

# An Ethnobotanical Study of Medicinal Plants in Hulet Ejju Enesie District, East Gojam Zone, Amhara Regional State, Ethiopia

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## Abstract

Traditional medicine plays an important role in Ethiopian society; knowledge about the extent and characteristics of traditional healing practices and practitioners is limited and has frequently been ignored in the national health system. The main objective of the study is to document plant species of medicinal value to the community in Hulet Ejju Enesie District and the associated knowledge on use, preparation and other aspects of the indigenous knowledge of the people in Hulet Ejju Enesie District. The study sites were selected purposefully based on the recommendations of elders and local authorities. Ethnobotanical data were collected using semi-structured interviews, field observations, group discussion, preference ranking and market survey. A total of 188 informants (171 males and 17 females) were selected to collect information on medicinal plant use from 6 sampled kebeles. The study resulted a total of 95 medicinal plant species distributed in 85 genera and 44 families. Plant family with the highest medicinal plants in the study area used for various diseases was fabaceae followed by Asteraceae. The result of growth form analysis showed that 37 (38.94%) were herbs constituted the highest proportion of medicinal plants. Leaves from 42 medicinal plants (44.21%) were the most frequently utilized plant parts for preparation of traditional herbal remedy. Among the total traditional medicinal plants, 75 plant species were used against human ailments and 11 plant species were used for treatment of cattle diseases and 9 plant species for the treatment of both human and veterinary diseases. The majority of medicinal plants were collected from the wild 71 (74.73%) whereas 24 (25.26%) were from Home-gardens areas. Oral administration 51 (53.68%) was the dominant route of remedy administration. Sudden sickness and evil eye is the highest informant consensus factor (ICF) value among human ailments. Among the reported medicinal plants *Kalanchoe pinnatifida* and *Shinus molle* has the highest FL (100) to treat wound and tonsillitis respectively. Agricultural expansions are the most threatening factors mentioned by participants and hence the local community or traditional healers must protect the medicinal plant resources from threat by doing different activities and transfer to the next generation for sustainable use.

**Keywords:** Traditional medicine; Indigenous knowledge; Medicinal plant; Traditional healers

## Introduction

Ethnobotany is the study of the relationships between human populations and plants, addressing the ideas conceptualized by a given society regarding plant life [1]. Ethnobotanists attempt to and preserve traditional botanical knowledge related to the various uses of local Flora [2].

Formal documentation of indigenous plant utilizes began with the campaign of European investigators, looking for 'Green gold', to arrive possessed by indigenous individuals [3]. Such campaign were ice breakers to experience critical plant utilize learning, trailed by the resulting exchange of valuable species and their related utilize information to various nations [4].

The principal objective of all ethnobotanical examines includes documenting, analyzing and disseminating information on the connection amongst individuals and plants [5]. Ethnobotanical examination investigates not just how a particular gathering of individuals uses plants additionally how that gathering sees them, how it deciphers these recognitions, how these discernments impact the exercises of individuals from that society, and how these exercises impact the encompassing vegetation and the biological system on which the general public depends [6].

Loss of knowledge is caused when communities emigrate to towns or to other regions with a different flora and can also be lost by life style changes due to industrialization, rapid loss of natural habitats, drastic alteration of the local ecology [7] even though Ethiopia is endowed with abundant medicinal plant resources and traditional

medicinal practices [8]. Most of the knowledge acquired by the local people has been passed on to them by a word of mouth from one generation to the other. Such orally preserved information is liable to loss if left undocumented [9]. Therefore this study aimed to identify and document plant species that have medicinal value for human and livestock in Hulet Ejju Enesie District.

## Methods

### Description of the study area

Hulet Ejju Enesie District (HEEW) is one of the 21 District in East Gojjam Zone and 151 Districts in Amhara National Regional State. Relative location of the District is 370 km away from Addis Ababa, 120 km from Bahir Dar the regional capital city and 202 km from Debre Markos (Zonal city of East Gojjam). Hulet Ejju Enesie District is bounded in the North by South Gondar Zone, in the South by Sedie District, in the east by Goncha District, in the South West

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**Received:** 21-Feb-2024, Manuscript No. jpgb-24-127952; **Editor assigned:** 23-Feb-2024, PreQC No. jpgb-24-127952 (PQ); **Reviewed:** 11-Mar-2024, QC No. jpgb-24-127952, **Revised:** 18-Mar-2023, Manuscript No. jpgb-24-127952 (R); **Published:** 29-Mar-2023, DOI: 10.4172/jpgb.1000196

**Citation:** Reta H (2024) An Ethnobotanical Study of Medicinal Plants in Hulet Ejju Enesie District, East Gojam Zone, Amhara Regional State, Ethiopia. J Plant Genet Breed 8: 196.

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by Bibugn (Hulet Ejju Enessie District administrative office, 2018). Geographically, the area is located at 11°00'0" - 11°10'0"N latitude and 37°40' 0" - 37° 50'0"E longitude with an average altitude of 2500 m.a.s.l (Figure 1).

### Data collection techniques

**Selections of study sites:** Reconnaissance survey of the study area was conducted from November 10-20 in 2018. During this time information related to topography, vegetation distribution, soil type, boarder of the district, traditional healers were observed and data related to the above mentioned features were also collected. Six kebele were selected from 29 kebeles located in the district purposively by considering agro ecology, accessibility, herbal utilization and relative vegetation cover.

**Sample size determination and Informant selections:** The sample size would be determined statistically by using the Kothari (2004) formula as shown below.  $n = \frac{z^2 \cdot p \cdot Q \cdot N}{(e^2(N-1) + Z^2 \cdot P \cdot Q)}$ , Where n=sample size, Z= value of standard variant at 95.5 confidence level (2.005), P= sample population (0.02), N= total house hold population, Q= 1-P, e= the estimate should be within 2 % of the true value (0.02),  $n = \frac{(2.005)^2 \cdot (0.02) \cdot (1-0.02) \cdot (4382)}{((0.02)^2 \cdot (4382-1) + (2.005)^2 \cdot (0.02) \cdot (1-0.02))} = 188$ . The total informants were distributed proportionally to the selected kebele (sub district). After proportional allocation, each participant was selected systematically from each kebele until the number is reached.

**Semi-structured interviews:** Semi-structured interview was administered based on the checklist, prepared. The questions were

prepared in English and translated to Amharic language (local language of the study area).

**Field observation:** Field observations were applied on the study sites with the help of local people. During field observation important points like conservation action of medicinal plants, cultivation practice of medicinal plants, soil types and vegetation of an area were observed.

**Group discussion:** The discussion was conducted at two study kebeles selected by lottery system from six kebeles with 5 individuals (one traditional healer and four nontraditional healers). The participants were discussed about traditional medicinal system of the peoples, its conservation systems and how people transfer medicinal plant knowledge.

**Market survey:** Market survey was conducted on two kebeles of the markets to distinguish type of medicinal plants available in the markets. During the study the names of medicinal plants, preparation, rout of administration and dosages were recorded and were interviewed about medicinal value of the plants.

**Voucher specimens:** Plant specimens were collected from both habitats i.e., from home gardens and wild habitats Necessary information need for specimen identification like common name and voucher specimen were recorded during the plant species collection in the field. The collected plants were identified by using different volume of Flora of Ethiopia and Eritrea.

### Data analysis techniques

The data would mainly analyzed and summarized by descriptive statistics, preference ranking, paired comparison, direct matrix ranking as described in Martin [5], Cotton [3], Alexiades [10], fidelity level [11] and Informant consensus factor [12].

