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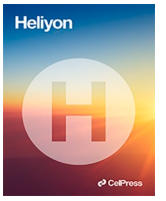

Research article

Traditional ethnobotanical knowledge and ethnomedicinal use of plants in the Tropical Rift Valley of Ethiopia

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ABSTRACT

Introduction: A wide range of floral resources are used in Ethiopia for primary healthcare. Unfortunately, due to inadequate documentation and the fact that they were verbally passed down from one generation to the next, these indigenous medicinal practices are being forgotten. The study's goal was to identify and record indigenous peoples' traditional knowledge of plant usage in the Abala Abaya District of Wolaita, Ethiopia.

Methods: The collection of ethnobotanical data used a cross-sectional research design involving focus group discussions and semistructured questionnaires between January 2021 and April 2022. From each selected kebele (ward; smallest administrative unit), 50 informants (a total of 200) were selected as representative sample using a systematic random sampling technique.

Results: More than 50 different human and animal illnesses have been documented to be treated by seventy-two species of plants grouped in thirty-two families. The most abundant families were Poaceae and Asteraceae (8 taxa in each). The two most often used plant parts were leaf (29%) and herbs (54%), respectively. Oral administration was the most typical mode of delivery (75%). For treating stomachache in the category of gastrointestinal illnesses, *Hagenia abyssinica* (Bruce) J.F. Gmel got the greatest fidelity level scores (FL = 100%).

Conclusions: In Abala Abaya District, there is broad access to traditional medicinal plants that can treat ailments in both humans and animals. This study, therefore, might be a baseline piece of information for further botanical related studies in the region. Plants with the highest FL values are highly recommended for novel drug discovery.

1. Introduction

Six percent of the world's population are indigenous peoples residing in 90 different countries [1]. They represent 5000 distinct cultures and make up 15% of the severely impoverished and underprivileged communities in terms of social services and economic resources [2]. Nationally and internationally, they all share ancestors who were connected to, occupied, or dispersed from the natural resources and places they currently call home [3,4]. Their reliance on land and other resources is the foundation of their identity,

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culture, means of existence, and general state of mental and physical wellness. There are ethnic groups that speak Afro-Asiatic languages that are part of the Omotic branch in Ethiopia. They are residents of the southern part of the country. They include two indigenous populations: the Wolaita and the Gamo people [3]. The ecosystem in the region is highly influenced by interactions between people and the environment [2] and the utilization of wild plants for medicament is still prevalent in rural villages, particularly those that have an oral tradition that has been transmitted from one generation to the next.

Ethiopia has a diverse range of ecological, edaphic, and climatic variables suitable for the growth of different plant species [3,5]. There are about 6500–7000 plant species exist in the country, some of which are medicinal, with 12–19% of these species being endemic to the country [6]. Due to their inexpensive price tags, cultural attachment to customs, and societies' overwhelming trust in curative properties, Ethiopians have an exceptional need for plants for medicinal purposes [7]. Despite the fact that people have a plethora of ancestral information with regards to using plants, little attention has been paid to their history of use, ecology, and state of conservation. Forest loss to supply commercial lumber, degradation of habitat, and forest invasion for agriculture, urbanization, investment, food production, and various other land-use changes have all contributed to the loss of hundreds of many thousands of hectares of woodland which were formerly home to medicinal plants.

From an ethnobotanical points of view, four districts [3,7,8] and some particular regions of the zone have been investigated. Another study investigated a small section of the region [9]; however, this kind of scientific investigation hasn't previously been carried out in the Abala Abaya district, and it is not generally known how traditionally available medicinal plants were used therein. The study was aimed; (1) to identify, document, gather, and catalog medicinal plants that have historically been utilized by locals in Southern Ethiopia's Abala Abaya District to heal illnesses so as to maintain an appreciation of and procedures for using medicinal herbs; (2) to associate and compare the medicinal plants use knowledge by respondents for a given disease category and how the informants' gender, age, and level of education affected their awareness of these plants' uses; and (3) to recommend plants that are highly preferred by respondents for further study to identify and isolate their active ingredients (alkaloids, glycosides, volatile oils, etc.), responsible for their pharmacological action to prepare different dosage forms after preclinical toxicity studies and clinical trials. The following research questions were addressed by this study; (1) what are the medicinal plants historically utilized by locals in Southern Ethiopia's Abala Abaya District to heal illnesses?, and (2) how can this knowledge be associated with the informants' gender, age, and level of education? The study hypothesized that the medicinal plants used by respondents for a given disease category vary significantly in terms of species and usage across different age groups, genders, and levels of education in the Abala Abaya District of the Southern Ethiopia's Tropical Rift Valley.

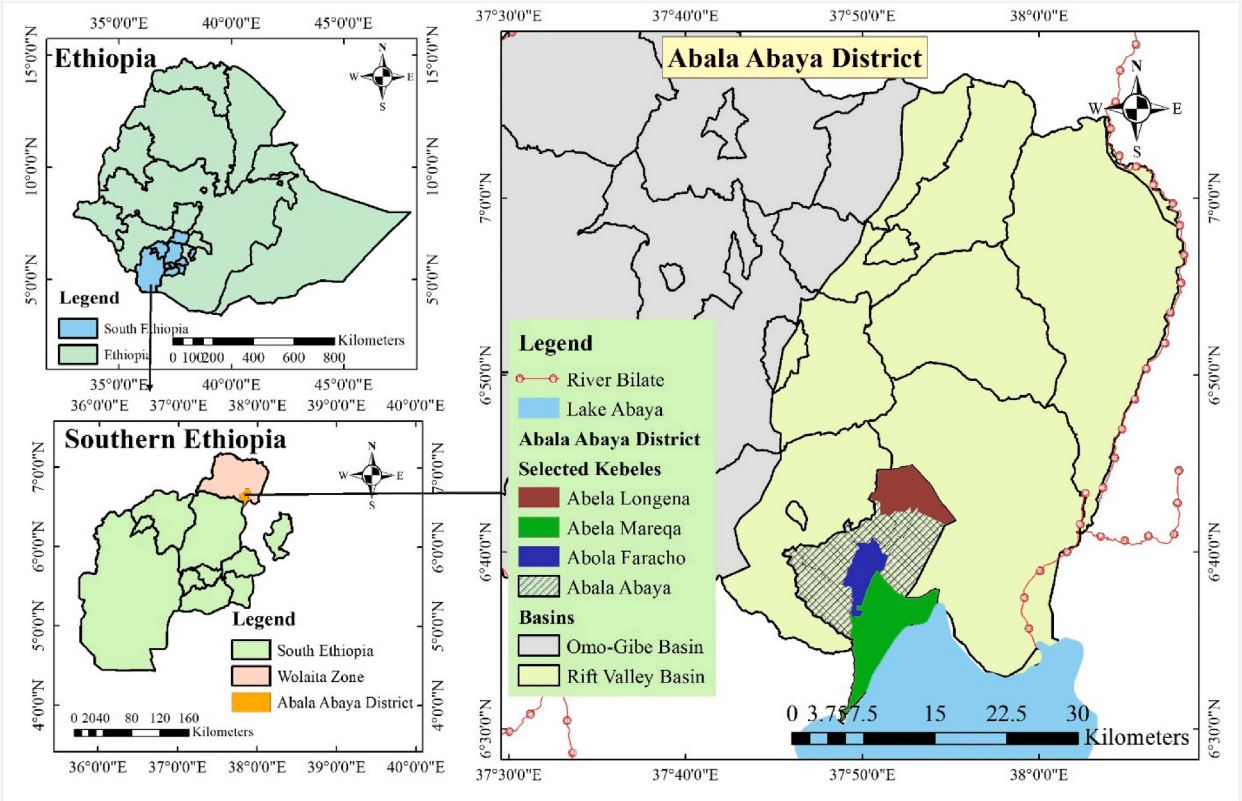

Fig. 1. Study area; Abala Abaya District, Wolaita Zone, South Ethiopia State.

Table 1
Plants used for medicine in the study area with their respective fidelity level (FL) and informant consensus factor (ICF) values.

