accordance in earlier findings by Akkol et al. (2011). *Brassica rapa* L. (Brassicaceae) is useful for the treatment of hepatitis A, B and C (Daniell et al., 2001). *Boerhavia diffusa* L. (Nyctaginaceae) is used in kidney problems and helpful in cough and flue. *Calotropis procera* (Aiton) Dryand. has anti-diarrhoeal and anti-

inflammatory activity (Kumar and Basu, 1994). *Cannabis sativa* L. (Cannabaceae) is useful for having diuretic, anti-inflammatory antipyretic and pain killing properties (Lozano, 2001). *Senna occidentalis* (L.) Link (Fabaceae) used to control blood pressure and cholesterol level. Its herbal tea was good to lover high blood pressure. Al-Daihan et al. (2013) also conducted study to observe most common medicinal plants by local people were *Cannabis sativa* L. (UV=0.98), *Fagonia indica* Burm.f. (Zygophyllaceae) with UV of 0.87 and *Plantago ovata* Forssk. (Plantaginaceae) with use value (UV=0.98) which showed their widespread utilization in indigenous herbal medication. The high FL value showed the use of a particular weed by the local people to treat a specific disease (Padmavathi et al., 2005).

Many researchers reported the use of wild plants species in different regions of the world and Pakistan. Most of the information is related to these find that have been explored during the surveys in Gujrat, Pakistan. Petrovic et al. (2005) reported that *Cichorium intybus* L. was used to cure kidney and liver problems and have antibacterial properties. *Datura metel* L. (Solanaceae) cure arthritis and have antimicrobial properties and useful for herbicidal purpose and veterinary purpose (Khan et al., 2014). *Euphorbia helioscopia* L. (Euphorbiaceae) used to cure constipation, athlete's foot and intestinal problems. Euphorbia prostrata Aiton (Euphorbiaceae) was useful for the treatment of wounds (Nagori and Solanki, 2011).

It was noted that paste of *Fumaria parviflora var. indica* (Hausskn.) Parsa (Papaveraceae) was useful for curing joint swellings. Previously plant was used for its antifungal properties (Mishra et al., 2011). All these studied showed the importance of plants among local community. These wild plants should be utilized rather than to eradicate as waste. It can be sold to herbal industries and local Hakims to prepare many medicines that can also be a source of income for people (Hussain et al., 2008). It was confirmed from these studies that the weeds identified from district Gujrat has much importance in traditional medicine. It should be utilized in Pharmaceutical or herbal industries to manufacture the medicine on commercial scale that can be a good addition in health sector.

Conclusions

It was concluded that the area of Gujrat, Punjab, Pakistan is rich source of important wild medicinal plants that are considered as weeds by farmers but on the other hand, these are also used to cure many diseases. It has been neglected by the researcher to document and collect the information about this region. There is need to create awareness among the people to collect these weeds as source of raw materials to prepare medicines.

Declarations

List of abbreviations: Not applicable.

Ethical approval and consent to participate: This study was approved by the Departmental Research and Review Committee (DRRC) and Ethics Committee of Advanced Studies and Research Board (ASRB), University of Gujrat, Pakistan with reference no. UOG/ASRB/3/1586.

Consent for publication: Not applicable

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Authors' contributions: AR, KH designing of the study and proposed the study area; KN, NA and II participated in the collection of field data and identification of plant samples. SSA, AN, ZB identified the weeds reference herbarium and flora. SJ and UA analysed the data and wrote the initial draft of the manuscript. All the authors participated in writing and giving feedback on the manuscript and approved the final version of the manuscript.

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