## Results

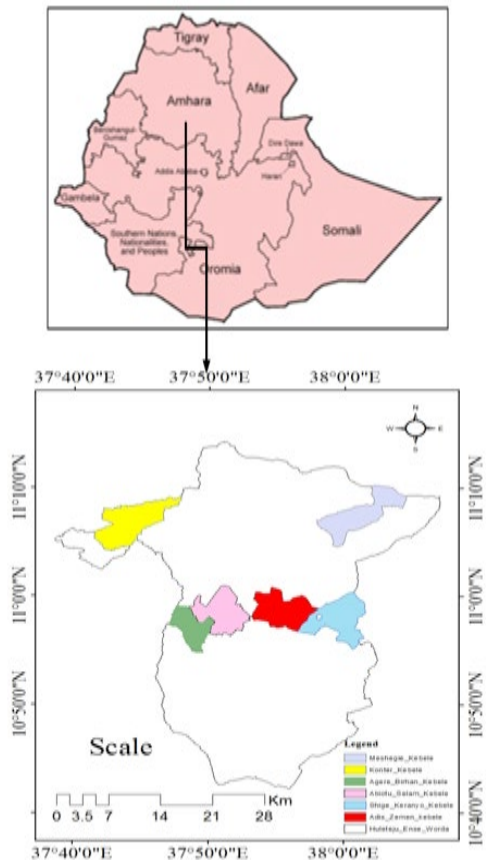
### Medicinal plants

**Medicinal Plant recorded, their Sources and growth habit:** A total of 95 medicinal plants distributed to different genera (85) and family (44) were collected from the study area. Of this, 71(74.73%) plant species were collected from wild habitat and the rest 24 (25.26%) medicinal plant species were collected from homgarden. Fabaceae was the most dominant family that contains 13 species under 11 genera followed by Asteraceae with 7 species and 6 genera, followed by Lamiaceae five species with four genera and Euphorbiaceae and Solanaceae four species with four genera. Regarding the plant habit, herbs were the most common and stood first with 37 species (38.94%), followed by shrubs 32 species (33.68%), trees 19 species (20%) and climbers 7species (7.36%) (Table 1).

**Medicinal plant part used for preparation of medicine:** The study on ethnomedicinal plants in the study area revealed that the plant parts used substantially to treat ailments are leaves 42 (43.75%) followed by roots 12 (12.5%) (Table 2).

**Method of preparation:** Participants reported that remedy preparations vary based on the type of disease treated and the actual sites of ailments. The principal methods of plant parts remedy preparation forms were reported to be through crushing, which accounts for 18 (24%), followed by crushing, powdering and mixing 12 (16%), boiling 11 (14.66%),Crushing and squeezing 8(10.66%) (Table 3).

**Route of administration and measurements utilized:** The most favored route of administration is through oral 51(53.68%) followed by



**Figure 1:** Map of study area in East Gojam Zone, Amhara Region, and Hulet Ejju Enaessie District.

**Table 1:** List of traditional medicinal plants used to treat human and livestock health problems with parts used, ailment type, route of administration, preparation, application and dosage

Scientific Name	Family	Local Name (amharic)	Hb	Pp	Uf	Ailment type	Ra	Cp	Preparation, Application and Dosage	
Acacia abyssinica	Fabaceae	Girar	T	R	Hu	Evil eye	Na	D/F	The root is crushed, squeezed with water and one cup is taken orally at night and then sleeping is Recommended.	
Acanthus polystachius	Acanthaceae	Koshishelie	S	L	Hu	Trachoma	O	F	The leaf is crushed, squeezed with water and one cup taken orally	
Acacia piliispina	Fabaceae	Cheba	T	Fr	Hu	Tonsillitis	O	F	Chewing of fresh fibers and sucking the juices	
Allium cepa	Alliaceae	Key shinkrt	H	Sd	Hu	Hypertension	O	F	The seed Allium cepa is crushed and immersed in little water then filtrated and drunk before food.	
Allium sativum	Alliaceae	Nech shinkurt	H	Bu	Hu	Malaria	O	D	The bulb of Allium sativum with Lepidium sativum is pound Powdered and mixed with little water or eaten by Injera	
						Typhoid	O	F/D		The bulb mixed with bulb of Allium cepa and Nigella sativa (Tikurazmud) are crushed, soaked in water for over nights and one glass is taken continuously in the morning
						Common cold	O	F		The bulb is crushed and smelling the aroma
Aloe percrassa	Aloaceae	Eret	H	L	Ca	Emaciation	O	F	The leaf is cut into pieces, mixed with salt and with leaf of caster is given orally.	
				Lat	Hu	Gastritis	O	F		Latexes collected, mixed with honey and one glass is taken in the morning
						Bon Fracture	Dm	F		Latexes collected and apply on fractured part
Artemisia abyssinica	Asteraceae	Chukun	H	L/S	Ca	Eye Disease	Ey	D/F	The leaf and stem are crushed and mix with water to diffuses the eye	
Asparagus africanus	Asparagaceae	Yesiet kest	Cl	R	Hu/Ca	Mehaninet	O	F	The root of Asparagus africanus mix with root of Sida schimperi and crushed together finally eat with honey one spoon	
Bersama abyssinica	Melanthaceae	Azamir	S	L	Hu	Ascariasi	O	F	The leaf is boiled in milk or potato tuber and one cup is taken orally	
Brassica carinata	Brassicaceae	Gomen	H	Sd	Ca	Wajima	O	D	Dry seed crushed and mix with water and drink it enough amounts	
Brucea antidysenterica	Simaroubaceae	Abalo	S	Fr	L	Hu	Eczema	Dm	D	Fruits are grounded, powdered, mixed with butter and creamed Wound then expos in to the sunlight for few minutes
										Wound
Buddleja polystachya	Loganiaceae	Anfar	S	L	Hu	Wound	Dm	D/F	The leaf of Buddleja polystachya is pounded, powdered and applied on wound	
Calpurnia aurea	Fabaceae	Digita	S	L	Hu	Heart disease	O	F	Boild the leaf and drink it one glass befor food	
Capsicum annum	Solanaceae	Berberere	H	Sd	Ca	Leech	N/O	D	Chille powder mix with Goat milk and it give through nasal and oral with bottl	
Capparis tomentosa	Fabaceae	Gemero	S	Sb	Ca	Epidemic	O/N	D	The bark is crushed and take one spoon powder, placed on the red hot charcoal and is used to fumigate smokes.	
Carissa spinarum	Apocynaceae	Agam	S	R	Hu	Evil eye	Na	D/F	The root is crushed with bulbs of garlic, squeezed in water and droplets are taken through the nose, and the remaining parts tied with clothes for smelling	
						Ca	Evil eye	O		D
Clematis simensis	Ranunculaceae	Yeazo Areg	Cl	L	Hu	Kintarot	D	F	Croton macrostachyus and Clematis simensis leaf crushed with butter, water and boild it applied on infected parts	
Clerodendrum myricoides	Lamiaceae	Misrich	S	Fr & L	Hu	Malaria	O	D	The leaf and fruits of Clerodendrum myricoides with bulb of garlic are mixed, crushed, powdered and soaked in honey for one day and one glass is taken continuously	
				Sb	Hu	Evil Eye	Na	D		The bark is crushed and placed on the red hot charcoal and is used to fumigate smokes
Clausena anisata	Rutaceae	Limich	S	L	Ch	Coccoids	O	F	Fresh part of leaf is crushed, dried and mix water to drink it or eating with enjera	
				R	Hu	Emergency	O	F		The root is crushed & squeezed in water and drunk with one glass.
Clutia lanceolata subsp. Lanceolata	Euphorbiaceae	Fiyefeg	S	R	Hu	Evil Eye	Na/D		The root is crushed and placed on the red hot charcoal and is used to fumigate smokes through nasal	
Citrus limon	Rutaceae	Lomi	S	Fr	Hu	Athletes foot	Dm	F	The fruit of Citrus limon is squeezed and creamed on affected for continuous days up to recovery	