Aliments category	Plants used	Np	P	FL (%)	ICF
Gastrointestinal ailments (GIA)					0.97
Stomachache	*Eucalyptus globulus* Labill.	78	189	41.3%	
	Solanium incanum L.	195	200	97.5%	
	Vernonia amygdalina Delile	85	155	54.8%	
	Lippia adoensis Hochst.	87	152	57.2%	
	Nigella sativa L.	133	152	87.5%	
	Solanium macrocarpon L.	100	195	51.1%	
	Artemisia afra Jacq. ex. Willd	99	130	76%	
	Brassica nigra (L.) K.Koch	96	130	73%	
	Citrus limon (L.) Osbeck	69	100	69%	
	Dovyalis abyssinica (A.Rich.) Warb.	88	130	67.6%	
	Ruta chalepensis L.	187	190	98.4%	
	Echinops kebericho Mesfin	190	200	95%	
	Ocimum basilicum L.	45	133	33.8%	
	Lepidium sativum L.	79	146	154%	
	Hagenia abyssinica (Bruce) J.F.Gmel	200	200	100%	
	Ocimum lamiifolium Hochst. ex Benth.	50	189	26.4%	
	Moringa stenopetala (Bakerf.) Cufod.	66	136	48.5%	
	Cordia africana Lam.	56	130	43%	
	Allium sativum L.	90	122	73%	
	Zingiber officinale Roscoe	83	160	51.8%	
	Cordia africana Lam., Citrus limon (L.) Osbeck	22	125	17.6%	
Amoebiasis	*Capsicum annum* L.	75	159	47.2%	
	Moringa stenopetala (Bakerf.) Cufod.	66	147	44.9%	
Gastritis	*Capsicum annum* L.	52	125	41.6%	
	Carica papaya L.	120	150	80%	
	Musa accuminata Colla	87	190	45.6%	
Motion sickness (vomiting)	*Citrus limon* (L.) Osbeck	144	169	85.2%	
Constipation	*Ensete ventricosum* (Welw.) Cheesman	188	200	94%	
Liver disease	*Linum usitatissimum* L.	56	150	37.3%	
Diarrhea	*Syzygium guineense* (Willd.) DC.	25	190	13.2%	
Bloating	*Euphorbia tirucalli* L.	36	150	24%	
	Vernonia amygdalina Delile	99	188	52.7%	
	Juniperus procera Hochst. ex Endl.	87	179	48.6%	
	Artemisia afra Jacq. ex. Willd	120	188	63.8%	
Respiratory systems diseases (RSD)				**0.89**	
Tonsillitis	*Rhamnus prinoides* L′ Her.	46	100	46%	
	Zingiber officinale Roscoe	146	162	90%	
	Acmella caulirhiza Delile.	100	160	62.5%	
	Linum usitatissimum L.	68	188	36.2%	
	Acacia abyssinica Benth.	32	145	22%	
	Ricinus communis L.	55	140	39.2%	
	Spilanthes mauritiana (A.Rich. ex Pers.) DC.	109	123	88.6%	
	Olea europaea subsp. cuspidata (Wall. ex G. Don) Cif.	55	152	36.2%	
Cough	*Allium sativum* L.	200	200	100%	
	Solanium macrocarpon L.	197	199	98.9%	
	Amaranthus caudatus L.	190	200	95%	
	Manihot esculenta Crantz.	120	155	77.4%	
	Artemisia afra Jacq. ex. Willd	100	120	83.3%	
	Zingiber officinale Roscoe	100	163	61.3%	
	Citrus sinensis (L.) Osbeck	78	140	55.7%	
	Eucalyptus globulus Labill.	65	152	42.3%	
	Nicotiana tabacum L.	63	156	40.3%	
	Guizotia abyssinica (L.f.) Cass.	58	135	42.9%	
	Moringa stenopetala (Bakerf.) Cufod.	55	123	44.7%	
	Ocimum basilicum L.	35	102	34.3%	
Asthma	*Allium sativum* L.	36	155	23.2%	
	Moringa stenopetala (Bakerf.) Cufod.	99	129	76.7%	
Respiratory tract infection	*Zingiber officinale* Roscoe	88	158	55.6%	
Skeletomuscular system disorders (SMSD)				**0.77**	
Bone fracture	*Avena sativa* L.	200	200	100%	
	Pentas arvensis Hiern	200	200	100%	
	Triticum dicoccum (Schrank) Schübl.	199	200	99.5%	
	Linum usitatissimum L.	140	198	70.7%	
Swelling	*Rhamnus prinoides* L′ Her.	120	198	60.6%	
	Lagenaria siceraria (molina) standl.	99	145	68.2%	
	Croton macrostachyus Hochst. ex Delile	58	196	29.5%	
	Vicia faba L.	45	178	25.3%	

(*continued on next page*)

Table 1 (*continued*)

Aliments category	Plants used	Np	P	FL (%)	ICF
Inflammation	*Hordeum vulgare* L.	55	169	32.5%	
	Amaranthus caudatus L.	32	158	20.2%	
Toothache	*Ocimum lamiifolium* Hochst. ex Benth.	63	147	42.9%	
	Citrus limon (L.) Osbeck,	64	168	38.1%	
	Acmella caulirhiza Delile.	80	166	48.2%	
	Nicotiana tabacum L.	33	152	21.7%	
	Dovyalis abyssinica (A.Rich.) Warb.	58	176	32.9%	
	Datura stramorium L.	99	136	72.8%	
Leech	*Olea europaea* subsp. cuspidata (Wall. ex G. Don) Cif.	79	150	52%	
Dermatological infections/diseases (DID)				**0.41**	
Wound	*Trigonella foenum-graecum* L.	49	150	32.6%	
	Vernonia amygdalina Delile	70	165	42.4%	
	Nicotiana tabacum L.	87	147	59.2%	
	Aloe vera (L.) Burm.f.	199	200	99.5%	
	Coffea arabica L.	187	200	93.5%	
	Croton macrostachyus Hochst. ex Delile	100	198	50.5%	
Skin disease	*Datura stramorium* L.	87	156	55.7%	
	Musa accuminata Colla	96	165	58.2%	
	Sorghum bicolor (L.) Moench	155	189	82%	
	Commelina benghalensis L.	200	200	100%	
Dandruff	*Persea americana* Mill.	136	188	72.3%	
Allergic reaction on skin	*Aloe debrana* Christian	100	189	52.9%	
	Euphorbia tirucalli L.	97	178	54.5%	
Poisonous bites (PB)				**0.68**	
Rabies	*Euphorbia abyssinica* J.F.Gmel.	36	152	23.6%	
	Lagenaria siceraria (molina) standl.	56	136	41.1%	
Snake bite	*Cynodon dactylon* (L.) Pers.	23	122	18.9%	
	Verbascum sinaiticum Benth.	15	174	8.62%	
Fever (F)				**0.52**	
Malaria	*Vernonia amygdalina* Delile	33	159	20.8%	
	Aloe vera (L.) Burm.f.	100	166	60.2%	
	Ocimum lamiifolium Hochst. ex Benth.	63	136	46.3%	
	Allium sativum L.	69	189	36.5%	
	Moringa stenopetala (Bakerf.) Cufod.	120	158	75.9%	
Febrile illness	*Eucalyptus globulus* Labill.	60	178	33.7%	
	Justicia schimperiana (Hochst. ex Nees) T. Anderson	55	189	29.1%	
	Ocimum basilicum L.	36	145	24.8%	
General and unspecified (GU)				**0.9**	
General malaise (Mitch)	*Ocimum lamiifolium* Hochst. ex Benth.	69	169	40.8%	
Evil spirit/eye	*Ruta chalepensis* L.	170	190	89.5%	
	Allium sativum L.	111	155	71.6%	
	Echinops kebericho Mesfin	100	146	68.5%	
	Vernonia amygdalina Delile	69	169	40.8%	
	Lagenaria siceraria (molina) standl.	58	158	36.7%	
	Leucas abyssinica (Benth.) Briq.	25	144	17.4%	
Sudden illness	*Linum usitatissimum* L.	22	155	14.2%	
	Eucalyptus globulus Labill.	36	147	24.5%	
	Leucas abyssinica (Benth.) Briq.	45	165	27.3%	
	Allium sativum L.	56	145	38.6%	
Loss of appetite	*Capsicum frutescens* L.	136	145	93.8%	
	Capsicum annum L.	120	147	81.6%	
	Allium sativum L.	96	169	56.8%	
Cardiovascular system diseases (CSD)				**0.94**	
Hypertension	*Moringa stenopetala* (Bakerf.) Cufod.	113	188	60.1%	
Pulmonary arteritis	*Ocimum lamiifolium* Hochst. ex Benth.	69	147	46.9%	
Bleeding	*Musa accuminata* Colla,	88	198	44.4%	
Disease of the sensory nerve (SND)				**0.96**	
Headache	*Coffea arabica* L.	136	198	68.7%	
	Capsicum frutescens L.	69	158	43.6%	
	Acacia abyssinica Benth.	78	144	54.2%	
Eye disease	*Leucas abyssinica* (Benth.) Briq.	16	156	8.86%	
	Ocimum basilicum L.	25	136	18.4%	
	Artemisia afra Jacq. ex. Willd	96	189	50.8%	
Nutritional, metabolic, and endocrine (EMN)				**0.96**	
Diabetes	*Thymus schimperi* Ronniger,	100	148	67.6%	
	Persea americana Mill.	78	147	53.1%	
	Amaranthus caudatus L.	96	169	56.8%	
	Aloe vera (L.) Burm.f.	14	174	8.04%	
Weight gain	*Hordeum vulgare* L.	190	200	95%	

(*continued on next page*)

Table 1 (*continued*)

Aliments category	Plants used	Np	P	FL (%)	ICF
	Triticum dicoccum (Schrank) Schübl.	200	200	100%	
	Linum usitatissimum L.	100	174	57.5%	
	Avena sativa L.	163	188	86.7%	
Disorders of the genitourinary system (GUA)				**0.97**	
Hemorrhoids	*Euphorbia tirucalli* L.	36	152	23.7%	
	Ricinus communis L.	15	136	11%	
Urinary problem	*Moringa stenopetala* (Bakerf.) Cufod.	22	122	18%	
Retained products of conception (RPOC)				**0.97**	
Retained placenta	*Artemisia afra* Jacq. ex. Willd	78	147	53.1%	
	Coffea arabica L.	63	150	42%	
	Ensete ventricosum (Welw.) Cheesman	25	165	15.2%	
Mastitis (inflammation of the udder) (M)				**1**	
Loss of milk quality	*Nicotiana tabacum* L.	33	150	22%	

2. Materials and methods

2.1. Description of the study area

The study was carried out in the Wolaita Zone between January 2021 and April 2022. Wolaita is one of the administrative zones in Ethiopia. The zone bears the name Wolaita in honor of the Wolaita people, whose homeland is there. Wolaita bordered on the west by the Omo River, which divides it from the Dawro, on the northwest by Kembata Zone; on the north by Hadiya; and on the east by the Bilate River, which divides it from the Sidama Region, Lake Abaya on the southeast, and the Oromia Region on the northeast. Wolaita Zone is a regional state in southern Ethiopia. The zone's and southern Ethiopia state administrative center is Wolaita Sodo. More than 5.3 million people live within the 4383.7 km^2 of this zone. The Zone has 22 districts and Abala Abaya is one of the districts (Fig. 1) which is in the Omo-Gibe Basin of Wolaita Zone.

2.2. Sample size and informant selection

On the basis of their relatively high plant diversity, their knowledge for creating traditional medicines, and the based on recommendations of senior district residents and local government authorities, four kebeles (wards; smallest administrative units) were specifically chosen. The Abala Longena, Abala Mareqa, and Abala Faracho were the kebeles selected. A systematic random selection technique was used to pick 50, 60, and 90 informants (a total of 200) as representative samples from each chosen kebeles respectively. A procedure from Yamane [10] was used to calculate the sample size, with a 90% confidence level (Table 1).

$$n = \frac{N}{1 + N(e)^2}$$

Where; n represents the sample size,
N denotes the population size
e is the level of precision.
With the assumption of a 7% level of precision, a total of 5000 population sizes were taken from this total population sample size as follows:

$$n = \frac{5000}{1 + 5000(0.07)^2}$$

n = 200.
The informants' occupations were farmers, housewives, shepherds, Hiillaa (traditional local doctors), and a knowledgeable member of the community and labourers (forestry worker).

2.3. Ethnobotanical data collection

When conducting this study, the best practices for conducting an ethnopharmacological investigation were adhered to Heinrich et al. [11]. Face-to-face interviews were done with district people in Wolaitic language (the dialect of the research participants and researchers) during numerous visits to the district between 2021 and 2022. The interviews were conducted in a range of settings, including coffee shops, gardens, houses, and fields. Information gathered were the plants local names, parts used, diseases treated, preparation methods, dosage, and prescription strategies.

2.4. Specimen collection and identification

Utilizing Gabor wavelet categorization methods and semantic-based automatic structuring of leaf specimens for enhanced plant

species identification, each species of plant was determined from the samples collected in addition to The World Flora Online [12] and before the culmination of botanical verification in a field lab utilizing taxonomic identifiers of the Ethiopian and Eritrean floras [13, 14]. The national herbarium was able to identify the plants the informants used by looking at specimens taken of them. Zekarias Demissie, a botanist, assisted the first author with the identification of the plants.

2.5. Data analysis

Microsoft Excel for Windows 2013 was used to refine, and analyze data obtained from interviews, focus groups, and semistructured surveys using a variety of quantitative indices like Fidelity Level (FL), Informant Consensus Factor (ICF), Relative Frequency of Citation (RFC), Citation Frequency (CF), Direct Matrix Ranking (DMR), and Preference Ranking. Since it has been generally established that a single index can only offer a finite amount of information, particularly for management and conservation objectives, therefore, it is necessary to use a wide range of indices to enable a comprehensive analysis of the data.

2.5.1. Citation frequency (CF)

Citation frequency was computed by totaling the number of local respondents who mentioned the plant species in their answers as being used for ethnomedicine (Hoffman and Gallaher, 2007). Plants with the highest percentage of respondents claiming to treat specific types of diseases received high CF values.

2.5.2. Fidelity/confidence level (FL)

Using the fidelity level (FL) method, it was determined which species the locals selected to treat a variety of ailments [15]. In the current investigation, the FL values ranged from 1.0% to 100%. High-favored plants have a higher FL value. The formula used to calculate FL values was

$$\mathrm{FL}\ (\%) = \mathrm{Ip}/\mathrm{Iu} * 100 \tag{1}$$

Where: Iu stands for all interviewees who cited utilizing a plant to treat any illness, and Ip represents the sum of respondents who indicated utilizing a plant to cure a particular condition. It is believed that medicinal plants used by a large percentage of respondents for a particular disease category are more likely to be effective scientifically [13].

2.5.3. Informant consensus factor (ICF)

Based on the reported medicine for a certain category of disorders, the informant consensus factor, or ICF, was determined. By highlighting species that are widely used in a community, ICF assists in the selection of plants for pharmacological and phytochemical study. The ICF scale goes from 0.00 to 1.00. The ICF value is high when a small number of plants are suggested to treat a certain condition by a substantial number of informants. The formula used to calculate ICF is

$$\mathrm{ICF} = \mathrm{Nur\text{-}nt}/\mathrm{nur\text{-}1} \tag{2}$$

Where: nur denotes each condition's number of citations and nt denotes the number of species actually utilized to treat this condition.

2.5.4. Direct matrix ranking

Based on the information received from informants, a direct matrix ranking was created using a key from Martin [16] to compare the various applications of a particular plant species. Multipurpose plants serve several functions for the local community. The plants that are classified according to their uses include those that are used as food, tools, building materials, fences, firewood, charcoal, and other similar items. From all of the identified medicinal plants, 15 plant species that were used in more than three use classifications were selected [16], and their varied applications were recorded. Six key informants who were chosen at random were asked to rate the use of each species as follows: 5 = best, 4 = very good, 3 = good, 2 = less used, 1 = least utilized, and 0 = not used. The average scores for each species were added, and the outcomes were ranked.

2.5.5. Preference ranking

The locals' acceptance or agreement in the use of a particular plant species for treating the most frequently occurring ailments in the community was determined based on the works of Martin [16]. Martin [16] used preference ranking to do this. Sixteen plant species were chosen for preference ranking out of all medicinal plants that were found to treat stomachache in people (because stomachache was common in society). Each species was given a use value of 5 (best), 4 (very good), 3, good, 2, least used), and 0 (not used) from six randomly chosen informants (I1–I6). The average scores for each species were added, and the outcomes were ranked.

3. Results

3.1. Demographic features of the informants

On average, men made up 70.3% of the 200 survey respondents, while women made up 29.7%. The highest proportion age category of the respondents (56.7%) were between 41 and 65. Just over a quarter (43.9%) of respondents were illiterate or could only

sign their names, and only 21 percent of participants finished elementary school.

3.2. Medicinal plants, their growth forms and habitats

In the Abala Abaya District, a number of medicinal plants have been utilized to treat human and livestock illnesses (Table 1; Annex 1 in Supplementary data sheet). Plants such as *Hagenia abyssinica* (Bruce) J.F.Gmel, *Zingiber officinale*, *Vernonia amygdalina* Delile, *Musa accuminata,* Colla, *Hordeum vulgare* L., *Euphorbia tirucalli* L., *Eucalyptus globulus* Labill., *Ensete ventricosum* (Welw.) Cheesman, *Linum usitatissimum* L., *Citrus limon* (L.) Osbeck were used to treat various diseases such as stomach pain, toothache, tonsillitis, retained placenta, pulmonary arteritis, malaria, gastric pain, constipation, and common cold.

According to the informants from the study area, medicinal plants were collected from a variety of habitats. Among all medicinal plants, home gardens provided 53%, 35% were wild, and the rest (12%) were both wild (forests, farmland, grazing land, by the side of a road, near a stream or river, grassland, and fallow land) and home gardens (Fig. 2).

3.2.1. Family of plants used by indigenous people for preparing medicines

There were about 32 families represented by 72 plant species. The Asteraceae and Poaceae families had eight plant species, with the Rubiaceae (7) following, Solanaceae (6), and Euphorbiaceae (5) (Fig. 3).

Herbs make up the biggest class of pharmacological plants (38, 54%), followed by shrubs (18 species, or 25%), and trees (15 species, or 21%) (Fig. 4).