<i>Cicer arietinum</i>	Fabaceae	Shimbira	H	Se	Hu	Malaria	O	D	The seed is crushed and boiled with water and drunk many water glasses
<i>Cordia africana</i>	Boraginaceae	Wanza	T	S	Hu	Diarrhea	O	D	The stem bark is crushed & squeezed in water and drunk one tea glass
<i>Coriandrum sativum</i>	Apiaceae	Dinbilal	H	S	Hu	Common cold	O	D	The seed is crushed and boiled with water and drunk with three cups
<i>Croton macrostachyus</i>	Euphorbiaceae	Bisana	T	Sb	Hu	Malaria	O	D	The stem bark is crushed, powdered, soaked in honey and one glass is taken orally. But it was reported that it has powerful effect for over dosage
						Cut	Dm	D	The shoot is crushed, powdered and mixed with butter and creamed injured parts until healing
<i>Cucumis ficifolius</i>	Cucurbitaceae	Yemdir Embouy	H	L	Ca	Kurba	O	F	The Leaf is crushed & squeezed in water and drunk it one cup
<i>Coffea arabica</i>	Rubiaceae	Buna	S	Sd	Hu	Diarrhea	O	D	Its seed of <i>Coffea arabica</i> is roasted, crushed, powdered, boiled and the filtrate one cup of tea, mixed with few drop of oil then drunk
						Fire burn	Dm	D	Its seed of <i>Coffea arabica</i> is roasted, crushed, powdered and applied on wounded up to recovery
<i>Cynodon dactylon</i>	Poaceae	Serdo	H	L	Hu	Jardia	O	F	The Leaf is crushed & squeezed in water and drunk with one glass
<i>Cynoglossum coeruleum</i>	Boraginaceae	Shemigegit	H	R	Ca	Wound	Dm	D	Its root is dried, crushed, powdered and applied on wounded up to recovery
<i>Datura stramonium</i>	Solanaceae	Astenager	H	S	Hu	Toothach	O	D	One or two seed is dried and crushed with teeth
<i>Echinops kebericho</i>	Asteraceae	Kebericho	H	R	Hu	Epidemic	O/N	D	Its root is dried, crushed and smoke through mouth and nose
<i>Dodonaea angustifolia</i>	Sapindaceae	Kitkita	T	L	Hu	Wound	Dm	D/F	The leaf is crushed, powdered, mixed with butter and creamed wound until recovery
						Dysentery	O	F	The leaf is crushed, soaked in water with sugar, decanted and one can is taken orally.
<i>Embelia schimperi</i>	Myrsinaceae	Enkoko	T	Fr	Hu	Tapeworm	O	D	Fruits are crushed, soaked in local Tella and drink it one glass before food
						Intestinal parasite	O	F	Fruits are crushed, soaked in local Tella and drink it one glass before food
						Li	Tapeworm	O	D
<i>Eucalyptus globules</i>	Myrtaceae	Nech bahir zaf	T	L	Hu	Common cold	O/N	F	Boiled leaf is inhaled to relieve common cold (until he or she forms sweat)
<i>Euclea divinorum</i>	Ebenaceae	Dedeho	T	L	Hu	Likift	O	F	Collect a number of leaves from seven parts of <i>Euclea divinorum</i> tree and crushed with teeth
<i>Lactuca inermis</i>	Asteraceae	Yegede wotet	S	R	Hu	Diarea	O	F	The root is crushed & squeezed in water and drunk to childrens one cup
<i>Erythrina brucei</i>	Fabaceae	Korch	T	L	Hu	Wound	O	F	Crushed, mix the leaf of <i>Phytolacca dodecandra</i> with <i>Erythrina brucei</i> and one tea glass drunk with water
<i>Feoniculum vulgare</i>	Apiaceae	Ensillal	H	L	Hu	Dry cough	O	F	The leaf is crushed, soaked in milk and one glass is drunk continuously
<i>Ficus carica</i>	Moraceae	Beles	S	L/Lat	Hu	Wound	Dm	D/F	The leaf is crushed, powdered and pasted on the wound then; fresh milky latex is also pasted until recovery
<i>Ficus sur</i>	Moraceae	Sholla	T	L	Cat	Donkey's wart	Dm	F	The leaf is boiled in the water with sugar and applied on infected parts until recovery
						Dermal infection	Dm	F	The leaf is boiled in the water with sugar and applied on infected parts until recovery
<i>Ficus vasta</i>	Moraceae	Warka	T	Sb	Cat	Diarrhea	O	D	The bark is crushed, powdered, mixed with salt and given to eat with food
<i>Grewia ferruginea</i>	Tiliaceae	Lenquata	S	L	Cat	Dysentery	O	F	The leaf is crushed, soaked in the water with egg yolk and salt and one can is given orally.
<i>Guizotia abyssinica</i>	Asteraceae	Nug	H	Sd	Hu	Cough	O	D	The seed is crushed and boiled with water and egg yolk and given orally or drink one water glass.
<i>Hordeum vulgare</i>	Poaceae	Gebes	H	Sd	Hu	Skin rash	Dm	D	Collect germinated seeds and pressed it to give milks, Then the seed milks applied on infected areas up to recover
<i>Jasminum grandiflorum</i>	Oleaceae	Tenbelel	S	L	Hu	Tapeworm	O	F	The leaf of <i>Croton macrostachyus</i> and <i>Jasminum grandiflorum</i> are crushed and cooked with oil and eat with half Enjera
						Cut	O	F	The leaf of <i>Jasminum grandiflorum</i> are crushed and applied on cutting areas until recovery
<i>Juniperus procera</i>	Cupressaceae	Tsed	T	L	Hu	Vomitting	O	F	The leaf is crushed and one tea glass drink with water
<i>Justicia schimperiana</i>	Acanthaceae	Simiza	S	L	Hu	Malaria	O	D	The leaf and shoot is crushed, boiled in the water with salt, butter and one glass is taken continuously