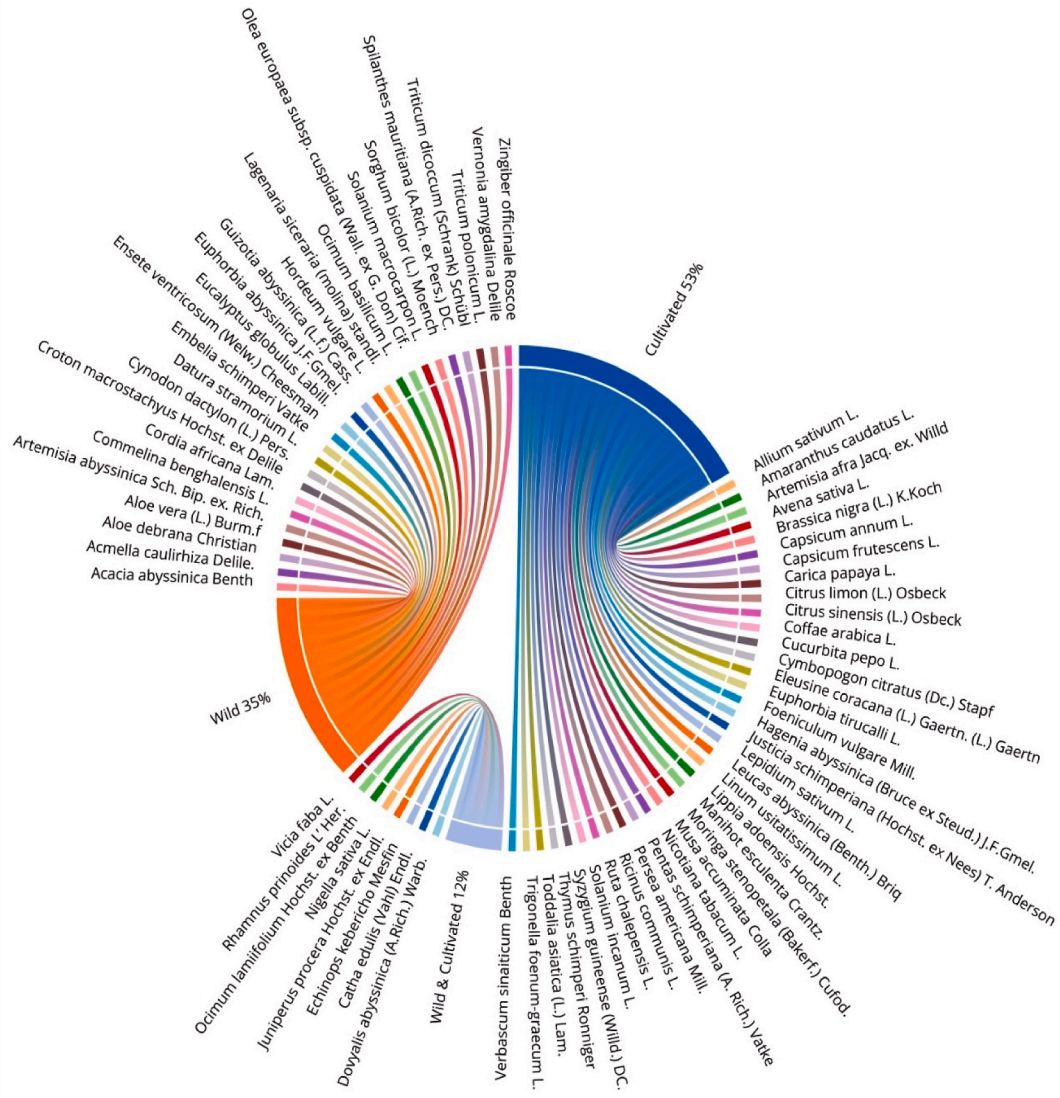

Fig. 2. Habitats where plants collected.

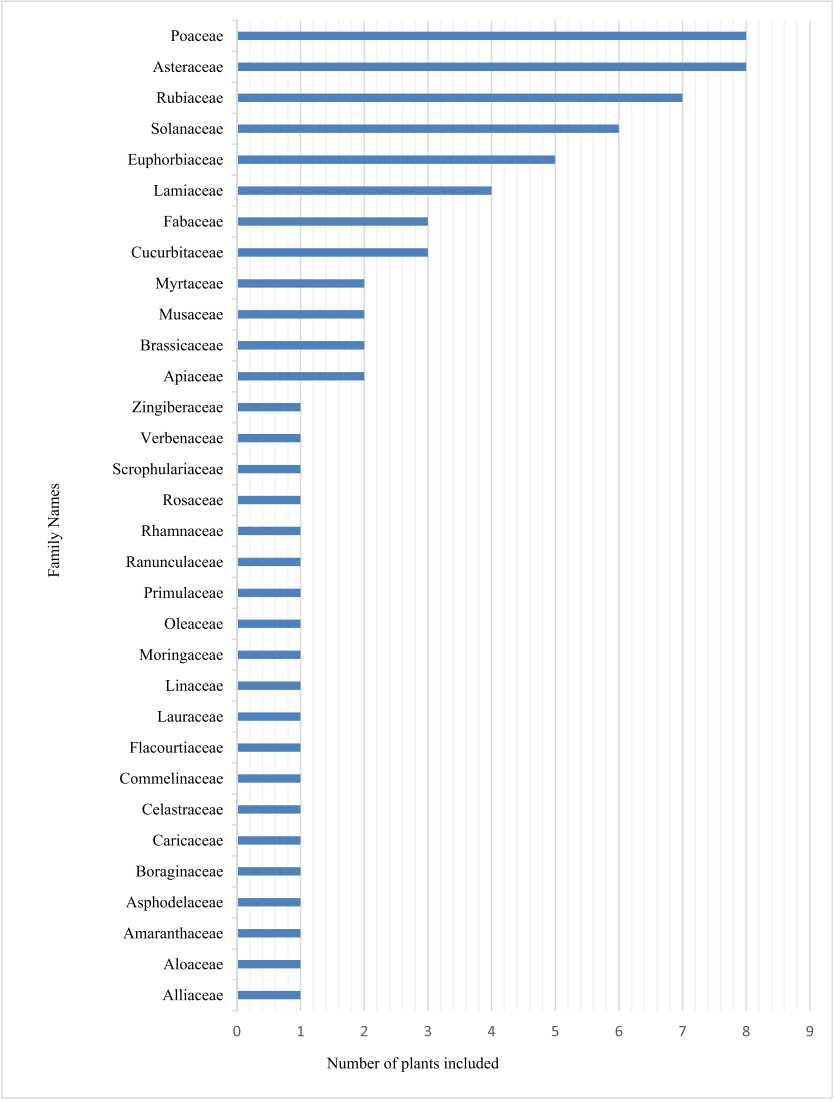

Fig. 3. Plant families used by traditional people to prepare remedy species.

3.3. Used plant parts, remedy preparation and administration method

Leave (26%) was the most frequently used plant part, followed by seeds (21%), fruits (14%), roots (7%), stems (5%), latex/stalk (4%), and bark (3%) (Fig. 5).

The nasal, dermal, oral, and optical ways were listed as the study area's most popular methods of remedy administration routes. Oral administration was mentioned the most (107), followed by dermal (31), and optical (2).The formulated medicines can interact physiologically with infections quickly via the oral and nasal routes (1) and this increases their curative effectiveness (Fig. 6).

The therapeutic plants prepared in their fresh form received the highest use report (66.89%), than the dry form (23.64%). In terms of diluent, water made up 60% of the preparations and was the most commonly utilized diluent in the production of treatments, followed by saliva (10%). Thirty-nine percent of the medicinal plant preparations didn't need diluents (Fig. 7).

3.4. Medical conditions of humans and livestock

3.4.1. Frequency of citation (RFC)

One of the research area's most commonly cited (CF) plants with medicinal properties for alleviating human and animal illnesses were *Zingiber officinale* Roscoe, *Ruta chalepensis* L., *Eucalyptus globulus* Labill., *Ensete ventricosum* (Welw.) Cheesman, *Coffea arabica* L., *Carica papaya* L., *Capsicum frutescens* L., *Capsicum annum* L., *Artemisia afra* Jacq. ex. Willd, and *Allium sativum* L. (Table 2).