					Chi	Coccoides	O	F	The leaf is crushed and squeezed with water and given with injera.
					Hu	Intellegency	O	F	Collect three leaves from one node and crushed , mix with hony and one spoon drunk it three days contenusly
Kalanchoe petitiiana	Euphorbiaceae	Endawula	H	L	Hu	Wound	Dm	F	Crushed the leaf and mix with red teff and applied on emerjency part until recovery
						Body Swelling	Dm	F	The leaf of Kalanchoe petitiiana is first heated and put on affected part until recovery
Lagenaria siceraria	Cucurbitaceae	Qel	Cl	Fr	Hu	Body Swelling	Dm	D	The fruit of Lagenaria siceraria is first heated and then put on infected part of body.
Laggera tomentosa	Asteraceae	Gemi	H	L	Hu	Common cold	N	F	The leaf is crushed and smell it
Lepidium sativum	Brassicaceae	Feto	H	Sd	Hu	Stomach	O	D	Ground seeds mixed with water and drink it with glass up to enough
					Li	Berer	O	D	Fruits are directly mixed with fruits of barely and given to eat with enjera.
Linum usitatissimum	Linaceae	Telba	H	S	Hu	Gastritis	O	D	Seeds are cooked with water and drink it one glass fore one weeks each days
Lupinus albus	Fabaceae	Gibto	H	S	Hu	Hypertension	O	D	Lupinus albus Seeds are rosted with water up to seven days and eat befor food
Malva verticillata	Malvaceae	Yewusha nacha	H	R	Hu	Vomiting	O	F	The root is crushed, squeezed, mixed with "Zebib" and two cups are taken orally.
Maeso lanceolata	Myrsinaceae	Kilamba	S	L	Hu	Nimonia	O	D	Dried leaves are crushed and mix with butter ,water and drink one cup to three days
Maytenus senegalensis	Celasteraceae	Koba	T	Sb	Hu	Sexual retardation	O	D	The stem bark is cooked with hen meat and eating with enjera up to three days
Nicotiana tabacum	Solanaceae	Tinbaho	H	L	Cat	Leech Infestation	N	F	The leaf is squeezed in water and one glass juices are dropped on the nose
						Bloating	O	F	The leaf is squeezed with water and one glass of juice is given orally
Ocimum basilicum	Lamiaceae	Zqaqeb	H	L	Hu	Intestinal disease	O	F	The fresh leaf of Ocimum basilicum is chewing and swallowing during feeling pain
Ocimum lamiifolium	Lamiaceae	Damakessi	S	L	Hu	Common cold	O	F	The fresh leaf of Ocimum lamiifolium is squeezed and added in tea or coffee and one cup drunk.
						Fibril illness	O	F	The fresh leaf of Ocimum lamiifolium is squeezed and drunk with cup.
Olea europaea subsp. Cuspidate	Oleaceae	Weyra	T	L	Hu	Evil	Dm	D	The leaf of Olea europaea subsp. cuspidate is burn and smok it around the house
Osyris quadripartite	Santalaceae	Keret	S	L	Hu	Liver disease	O	F	The leaf of Osyris quadripartite Crushed, mix with yoghurt and drink it one glass
Otostegia integrifolia	Lamiaceae	Tnjut	S	L	Hu	Common cold	O	F	Chewing of the leaf and sucking juices
Pisum sativum	Fabacea	Ater	H	Sd	Hu	Buginge	Dm	D	The seed of Pisum sativum is crushed and then placed on the wound until it is recovery
Gnidia glauca	Thymelaeaceae	Awra	S	L	Hu	Tonsillitis	O	F/D	The leaf is boiled in water with sugar for few minutes and one glass is taken orally.
Fresen									
Phytolacca dodecandra	Phytolacaceae	Endode	S	L	Hu	Body Swelling	O	F	The Leaf Phytolacca dodecandra is crushed,squeezed and mixed with Little water and one cup drunk
					Cat	Bloating	O	F	The leaf is crushed, soaked in water for one day and one bottle juice is given.
Plantago lanceolata	Plantaginaceae	Gorteb	H	F	Hu	Cut	Dm	F	Squeezed fresh leaf and juices are Pasted on the cut surface of the body.
Premna shimperi	Lamiaceae	Chocho	H	L	Hu	Heart diseae	O	F	The leaf of Premna shimperi is crushed with water and one glass drunk
Pterolobim stellatum	Fabaceae	Kentafa	Cl	Sb	Hu	Asthma	N/O	D	The stem bark is dried and crushed then taking one spoon powder oral and nasal
Rhamnus prinoides	Rhamnaceae	Gesho	S	Fr	Hu	Tonssilitis	O	D	Two or three dried fruits are crushed and eat before food until recovery
Rhus vulgaris	Anacardiaceae	Eshikammo	S	L	Hu	Wounds	Dm	D	The leaf is crushed, powdered, mixed with butter and creamed Wounds until recovery
						Intestin Parasite	O	F	Fruits are crushed, and eat to enough amount
Ricinus communis	Euphorbiaceae	Kachima	H	L	Li	Blotting	O	F	The seed of Ricinus communis is pounded and mixed with water and then drunk the solution only

Rosa abyssinica	Rosaceae	Kega	S	Fr	Hu	Tapeworm	O	F	Hand ful of ripened fruits is eaten befor food at morning	
						Gastritis	O	F	Hand ful of ripened fruits is eaten befor food until recovery	
Rumex abyssinicus	Polygonaceae	Mekemeko	H	Rh	Hu	Lung Tuberculosis	O	D	The rhizome is crushed, mixed with fresh flowers of Calpurnia aurea, boiled in water and taken orally until recovery	
Rumex nepalensis	Polygonaceae	Yewushamlas	H	R	Hu	Kurba	O	F	crushed the root and one cup drink with water	
				L	Hu	Retained Placenta	V	F	The root is inserted in the vagina and waiting for few minute.	
Rumex nervosus	Polygonaceae	Embacho	S	L	Hu	Eye diseases	Eye	F	Squeezed the leaf and juices are Dropped one or two drobes on eyelash with cotton.	
Ruta chalepensis	Rutaceae	Tenadam	H	L	Hu	common cold	O/N	F	The branches are crushed, soaked in boiled coffee or tea and one cup is taken continuously days	
				Sd	Hu	Evil eye	Na	D/F	The seed of Ruta chalepensis with Allium sativum and finely crushed together and sniffed at the sickness time.	
Saccharum officinarum	Poaceae	Shenkorageda	H	St	Hu	Cough	O	F	The stem is crushed and mix with seed of Coriandrum sativum and cooked finally drink with butter one glass contineously	
Schinus molle	Anacardiaceae	Kundo	T	Sd	Hu	Tonsillitis	O	D	The seed of Schinus molle is pounded, powdered, mixed with honey and then drink with cup	
		Berbere								
Senna singueana	Fabaceae	Gufea	T	R	Hu	Evil eye	Na	F	Mix the root of Senna singueana and Ruta chalepensis leaf and crushed then burn and smoke it through nasal	
						Snake bite	O	F	the root of Senna singueana crushed and eat during bite	
Sida schimperiana	Malvaceae	Chifreg	H	R	Hu	Shotelay	O	F	The root is cut, crushed and three spoon drink with water	
						Evil eye	Na	D	Root is crushed then burn and smoke it through nasal	
Solanum anguivi	Solanaceae	Zerch Embouy	S	L	Hu	Birth control	O	F	Dried leaf and barks are crushed, powdered, homogenized in water and one cup is drunk once.	
Solanecio gigas	Asteraceae	Boz	S	L/Sb	Cat	Epidemic	O	D	The leaf and stem barks are crushed, powdered, mixed with salt and then with leaf of castor are given orally	
Stephania abyssinica	Menispermaceae	Yeayt areg	Cl	L	R	Hu	Body Swelling	Dm	F	Its root of Stephania abyssinica is crushed, squeezed and then creamed on affected part until recovery
				L	Hu	Syphilis	O	F	Its leaf of Stephania abyssinica is squeezed and one glass drunk.	
Syzygium guineense	Myrtaceae	Dokima	T	L	Hu	Leprosy	Dm	D	The leaf is roasted, powdered, mixed with honey and creamed skin continuously.	
Trigonella foenum-graecum	Fabaceae	Abishe	H	Sd	Hu	Body swelling	O	D	The seed of Trigonella foenum-graecum is crushed, powdered, mixed with honey and little water then boiled and eaten before food at morning	
				L	Hu	Heart disease	O	F	The leaf is cutting and cooked with oil and eat with enjera during sicknes	
						Gastritis	O	F	The fresh leaf of Urtica simensis is collected and roasted like "wot" and eaten by injera.	
Vernonia amygdalina	Asteraceae	Grawa	S	L	Hu	Ameba and Giardia	O	D/F	The leaf is crushed, soaked in honey and one cup is taken continuously.	
Vicia faba	Fabaceae	Bakela	H	Sd	Hu	"Bugging"	Dm	D	The seed of Vicia faba with seed of Lepidium sativum is crushed, mixing with salt and then placed on the wound until recovery	
Vernonia myriantha	Asteraceae	Gengerita	S	L	Hu	Wound	Dm	F	The leaf is crushed and mix with none water butter and applied on wound until recovery	
Zehneria scabra	Cucurbitaceae	Haregres	Cl	L	Hu	Fibril illness	Dm	F	The leaf of Zehneria scabra is crushed and creamed the body.	
Prunus persica	Rosaceae	Kok	T	L	Hu	Stomach-ache	O	F	The fresh leaf of juice is drink one tea contenusly glass	
Hagenia abyssinica	Rosaceae	Kosso	T	Fr	Hu	Tapeworm	O	D	Drink half cup of dried fruit powder with water	
Dombeya torrida	Sterculiaceae	Wulikifa	T	L	Hu	Fire burn	D	F	The fresh leaf is squeezed and creamed the affected part until recovery	
Dovyalis abyssinica	Flacourtiaceae	Koshime	S	Fr	Hu	Intestinalparasites	O	D	Its fruit is eaten as food for the case of intestinal parasite before breakfast every morning	
Nuxia congesta	Loganiaceae	Atquar	S	L	Hu	Tonsillitis	O	F	The leaf is squeezed and only a pure solution is drunk one spoon	