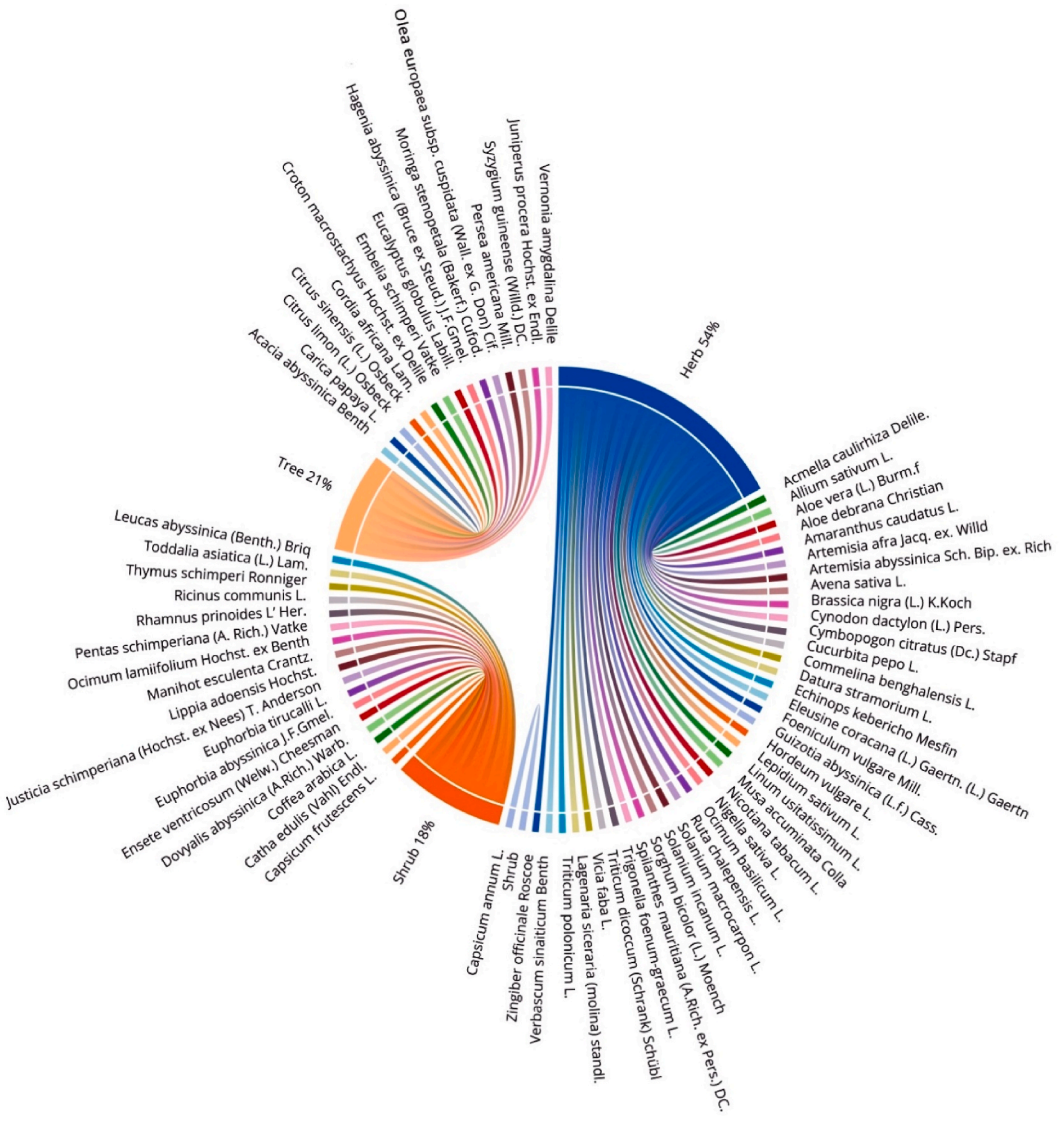

Fig. 4. Medicinal plant growth habitat.

3.4.2. *Consensus factor of informants (ICF)*

Thirteen categories of 41 illnesses hurting humans and animals were identified in the course of the investigation (Table 1). Mastitis treatment (inflammation of udder) disease category possessing the greatest informant consensus factor (ICF = 1), followed by genito-urinary disease categories and retained fetal products (ICF = 0.97 each).

3.5. *Target patients/used by*

In order to address both human and animal health issues, medicinal plants were used. Humans were the highest group (87%), receiving medical treatment followed by livestock (3%) (Fig. 8).

3.6. *Methods of preserving traditional medicinal plants*

The greatest and most effective technique of keeping medicinal plants preserved was hanging them from roofs (25%), followed by fastening them on building walls (16%), storing them inside clay pots (13%), putting them in aluminum bags (10%), plastic bags (5), cloth sheets (5%), and papers (1%) (Fig. 9).

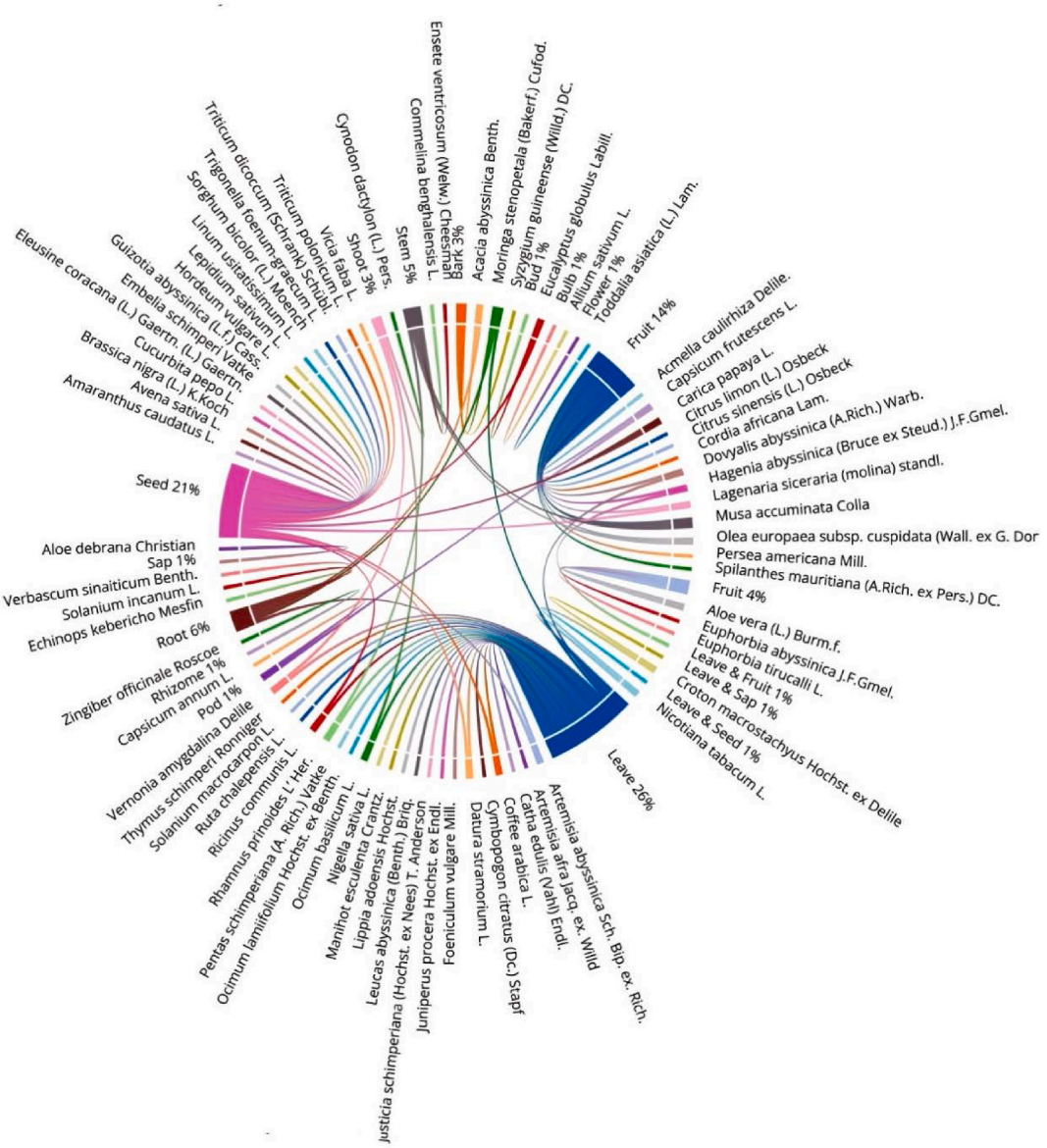

Fig. 5. Parts of the plant utilized in traditional medicine.

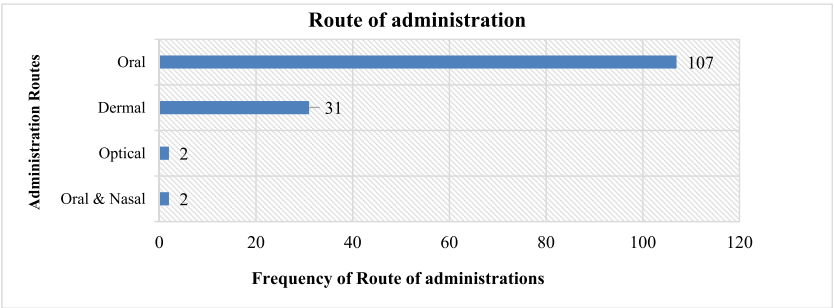

Fig. 6. Route of administration.

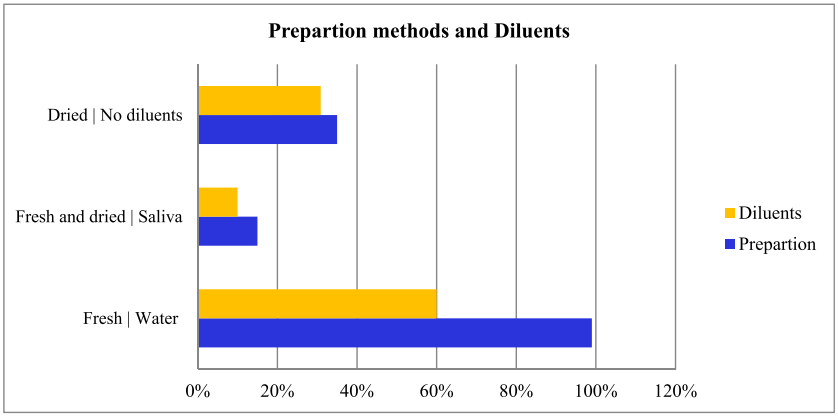

Fig. 7. Preparations of medicinal plants and diluents used.

Table 2
Frequency of citation (CF) for herbal remedies cited for more than two distinct diseases.

Family names	Scientific names	No. of informants	Percent (%)	Rank
Zingiberaceae	*Zingiber officinale* Roscoe	140	70%	4th
Solanaceae	*Capsicum annum* L.	114	57%	8th
	Capsicum frutescens L.	100	50%	9th
Rutaceae	*Ruta chalepensis* L.	174	87%	2nd
Rubiaceae	*Coffea arabica* L.	98	49%	10th
Poaceae	*Hordeum vulgare* L.	88	44%	12th
Myrtaceae	*Eucalyptus globulus* Labill.	133	66.5%	5th
Musaceae	*Ensete ventricosum* (Welw.) Cheesman	141	70.5%	3rd
	Musa accuminata Colla,	79	39.5%	14th
Lamiaceae	*Ocimum lamiifolium* Hochst. ex Benth.	82	41%	13th
Euphorbiaceae	*Euphorbia tirucalli* L.	97	48.5%	11th
Caricaceae	*Carica papaya* L.	126	63%	6th
Asteraceae	*Artemisia afra* Jacq. ex. Willd	123	61.5%	7th
Alliaceae	*Allium sativum* L.	186	93%	1st

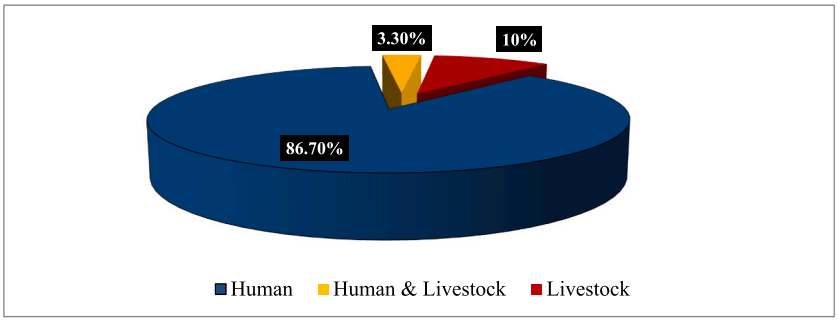

Fig. 8. Target patients/used by.

3.7. Community acceptance of medicinal plants

In accordance with the usage criterion, (5 = best, 4 = very good, 3 = good, 2 = less utilized, 1 = least used, and 0 = no value).

The direct matrix ranking showed that, based on the assumption that the plant species are well-known and frequently utilized by the local community for the treatment of a minimum of three distinct medical conditions, *Persea americana* Mill. and *Croton macrostachyus* Hochst. ex, Delile were ranked first and second, respectively, among multifunctional plant species in the research region (Table 3). According to reports, *Persea americana* Mill. was well-known in the substantial population and even used by families as a cash crop, fuel, building material, charcoal manufacture, food, and fodder in addition to its medicinal worth.

Out of all the medicinal plants that were discovered to treat stomachaches in communities (since stomachaches were common in civilization), sixteen plant species were picked for preference ranking. Each species was given a use value of 5 (best), 4 (very good), 3, good, 2, least used), and 0 (not used) from six randomly chosen informants (I1–I6). The average scores for each species were added,

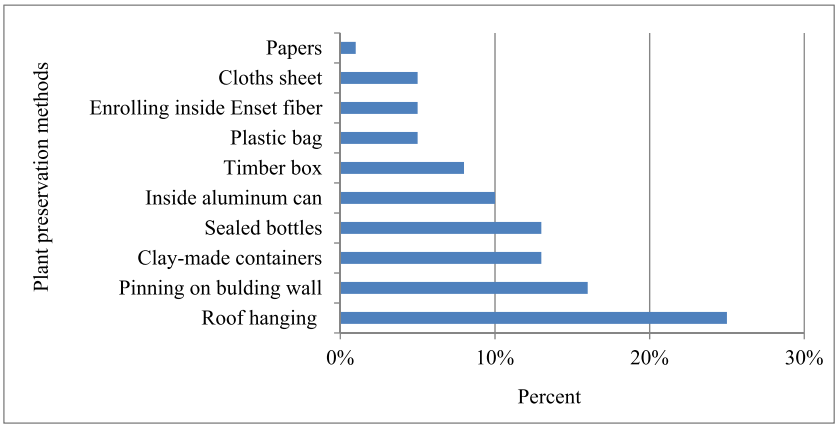

Fig. 9. Traditional medicinal plant preservation methods.

Table 3
Using a direct matrix rating system, informants (A-C) ranked medicinal plants according to utilization categories.

Medicinal plants name	Cash crop			Nutriment			Forage			Fuelwood			Building			Charcoal				
	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	Total	Rank
Acacia abyssinica Benth	5	5	5	0	0	0	0	0	1	5	5	5	5	5	5	5	5	5	61	4th
Carica papaya L.	5	5	5	5	5	5	1	1	2	0	0	0	0	0	0	0	0	0	34	11th
Citrus sinensis (L.) Osbeck	5	5	5	0	0	0	0	0	0	5	5	5	4	3	3	3	0	0	43	9th
Coffea arabica L.	5	5	5	0	0	0	0	0	0	5	5	5	3	3	3	3	0	0	42	10th
Cordia africana Lam.	5	5	5	0	0	0	0	0	0	5	5	5	5	5	5	5	5	5	60	5th
Croton macrostachyus Hochst. ex Delile	5	5	5	0	0	1	1	3	1	5	4	5	5	5	5	5	5	5	65	3rd
Dovyalis abyssinica (A.Rich.) Warb.	3	1	2	1	0	0	0	0	0	5	5	5	3	2	3	5	5	5	45	7th
Ensete ventricosum (Welw.) Cheesman	3	2	4	5	5	5	5	5	5	1	1	1	2	3	1	4	5	2	59	6th
Eucalyptus globulus Labill.	5	5	5	0	0	0	0	0	0	5	5	5	5	5	5	5	4	4	58	5th
Juniperus procera Hochst. ex Endl.	5	5	5	0	0	0	0	0	0	3	1	5	5	5	5	5	5	5	54	6th
Olea europaea subsp. cuspidata (Wall. ex G. Don) Cif.	4	2	4	0	0	0	0	0	0	3	3	4	1	1	2	1	1	1	27	12th
Persea americana Mill.	5	5	5	5	5	5	5	5	5	5	5	5	5	4	3	5	5	5	87	1st
Syzygium guineense (Willd.) DC.	5	5	5	5	5	5	5	4	1	5	5	5	5	5	5	5	5	5	85	2nd
Vernonia amygdalina Delile	0	0	0	0	0	0	0	0	0	5	5	5	5	5	5	5	5	5	45	7th
Total	175			62			50			171			154			153				
Rank	1st			5th			6th			2nd			3rd			4th				

Table 4
Ranking of preferred medicinal plants for treating human stomachaches.

Medicinal plants	Informants [1–6]							
	I [1]	I [2]	I [3]	I [4]	I [5]	I [6]	Total	Rank
Allium sativum L.	3	2	1	5	4	3	18	12th
Artemisia afra Jacq. ex. Willd,	5	3	4	3	3	2	20	10th
Brassica nigra (L.) K.Koch	5	3	2	1	3	3	17	13th
Capsicum annum L.	3	4	3	3	5	3	21	9th
Citrus limon (L.) Osbeck	5	5	5	3	4	2	24	5th
Cordia africana Lam.	5	5	5	4	3	3	25	4th
Cymbopogon citratus (Dc.) Stapf	1	3	2	1	5	4	16	14th
Echinops kebericho Mesfin	5	3	2	5	5	2	22	7th
Eucalyptus globulus Labill.	1	2	2	3	5	2	15	15th
Hagenia abyssinica (Bruce ex Steud.) J.F.Gmel.	5	5	5	5	5	5	30	1st
Lippia adoensis Hochst.	1	1	3	4	2	3	14	16th
Moringa stenopetala (Bakerf.) Cufod.	3	4	3	3	5	4	22	7th
Nigella sativa L.	1	3	2	5	5	3	19	11th
Ruta chalepensis L	5	5	4	3	5	4	26	3rd
Solanium incanum L.	5	5	5	5	5	5	30	1st
Zingiber officinale Roscoe	4	4	4	4	3	4	23	6th

and the outcomes were ranked. The study area's local healers ranked Solanum incanum L. as a first among plants that can be used as stomach ache treatment for people in the community, followed by Hagenia abyssinica (Bruce) J.F.Gmel, Ruta chalepensis L., Cordia africana Lam., and Citrus limon (L.) Osbeckby (*Table 4*).