(Key to abbreviations: Hb- habits, S shrub, T- tree, H- herb, Cl – climber, Pp-plant parts used, R –root, L-leaf, Sb –stem bark, Fl –flower, Fr –fruit, Sd –seed, Rh–rhizome, Bu – bulb, Lat – latex, Uf- used for, Hu–Human, Ca–cattle, Chi–chickens, Li–livestock, Ra–route of administration, O –oral, Dm –dermal, Ne-Neck, Na –nasal, Ey– eye, V- vaginal, Cp – condition of preparation, F- fresh, D- dry).

**Table 2:** Proportion of plant parts used for preparation of medicines.

Parts used	Total Plant parts	Percentage (%)
Leaf only	42	44.21
Root only	12	12.63
Fruit only	9	9.47
Stem bark only	9	9.47
Seed only	12	12.63
Latex only	1	1.05
Flower	1	1.05
Rhizome	1	1.05
Latex and Leaf	2	2.10
Root and Leaf	2	2.10
Fruit and Leaf	2	2.10
Leaf and Stem bark	1	1.05
Seed and Leaf	1	2.10
Total	95	100

**Table 3:** Ways of preparations of only human medicinal plants.

Type of Preparation	Type of Preparation	Percentage (%)
Crushing	18	24
Squeezing	7	9.33
Crushing, powdering, mixing	12	16
Concoction	2	2.66
Boiling	11	14.66
Crushing and squeezing	8	10.66
Crushing, powdering, mixed, boiled	2	2.66
Decoctio	2	2.66
Chewing	2	2.66
Roasted, powdering, mixing	2	2.66
Fumigating	2	2.66
Latex collection	3	4
Cooking in 'Wote'	2	2.66
Heating	2	2.66
Total	75	100

**Table 4:** Route of administration.

Administration type	Route of administration	Application	Percentage (%)
Internal	Oral	51	53.68
	Nasal	2	2.10
	Nasal & Oral	11	11.57
	Vaginal	1	1.05
External	Dermal	20	21.01
	Neck	2	2.10
	Eye	2	2.10
	Ear	1	1.05
Internal & External	Oral and dermal	-	-
	Total	95	100

dermal 20 (21.05 %) and others presented in (Table 4). Dosages were estimated using cups (TASSA or TIWA), Glasses, bottle (BIRCHIKO) to measure and administered liquids, spoon (MANKIA) for powders, numbers or in some cases handful for seed and fruits, and ('ATIK') or small figure for roots.

**Solvents or additives:** The practitioners used frequently water and Honey largely as additives along with the plant extract. The rest is presented (Table 5).

**Table 5:** Solvents and additives used during medicinal preparation.

Solvents and additives	Number of informants who cited the species	Percentage (%)
Water	40	42.10
Honey	20	21.05
Butter	12	12.63
Salt	3	3.15
Sugar	7	7.31
Oil	3	3.15
Tella	4	4.21
Sour milk or yoghurt	4	4.21
Boiled coffee or tea	1	1.05
Citrus juice	1	1.05
Total	95	100

**Table 6:** Plant parts used for human ailment treatment.

Parts used	Total Plant parts	Percentage (%)
Leaf only	31	41.33
Root only	8	10.66
Fruit only	5	6.66
Stem bark only	4	5.33
Seed only	13	17.33
Latex only	2	2.66
Seed & Leaf	2	2.66
Flower	2	2.66
Rhizome	2	2.66
Budd	2	2.66
Latex & Leaf	1	1.56
Root & Leaf	1	1.56
Fruit and Leaf	1	1.56
Leaf & Stem bark	1	1.56
Total	75	100

### Diversity of medicinal plants used to treat human diseases only

Seventy five (75) different medicinal plants were reported as medicine to treat human diseases only. These plants belong to 69 genera and 37 families. Family, Fabaceae contained the highest (eleven) medicinal plant species followed by Asteraceae and Lamiaceae (five each) Euphorbiaceae (four) plant species. Others were presented in the table below (Table 1).

**Sources of medicinal plants:** From the medicinal plants used for human ailments, 55 species were collected from the wild vegetation and 20 species from homegardens. These indicated that the local people obtained higher medicinal plant species from wild vegetation than homegardens (Table 1).

**Habits:** The habit of the collected medicinal plants reported for human diseases were herbs 28 species (37.33%), shrubs 25 species (33.33%), trees 17 species (22.66%) and climbers 5 species (6.66%) (Table 1).

**Parts used:** The study participants reported different parts of the plants for medicine. The most frequently utilized plant part was leaves 31 (41.33%) followed by seeds 13(17.33%), roots 8(10.66%), fruits 5(6.66%), stem bark 4(5.33%) (Table 6).

### Method of preparation

Participants reported that remedy preparations vary based on the type of disease treated and the actual sites of ailments. The principal

methods of plant parts remedy preparation forms were reported to be through crushing, which accounts for 18 (24%), followed by crushing, powdering and mixing 12 (16%), boiling 11 (14.66%),Crushing and squeezing 8(10.66%) (Table 7).

**Routes of administration:** There are various routes of administration of traditional medicinal plants reported by the local community. The major routes of administration in the study area are oral, dermal and nasal. In the study area oral administration is the dominant route with 45 (60%) of the cases followed by dermal 15 (20%) and others presented in (Figure 2).

### Medicinal plants used to treat livestock health problems

From the collected medicinal plant species, 11 medicinal plant species are used for livestock health problems. These plants are grouped in 11 genera and 9 families. Family Asteraceae and Solanaceae comprise two species each, and the other seven families comprise one species each (Table 8).

**Habits:** The habits of medicinal plants that are used for ethnoveterinary health problems are herbs (7 species), shrub (3 species) and trees (1 species).

**Plant parts:** The plant parts used for livestock health treatment in the area are stem bark 2 (25%), root 2 (25%), latex 1(12.5%), seed 1(12.55%), leaf 1(12.5%), rhizome 1(12.5%). Therefore, stem bark and root are the most harvested plant part for remedy preparation to treat livestock ailments.

Table 7: Ways of preparations of only human medicinal plants.

Type of Preparation	Type of Preparation	Percentage (%)
Crushing	18	24
Squeezing	7	9.33
Crushing, powdering, mixing	12	16
Concoction	2	2.66
Boiling	11	14.66
Crushing and squeezing	8	10.66
Crushing, powdering, mixed, boiled	2	2.66
Decoctio	2	2.66
Chewing	2	2.66
Roasted, powdering, mixing	2	2.66
Fumigating	2	2.66
Latex collection	3	4
Cooking in 'Wote'	2	2.66
Heating	2	2.66
Total	75	100

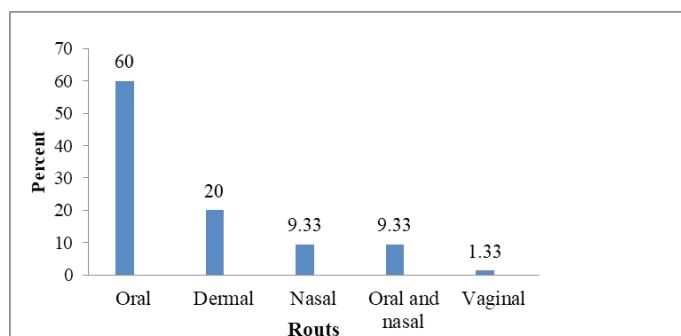


Figure 2: Route of administration of medicinal plant used to treat human disease.

Table 8: Number of taxa and families used in the treatment of only livestock ailments.

Family	Genera	Percentage (%)	Species	Percentage (%)
Asteraceae	2	18.18	2	18.18
Brassicaceae	1	9.09	1	9.09
Boraginaceae	1	9.09	1	9.09
Fabaceae	1	9.09	1	9.09
Cucurbitaceae	1	9.09	1	9.09
Euphorbiaceae	1	9.09	1	9.09
Moraceae	1	9.09	1	9.09
Solanaceae	2	18.18	2	18.18
Tiliaceae	1	9.09	1	9.09
Total	11	100	11	100

Table 9: Frequent livestock diseases and number of plant species used.

Disease treated	Total species	Percentage (%)
Bloating	1	9.09
Leech	2	18.18
Sudden sickness	2	18.18
Eye injury	1	9.09
Tape warm	1	9.09
Dysentery	1	9.09
Anthrax	1	9.09
Wound	1	9.09
Total	11	100
Total	75	100

### Method of medicinal plant preparations to treat livestock diseases:

The local people use different forms of remedy preparations and applications to treat livestock diseases. Crushed 3(27.27%), squeezed 1(9.09%), Crushed and squeezed 1(9.09%), crushing powdering and mixing 3(27.27%), powdering 2(18.18%).

**Rout of administration livestock ailments:** Rout of administration of ethnoveterinary medicinal plants involves oral 6(54.54%), nasal and oral 3(27.27%), dermal 1(9.09%) and eye 1(9.09%).

**Major livestock diseases and plant species:** A total of 9 livestock ailments were identified and 11 Plant species are used for the treatment of common diseases affecting livestock health in the study area. Leech and Sudden sickness which are treated by 2(18.18%) species, Bloating, eye disease, Diarea, Anthrax, Wajima, Wound and Dysentery are treated by 1(9.09%) species each (Table 9).

### Medicinal plant species used to treat both livestock and human ailments

A total of 9 medicinal plants were reported to treat both human and livestock in the study area. These medicinal plants are belonging to 9 families and 9 genera (Table 10). Eight of them were collected from the wild vegetation and 1 species was collected from home garden.

**Habits:** The habits of medicinal plants collected for both the treatment of human and livestock ailments are herbs 2 species, shrubs 4 species and trees 1 species and climbers 2species.

**Plant parts:** The plant parts used for both human and livestock treatment in the area were leaves 4(44.44%), root 2(22.22%), fruit 1(11.11%), seed 1(11.11%), Leaf and root 1(11.11%). Like that of human medicine leaves are the most harvested plant part of remedy preparation for both livestock and human ailments.

**Method of preparation:** The local community use different forms



of remedy preparations and applications to treat human and livestock diseases. The common forms of preparations are crushing 3 (33.33%), squeezing 2(22.22%), Crushing and soaked 1(11.11%), Crushing, powdering, mixing 1(11.11) and latex 1(11.11%).

**Routes of administration for both humans and livestock ailments:** Based on the nature of the ailment the remedies were applied through different routes. Oral route is the major route of administration 4(77.77%) species followed by dermal preparations 2(44.44%) species, nasal 2(22.22%), nasal and oral preparations 1(11.11%) species.

### Marketable medicinal plants of the study area

The results obtained from two local markets in (Keranio and Konter town) showed that most of the medicinal plants are not widely

**Table 10:** Number of taxa and plant families used to treatment of both livestock and humans disease

Family	Number of Genera	Percent (%)	Number of Species	Percent (%)
Acanthaceae	1	11.11	1	11.11
Apocynaceae	1	11.11	1	11.11
Asparagaceae	1	11.11	1	11.11
Brassicaceae	1	11.11	1	11.11
Moraceae	1	11.11	1	11.11
Myrsinaceae	1	11.11	1	11.11
Phytolaccaceae	1	11.11	1	11.11
Rutaceae	1	11.11	1	11.11
Aloaceae	1	11.11	1	11.11
Total	9	9	9	100

**Table 11:** Some of the cultivated and wild grown medicinal plants widely traded in the market for different uses other than medicinal values.

Scientific name of Medicinal Plants	Local name (Amharic)	Used for
Allium sativum L.	Nech shinkurt	Spice, Food
Lepidium sativum L.	Feto	Food
Capsicum annuum L.	Berbere	Food
Allium cepa L.	Key shinkurt	Spice, Food
Ruta chalepensis L.	Tenadame	Spice
Otostegia integrifolia Decn.	Tunjut	Aromatic
Linum usitatissimum L.	Telba	Food
Coffea arabica L.	Buna	Stimulant
Trigonella foenum-graecum	1	11.11
J. M. Suttie	Abshe	Food
Ocimum basilicum L.var.	Zqaqeb	Spice
Vicia faba L.	Bakella	Food
Pisum sativum L.	Ater	Food

traded for medicinal purposes, but mostly for other different uses. The local people prefer either collecting these medicinal plants from the available areas (vegetations) in the district to prepare the medicines or they prefer to go directly to the local healers to get treatments instead of buying the medicinal plants from the market. However, more of the medicinal plants are widely traded and used for many additional purposes other than their medicinal uses (Table 11).

### Ranking of most important medicinal plants

**Preference ranking:** When there are different species prescribed for the same health problem, people show preference of one over the other. Preference ranking of eight medicinal plants that were reported for treating wound was conducted after selecting twelve (12) key informants. The informants were asked to compare the given medicinal plants based on their efficacy and participants were asked to give the highest number (8) for the medicinal plant which they thought most of use in treating wound and the lowest number (1) for the least effective plant in treating wound. Ficus carica scored (75) ranked first indicating that it is the most effective in treating wound followed by Rhus vulgaris and the least effective was Buddleja polystachy (Table 12).

**Direct matrix ranking:** Average score for direct matrix ranking of five medicinal plants with use diversity (Use values given from 0 to 5:5=Excellent, 4=Very good, 3=Good, 2=Less, 1=Least and 0=No use). Direct matrix ranking was performed to assess the relative importance each of the plant. The result of the direct matrix ranking showed that Eucalyptus globules stood first in being the most multipurpose medicinal plant species followed by Cordia africana, Rosa abyssinica, Acacia abyssinica, and Croton macrostachyus respectively (Table 13).

**Paired comparison:** A paired comparison was made to determine the most preferred medicinal plants among the five species used to treat evil eye illness in the study area. The responses of Twelve (12) key informants showed that Ruta chalepensis the preferred medicinal plant followed by Sida schimperiana (Table 14).

### Informant consensus factor (ICF)

The diseases of the study area have been grouped into different categories based on the site of incidence of the disease, condition of the disease as well as treatment resemblance of the disease to the local people. Informant consensus factor was calculated on the identified disease categories. It is calculated as:  $ICF = \frac{nur - ns}{nur - 1}$ , Therefore, the highest ICF value was obtained from diseases related to sudden sickness (dingetegna himem) and Evil eye(0.73) and the least ICF was associated with Birth control, Sterility (Mehaninet), Retained placenta, Shotely and Sexual retardation (0.16) (Table 15).