3.8. Fidelity level index (FL)

A fidelity level (FL) was determined for each plant described as having medicinal value in order to assess its potential for healing. For treating stomachaches in the category of gastrointestinal disorders, *Hagenia abyssinica* (Bruce) J.F.Gmel had the highest level value (FL = 100%). The treatment of cough with *Allium sativum* L. received the highest fidelity level value (FL = 100%) in the category of respiratory system illnesses. In the domain of diseases affecting the skeletal and muscular systems, *Avena sativa* L. and *Pentas arvensis* Hiern have the highest fidelity values (FL = 100%, each) for treating bone fractures. Additionally, *Commelina benghalensis* L. was demonstrated to have the highest fidelity value (FL = 100%) for treating skin condition in the dermatological disease category (Table 1).

4. Potential risks to medicinal plants

The communities in the study area using therapeutic plants but both anthropogenic and non-anthropogenic activities could endanger such plants. These actions have the potential to have a considerable negative influence on the relative abundance and distribution of the native flora, including many species that are threatened globally. Deforestation (20%), furniture making (13%), agricultural expansion (12%), household construction (12%), firewood (11%), desertification (11%), environmental degradation (7%), youth generation's resistance (7%), oral-based knowledge transfer (5%), and secrecy (2%) were the study area's identified threats to medicinal plants. The majority of threats in recent days have been caused by severe increases in deforestation and desertification (Fig. 10).

5. Discussion

In the current study, male participants made up approximately 70.3% of the total contribution, while female respondents made up 29.7%. There was statistically significant gender-related variation in medicinal plant use with males having higher levels of use reported ($p < 0.05$). The same condition was reported in other findings [3,15,16] As an inheritance, only older male sons or other close relatives receive the knowledge of ethnomedicine and magico-religious practices from their fathers, therefore, more men available in the area were chosen for interviews. In addition to gender, age and education are just a few examples of socio-demographic information on respondents that are very helpful in an ethnobotanical study because they are crucial to understanding and assessing the feedback that was given [17–19].

Despite significant improvements in allopathic medicine and modern healthcare facilities, according to a reports [2,20], 80% of people worldwide still primarily treat medical conditions with herbal remedies. The mainstay of primary healthcare in Ethiopia continues to be complementary and alternative medicine, which is still practiced by about 80% of the population [2,21–23]. Due to poverty, the scarcity of hospitals, and the fact that it is a part of their culture, people frequently use traditional medicines [24]. The other reason may be the consumer perceptions of effectiveness and safety, as well as convenience of access [2].

Many therapeutic plants may be found in Ethiopia's south and southwest parts [24,25]. However, indigenous knowledge of using these plants in traditional herbal medicine was not exhaustively documented [2]. Particularly, there has been no previous study that has documented traditionally used medicinal plants from the Abala Abaya District of the Wolaita Zone. As a result, the goal of this study was to fill the knowledge gap in the reporting of ethnomedicine used in this specific region.

The women who participated in the survey were housewives who started making remedies after closely observing how their husbands made remedies. In other cases, the local villagers are knowledgeable about the use of specific remedy preparations throughout the community. Female respondents, on the other hand, were discovered to be more knowledgeable about the use of ethnomedicines than men in the US [26], Pakistani [27] and Spain [28] given that they are taking care of their families and children. Moreover, women visit pharmacies, nurses, and doctors more frequently and are more satisfied with alternative therapies [29].

Elderly community members have a concentration of ethnomedical knowledge, however, in the present study there was no statistically significant difference ($P = 0.729$) observed in the ethnomedicinal knowledge of people in different age groups. In their research on medicinal plant knowledge in various parts of the world, a number of other authors discovered the same pattern [30–32]. Age-related increases in knowledge may be caused by a number of variables, so each one should be carefully taken into account. Given that they have more time to learn new things, it makes natural that elderly individuals would possess greater knowledge about therapeutic plants than younger individuals [33]. According to studies carried out in various regions, industrialization (being able to access to advanced medical and educational systems) and changes in the environment have affected the transfer of traditional medicinal plant knowledge to the next generations. According to Figueireido et al. (1997) [34] modern medicine is more appealing to younger Brazilians who live in a community in the Atlantic rain forest than traditional medical care. In rural areas, such expertise frequently dissipates between generations as newer generations prefer modern healthcare facilities to their elders' traditional medicinal knowledge [30,32].

Most of the informants (43.9%) were illiterate, and only the fewest had completed primary school (21.3%). The considerable degree of illiteracy was mostly caused by poor socioeconomic conditions, restricted access to education, and the fact that the majority preferred traditional farming practices to maintain their livelihoods. Almost all respondents were farmers, with 190 (95%) having

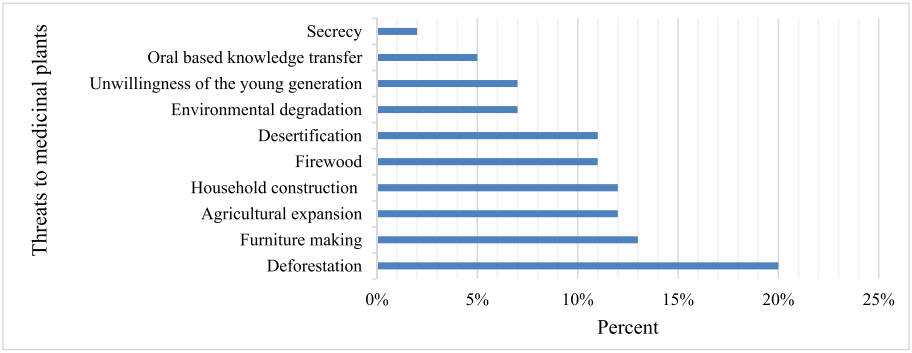

Fig. 10. Threats to medicinal plants in the study area.

adequate knowledge of ethnomedicine; however, none of them were officially registered or organised in the present-day system for the provision of health services.

The indigenous populations used 72 medicinal plants to treat over fifty various human and livestock illnesses. Weight gain, urinary trouble, rabies, malaria, inflammation, hypertension, hemorrhoids, gastritis, febrile illness, diarrhea, diabetes, bloating, asthmatic, and amoebic dysentery are among the illnesses treated. In different parts of the country, the same things were reported [2,33,35,36]. Locals more regularly cure human illnesses using medicinal plants rather than do animal illnesses. This may be due to the fact that locals prefer human health issues to those affecting cattle. The most cited (CF) herbal remedies found in the study area were *Artemisia afra* Jacq. ex. Wild, garlic, rue, Ensete, ginger, red gum, papaya, pepper, and coffee in order of importance. In another similar study, the highest CF was recorded for *Rauvolfia serpentine* [37]. Plant species with the highest ethnomedicinal citation frequency belong to those that are widely dispersed and conveniently accessible in addition to species that are well-known in communities [35].

With eight plant species, the Asteraceae and Poaceae plant families were found to be the most prevalent in the current study. In other similar studies conducted in Ethiopia [33,38–41]. Asteraceae and Poaceae were discovered to be the primary suppliers of medicinal plants. Euphorbiaceae [42], Lamiaceae [43,44], Fabaceae [45], and Solanaceae [2,43,46] were discovered to be predominate in the research done in the South Wollo Zone of the Amhara Region, Hulet Eju Enese District, and Diguna Fango District in the Wolaita Zone.

The study area contained a variety of medicinal plants, with herbs being the most prevalent growth form. Studies carried out in Ethiopia also showed that the majority of medicinal plants were used as herbs from the people of Sheko [47], Ankober [48], Damot Gale [49] and Diguna Fango [2], respectively. The relative abundance and accessibility of herbs allow for their potential widespread use [50].The majority of the medicinal plants, however, were shrubs in the south region of the country in Omo [51] and trees in the district of Guba Lapto [52].

It was confirmed by informants in the study area that medicinal plants were gathered from various habitats. Among all medicinal plants, home gardens took the largest share (53%). Informants in the study area prefer medicinal plants from their home gardens perhaps due to their ease of availability in their vicinity. In other findings, the majority of medicinal plants were harvested from home gardens [2,48,49]. However, the majority of the medicinal plants were gathered in the Konta and Sheko districts from wild [47].

In the study area, leaves were the most frequently used plant component for treating illnesses in both humans and livestock. Instead of taking a root or the entire plant, this may help to conserve plant diversity. In a similar vein, other findings indicated that the most common plant component used in their study sites was leaves [2,52]. Contrarily, the most widely used plant parts in the Burji [50], South Omo [51], and Hadiya Zone [53] areas were roots. In keeping with the present research, other reports have argued that harvesting aerial components, like leaves, is less harmful to medicinal plants than harvesting roots and bark [33,54,55]. Due to its accessibility and ease of drug preparation, people might prefer it.