Evil eye and Sudden sickness (Dingetegn himem) -This related disease had the highest ICF value (0.73) with 7 species reported by

**Table 12:** Preference ranking of medicinal plants used for treating wounded (R1-12) Key: R= Respondents.

Plant species	Respondents												Total	Rank
	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12		
Brucea antidysenterica J. F. Mill	7	6	2	2	7	2	6	8	1	2	2	2	47	4
Buddleja polystachya Fresen.	4	2	1	4	5	5	4	3	2	1	3	5	39	7
Cynoglossum coeruleum (Hochst. A.Rich.) DC	2	4	5	6	6	3	7	1	4	3	6	1	48	5
Dodonaea angustifolia L. f	3	5	4	5	4	6	2	2	5	5	8	3	52	4
Erythrina brucei Schweint.	1	1	6	7	3	4	5	2	3	4	1	5	42	6
Ficus carica L.	8	7	8	8	2	8	1	7	6	8	7	5	75	1
Kalanchoe Pettitiana A. Rich.	6	3	7	3	1	7	3	5	8	6	5	6	60	3
Rhus vulgaris Meikle	5	8	3	1	8	1	8	6	7	7	4	8	66	2

**Table 13:** Average score for direct matrix ranking of traditional medicinal plants (TMP) with use diversity (R1-12).

Plant species	Main uses					Total	Rank
	Medicine	Construction	Edible fruit	Charcoal	Firewood		
<i>Cordia africana</i> Lam.	12	15	13	10	10	60	2
<i>Croton macrostachyus</i> Del.	16	8	0	10	13	47	5
<i>Rosa abyssinica</i> Lindley	12	6	20	8	12	58	3
<i>Acacia abyssinica</i> Hochst.exBenth.	12	9	0	20	16	57	4
<i>Eucalyptus globules</i> Labill	17	18	0	19	20	74	1

**Table 14:** Paired comparisons of five medicinal plant species used to treat evil eye illness (R1-12).

Major Threats	Respondents												Total	Rank
	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12		
<i>Acacia abyssinica</i> Hochst.exBenth.	1	0	2	1	0	1	2	2	4	0	1	2	16	4
<i>Carissa spinarum</i> L.	3	3	1	0	1	0	0	3	0	4	0	0	15	5
<i>Clerodendrum myricoides</i> (Hochst.)Vatke	2	2	3	2	4	2	1	0	1	1	2	1	21	3
<i>Ruta chalepensis</i> L.	3	2	3	3	3	3	4	4	3	2	4	3	37	1
<i>Sidaschimperiana</i> Hochst. Ex.A. Rich.	1	3	1	4	2	4	3	1	2	3	3	4	31	2

**Table 15:** ICF for the given diseases category.

Category of Disease	Species	Use citation	ICF	
,Diarrhea, Dysentery, Tapeworm, Ascariasis Stomach disease, Gastritis, Ameba and Giardia, Losse of appetite, Bloating, Vomiting, Haemorrhoid, Toothachand intestinal parasites	Intestinal disease	16	23	0.31
Tonsillities, Cough, Common cold, Lung Tuberculosis, Asthma and pneumonia	Respiratory disease	11	19	0.44
Fireburn, Dandruf, Boils, Wound, Body swelling, Leprosy, Snakebite, Dermal infection, Athletefoot, Eczema, Unspecified disease, Skin rash and Anthrax	Skin infection diseases	14	20	0.3
Heart failure and Hypertension	Heart disease	4	6	0.4
Donkey's wart	Donkey disease	2	3	0.5
Birth control, RH incompatibility, Retained placenta and sterility	Gynecologic Condition	8	9	0.16
Leech, Emaciation, Blotting and Berer	Animal disease	6	14	0.56
Sudden sickness (dingetegn himem) and Evil eye	Accidental disease	7	24	0.73
Eye disease and Trachoma	Eye disease	3	5	0.5
Bon fracture, Tracima (cutting) and Arthritis	Muskuloskeletal disease	4	8	0.57
Liver disease	Liver diseases	2	3	0.5
Malaria, Fibril illness and Typhus fever	Febrile disease	9	11	0.2
Syphilis and Sexual impotency	Sexual organ disease	3	4	0.33
Mental retardation	Intellectual Disabilities	2	3	0.5
Coccoids	Hen disease	2	3	0.5

(Key: Ns-number of species, Nur- number of use report), ICF: Informant consensus factor

24 use citations. Plant species used in the treatment of such diseases included *Ruta chalepensis*, *Carissa spinarum*, *Ocimum lamiifolium*, *Ricinus communis*, and *Zehneria scabra* were listed.

### Fidelity level

Values of frequently reported disease in study area *Kalanchoe petitiiana* A.Rich for (Wound), *Schinus molle* L.for (Tonsillities) were that scored the highest Fidelity Level (FL) values (100%) and *Cordia africana* Lam.(Dirhea) were scored the least Fidelity Level values (66.66) (Table 16).

### Threats of medicinal plants in the study area

**Factors threatening medicinal plants:** The main threats of ethnomedicinal plant species were Drought followed by Agricultural expansion. The least threats to medicinal plants as perceived by informants were Grazing (Table 17).

### Discussions

The documentation of medicinal plants is gaining recognition in recent times in order to preserve and transfer the knowledge for the next generation and also make effective use of the resources. In this regard Ninety five medicinal plants their parts utilized for various treatments, mode of application and method of process were documented from Hulet Ejjuenessie District and its environment. Similar to other investigated areas in the country with the same objective [13-15], the study district is the home of different medicinal plants. The number of reported medicinal plants and their uses by the local people of Hulet Ejju Enese District indicates the depth of the local indigenous knowledge on medicinal plants and their diverse applications. Out of the collected medicinal plants, 75 species were reported as used to treat human diseases, whereas, 11 species were used to treat livestock ailments and 9 species were used to treat both human and livestock ailments.

The family Fabaceae was the most dominant family that contains

**Table 16:** Fidelity level values of medicinal plants commonly reported against a given ailment in the study area.

Medicinal Plant	Ailment	Np	N	FL Value (%)
Allium sativum L.	Evil eye	26	28	92.85
Cordia africana Lam.	Dirhea	2	3	66.66
Croton macrostachyus Del.	Malaria	3	4	75
Embelia schimperii Vatke.	Intestinal parasites	7	8	87.5
Eucalyptus globules Labill.	Common cold	21	23	91.30
Guizotia abyssinica (L.f.) cass.	Dry cough	5	6	83.33
Kalanchoe petitiiana A. Rich.	Wound	17	17	100
Ocimum lamiifolium Hochst.exBenth.	Fibril illness	27	29	93.10
Phytolacca dodecandra L.Herit	Body sweeling	4	5	80
Schinus molle L.	Tonsilities	4	4	100

**Key:** FL (%) =  $Np/N \times 100$  Where, Np is the number of informants that claim use of a plant species used for a particular purpose/disease and N is the number of informants that use the plants as a medicine to treat any given disease.

**Table 17:** Ranking of threats to TMP (R1-12 = Respondents 1-12).

Major Threats	Respondents												Total	Rank
	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12		
Firewood	3	2	4	4	2	3	1	5	3	5	1	3	36	3
Construction	2	4	2	3	1	2	5	1	2	1	3	2	28	4
Grazing	4	3	1	2	3	1	4	2	1	2	2	1	26	5
Drought	1	5	3	5	5	5	3	4	5	3	5	4	48	1
Agricultural expansion	5	1	5	1	4	4	2	3	4	2	4	5	40	2

**Key:** Respondents, TMP: Traditional medicinal plants

13 species under 11 genera followed by Asteraceae having 7 species with 6 genera. This is due to the high diversity of these two families in the Flora area of Ethiopia and also they are easily dispersed by wind and animals to colonize large areas. This agrees with the finding of Endalew Amenu, (2007) and Fisseha Mesfin et al, (2009). The local people obtain medicinal plant species from the wild vegetation than homegardens. The wild areas are the sources of most ethnomedicinal plants [16,17]. This result agrees with Ermias Lulekal, (2014) and Eskedar Abebe, (2011). The most represented life forms of medicinal plants in the study area are herbs followed by shrubs. Because herbs are mostly available during the wet and late rainy season and also easily grown when they get favorable environment compared to shrubs and tree species. In Ethiopia, many researchers also reported that herbs were commonly used medicinal plants [17-19].

The most frequently utilize plant part was leaves 29 (45.31%) followed by seeds 12 (18.75%). The leaves are the renewal and easily accessible part of the plants and their utilization do not put medicinal plants at risk of extinction over a period. Similar findings were also reported in earlier works in Ethiopia in which herbs are the dominant growth form for human health treatment [20-22].

From the data collected, the local people use crushing, which accounts for 18 (24%), followed by crushing, powdering and mixing 12 (16%) and boiling 11 (14.66%), method for plant part remedy preparation in descending order. In most cases, preparing plant remedies by crushing is advantageous over using decoction since heat may affect the active constituents of the remedies. This report agrees with the research conducted by Getaneh Gebeyehu [23].

In the study area oral administration is the dominant route with 51(53.68%) of the cases followed by dermal 20(21.05%). Oral administration of herbal remedies may be due to the high prevalence of gastrointestinal disorders. It is true that the rural people face hygiene problem due to lack of access to pure water. Similar results

were obtained by Ermias Lulekal (2014) and Eskedar Abebe (2011) that indicated oral administration dominates over others routes of administration. Dosages were estimated using different materials, but these measurements are not accurate enough to determine the precise amount. Similar results were obtained by Getu Alemayehu.

The highest Informant Consensus Factor (ICF) of the medicinal plants was associated with problems of sudden sickness (DINGETEGNA HIMEM) and Evil eye (0.73). This kind of complications is associated with the cultural attachment of the people to correlate every health problem to not well understandable by the scientific community. This showed that the study area is remote and people do not get access to modern health services even easily identifiable health problems were associated to evil related disorders.

Kalanchoe petitiiana and Schinus molle were scored the highest Fidelity Level (FL) values (100%) for Wound and Tonsilities management respectively and Cordia africana (Dirhea) were scored the least Fidelity Level values (66.66). High FL indicates that, all use reports refer to the same way of using it, whereas low FLs are obtained for plants that are used for many different purposes.

In conclusion, the study area encompasses different medicinal plants. However, due to miss management and lack of inclusive concern, Drought followed by Agricultural expansion is the highest treat factor identified by the study participants. Therefore, the healers and local communities need to give special attention for potential medicinal plants to cultivate in their home gardens.

#### Data Availability

The data used in this study is available from the corresponding author upon request.

#### Conflicts of Interest

The authors declare that they have no conflicts of interest.

## Funding: No funding

**Authors' contributions:** EW and HR collected, analyzed the data and written the manuscript, and was the major contributor of the study.

## Acknowledgment

Authors are grateful to the local communities of Hulet Ejjuenessie District, who have participated in sharing their traditional indigenous knowledge on medicinal plants.

## References

1. Balick MJ, Cox AP (1996) *Plants, People and Culture. The Science of Ethnobotany*. Sci Am Library New York USA 228.
2. Cardoso I, Ana P, Caldeira C, Cotton S T, Cristina F, et al. (2017) Ethnobotanical study of medicinal plants in urban home gardens in the city of abaetetuba, Paá state, Brazil. *Boletim Latinoamericano y Del Caribe de Plantas Medicinales y Aromaticas* 16: 206-262.
3. Cotton CM (1996) *Ethnobotany: Principles and Applications*. John Wiley and Sons 347.
4. Mann C (2011) 1493: *Uncovering the new World Columbus Created*. Knopf, New York.
5. Martin GJ (1995) *Ethnobotany: A Methods Manual*. Chapman and Hall, London, 285.
6. Hamilton AC, Shengji P, Kessy J, Khan AA, Lagos-Witte S, et al. (2003) *The Purposes and Teaching of Applied Ethnobotany*. WWF Godalming 76.
7. Zelalem G, Chandroyam S, Getinet M (2016) Studies on traditional medicinal plants in Ambagiorgis area of Wogera district Amhara Regional State, Ethiopia. *Int J Pure Apply* 4: 38-45.
8. Getachew A, Befikadu U, Amha W (2017) Systematic review on traditional medicinal plants used for the treatment of malaria in Ethiopia trends and perspectives. *Malar J* 16:307.
9. Cheikhoussef A, Shapi M, Matengu K, Mu A (2011) Ethnobotanical study of indigenous knowledge on medicinal plant use by traditional healers in Oshikoto Region, Namibia. *J Ethnobiol Ethnomed* 7: 1746-4269.
10. Alexiades MN (1996) *Collecting Ethnobotanical Data: An Introduction to Basic Concepts and Techniques. Selected Guideline for Ethnobotanical Research: A Field Manual*. The New York Botanical Garden, New York 10: 52-94.
11. Friedman J, Yaniv Z, Dafini A, Palewitch D (1986) A preliminary classification of the healing potential of medicinal plants, based on the rationale analysis of an ethnopharmacological field survey among bedouins in the Negev Desert, Israel. *J Ethnopharmacol* 16: 275-287.
12. Trotter R, Logan M (1986) Informant Consensus: A New Approach for Identifying Potentially Effective Medicinal Plants. *Plants and Indigenous Medicine and Diet* 91-112.
13. Fisseha M, Talemoss S, Abreham A (2014) An Ethnobotanical Study Of Medicinal Plants In Amaro Woreda, Ethiopia. *Ethnobotany Research & Applications* 12: 341-354.
14. Behailu A, Moa M, Tilahun TJ (2021) Ethnobotanical study of medicinal plants used to treat human diseases in Gura Damole District, Bale Zone, Southeast Ethiopia. *Asian Journal of Ethnobiology* 4: 42-52.
15. Moa M, Tesfaye N, Shiferaw B (2023) Ethnobotanical Study of Medicinal Plants Used against Human Diseases in Zuway Dugda District, Ethiopia. *Evidence-Based Complementary and Alternative Medicine*.
16. Debela H, A Zemedede, Ensermu K, (2006) Use of traditional medicinal plants by people of 'boosat' sub district, central eastern Ethiopia. *Ethiopian J Health Sci* 16: 141-155.
17. Ermias L (2014) *Plant Diversity and Ethnobotanical Study of Medicinal Plants in Ankober District, North Shewa Zone of Amhara Region, Ethiopia*. PhD Thesis in Addis Ababa University 1-184.
18. Eskedar A (2011) *Ethnobotanical study on medicinal plants used by local communities in Debarq Wereda, North Gondar Zone, Amhara Regional state*. MSc Thesis in Addis Ababa University 1-57.
19. Fisseha M, Sebsebe D, Tilahun T (2009) An ethnobotanical study of medicinal plants in Wonago Woreda, SNNPR, Ethiopia. *J Ethnobiol Ethnomed* 5: 1746-4269.
20. Getu A, Zemedede A, Ensermu K (2015) Ethnobotanical study of medicinal plants used by local communities of Minjar-Shenkora District, North Shewa Zone of Amhara Region, Ethiopia. *J Med Plants Stud* 3: 01-11.
21. Kothari CR (2004) *Research Methodology: Methods and Techniques*. New age International 401.
22. Mirutse G, Gobena A (2003) An ethnobotanical survey of plants of veterinary importance in two woredas of Southern Tigray, Northern Ethiopia. *SINET: Ethiopian J Sci* 26: 123-136.
23. Tesfaye H, Sebsebe D, Zemedede A (2009) An ethnobotanical study of medicinal plants used by local people in the lowlands of Konta special Wereda, Southern Nations, nationalities and peoples regional state, Ethiopia. *J Ethnobiol Ethnomed* 5: 26.