Medicinal plants were used in its natural/fresh form. Similarly, Kassa et al. [35], Assen et al. [36], Abebe and Teferi [46] and Tefera and Kim [56] found that freshly gathered plant components were the most commonly used in making traditional medicines. People prefer fresh plant parts to dried plant parts because the components are not lost before use and are more effective than stored ones [38]. However, the frequent collection of fresh plant parts, even during dry seasons, may endanger the plants because locals don't make much of an effort to store dried plant material for later use [55].

Stomach aches were the most common disease in the communities. The preference rankings of *Solanium incanum* L. and *Hagenia abyssinica* (Bruce ex Steud.) J.F.Gmel. were higher in treating stomachache in humans. Similar ethnobotanical research has also been carried out in Ethiopia, reporting diverse findings on the preferred medicinal plants for treating illnesses in humans and livestock. *Eucalyptus globulus* Labill was the most medicinally important plant by many villagers of the Hawassa Zuria district for having to treat stomach pain, according to Tefera and Kim's research [56]. The most popular choice for a medicinal plant to treat stomach aches among residents of the Berbere District was revealed to be *Stephania abyssinica* (Dillon & A. Rich.) Walp [57]. In general, and specifically in Ethiopia, ethnic tribes have similarities and cross-cultural connections. As a result, in traditional medicine, various plant species with specific parts were suggested for the treatment of conditions of a similar nature. Depending on how these body parts are prepared and applied, similar parts/products of various plants may have effects that are either the same as or different from each other. It is a common practice to try several treatments for the same condition and then discover that one of them is more effective than the

others.

The first- and second-ranked multifunctional plant species in the research region, according to the direct matrix ranking, were *Persea americana* Mill. and *Croton macrostachyus* Hochst. ex Delile. In addition to their medicinal benefits, *Persea americana* Mill. was said to be a well-known plant in the substantial community and even used at the household level as a cash crop, fuel, building material, charcoal manufacture, food, and fodder. Various medicinal plants were characterized as a multifunctional plant species in other studies from Ethiopia that are comparable to this one. For instance, Tefera and Kim [56] reported it as *Ensete ventricosum* (Welw.) Cheesman was the most common medicinal plant used in Hawassa Zuria District for a variety of purposes. The plant was also reportedly used as a type of food, as animal feed, to build houses, and to make robes, according to the authors. In a similar study, Eshete and Molla [58] reported that *Warburgia ugandensis* Sprague was the first-ranked multipurpose plant used by the Guji Oromo people of Ethiopia for a variety of tasks, including making charcoal, building materials, and furniture. In other reports from Tigray Region's Adwa District, *O. europaea* subsp. was noticed as a multifunctional plant species that is primarily employed in the production of charcoal, building, and food [59]. This variation can be brought on by various agro-ecological zones and the region's seasonal plant availability. This is important to know because the most commonly utilized plants are the ones most at risk of extinction in the absence of effective conservation management and sustainable use strategies [35]. To stop the extinction of these multipurpose plant species, more conservation efforts are urgently needed [59–61].

The informant consensus factor, or ICF, was derived based on the reported medicine for a certain group of disorders. When choosing plants for pharmacological and phytochemical research, it helps to identify species that are regularly used in a community. Reports of illnesses were categorized into 13 major categories, as in Wendimu et al. [2] and Mussarat et al. [27]. The highest ICF was cited for genito-urinary ailment disease category for humans and for mastitis (inflammation of the udder) in livestock. In other similar reports, the highest ICF value was for digestive system disease [37], and genitourinary system disease was the second highest [62]. The ICF value is high when one or a few plants are said to treat a particular widespread illness according to informants, and low ICF values indicate that the informants disagree on the plant choice [15].

Different communities used medicinal plants, and activities both related to humans and unrelated to humans could endanger medicinal plants. The relative abundance and distribution of the local flora, including many species that are threatened globally, can be significantly impacted by these activities, either directly or indirectly. Deforestation, furniture making, agricultural expansion, household construction, firewood, desertification, environmental degradation, young generation's resistance, oral-based knowledge transmission, and secrecy were the study area's identified threats to medicinal plants. The majority of threats in recent days have been caused by deforestation and desertification, which are both rapidly expanding. Similar results were found in other ethnobotanical studies in Damot Gale District [49] and South Omo people [51] as a result, greater conservation efforts involving all members of society are required to preserve indigenous knowledge and prevent the extinction of medicinal plant resources.

5.1. Conservation of biodiversity

Conducting ethnobotanical research to study traditional medicinal plants plays a vital role in preserving biodiversity by highlighting the importance of certain plant species for their medicinal properties. Wendimu et al. have demonstrated that documenting traditional knowledge can inform conservation efforts and sustainable management practices, ensuring the safeguarding of valuable medicinal plant resources. Ethnobotanical investigations have the potential to lead to the identification of new medicinal plant sources or the comprehension of the mechanisms behind traditional remedies [33]. For instance, these studies have contributed to the development of significant drugs such as reserpine from the *Rauvolfia serpentine* (L.) Benth. ex Kur plant species for hypertension treatment, podophyllotoxin from *Podophyllum peltatum* L. for cancer treatment, and bromelain from *Ananas comosus* (L.) Merr. for cancer treatment. Furthermore, other research [63] has shown that medicinal plants and spices can serve as natural and potent antibacterial agents against harmful microbes, emphasizing the importance of specific plant species for the medical industry. Therefore, such research is essential for promoting the conservation of biological diversity in Ethiopia and globally.

5.2. Cultural significance and healthcare practices

Ethnobotanical studies conducted in southern Ethiopia provide insights into the socio-cultural importance of traditional medicinal plants within indigenous communities. Recent research, such as the work of Wendimu et al. [33], has underscored the cultural significance of traditional healing methods and their potential incorporation into contemporary healthcare systems. This emphasizes the opportunity for cooperation between traditional healers and modern healthcare professionals, potentially resulting in healthcare interventions that are culturally relevant.

5.3. Market potential of medicinal plants

After conducting interviews with key informants and observing the market, we found that traditional healers struggle to earn a substantial income from treating patients and selling medicinal plants. This is likely due to a lack of awareness, low pricing, and limited market access for traditional medicine. Our research indicated that 80% of the medicinal plants we collected were not readily available in the market. Consequently, it appears that most medicinal plants are only gathered from the wild when they are needed for making remedies. The same findings were reported in elsewhere in Ethiopia [64–70]. While 20% of the medicinal plants were marketable, for example, *Zingiber officinale* Roscoe, *Withania somnifera, Triticum turgidum* subsp. *dicoccum* (Schrank ex Schübl.) Thell., *Ruta chalepensis* L., *Rhamnus prinoides* L'Hér., *Olea europaea* subsp. *cuspidata* (Wall. & G.Don) Cif., *Nigella sativa* L., *Nicotiana tabacum* L., *Moringa*

stenopetala (Baker f.) Cufod., *Linum usitatissimum* L., *Lepidium sativum* L., *Hagenia abyssinica, Eucalyptus globulus* Labill., *Echinops kebericho, Cymbopogon citratus* (DC.) Stapf, *Cucurbita pepo* L., *Coffea arabica* L., *Citrus limon* (L.) Osbeck, *Carica papaya* L., *Capsicum frutescens* L., *Artemisia abyssinica* Sch.Bip. ex Oliv. & Hiern, *Aloe vera* (L.) Burm.f., *Allium sativum* L., *Allium cepa* L., and *Aframomum corrorima* (A.Braun) P.C.M.Jansen. Although an in-depth valuation of traditional medicinal plant marketability in the respective research sites was outside the scope of this study, some healers appealed the importance of traditional medicinal plant marketability in the study areas. Besides there market potential some ethnomedicinal plant were reported to have a potential to kill insects such as bedbug [71], repel the mosquitoes [72], and some plants were used as a spice for the traditional beverages and food stuff [73], and some were used as a livestock fodder [74,75]. In overall, the present study could also be used as baseline for a future detailed investigation of the market potential and value chain of medicinal plant resources in the study regions and beyond.

5.4. Future recommendation

In order to comprehend the biological activity, phytoconstituents, and safety profile of the identified medicinal plants, more study is required. It may be possible to clarify the science underlying the efficacy of these plants, plant products, and health ethnopractices by conducting in-depth scientific research. This may result in the discovery of useful pharmaceutical agents and strategies that may be incorporated into human and livestock health management programs for the welfare of the human and livestock industry, as well as human life, in Africa. The Abala Abaya District must therefore deal with the issues of the sustainable use and conservation of these medicinal plants and plant products, focusing particularly on informing all stakeholders about sustainable methods of harvesting plant-based remedies and sustainable conservation mechanisms for establishing woodlots in arable farming systems to lessen pressure on the counterparts of wild resource. Additionally, plants that are highly preferred by respondents have a higher FL value. Therefore, it is strongly advised to continue researching the plants with the greatest FL values (FL = 100%), such as *Commelina benghalensis* L., *Allium sativum* L., *Avena sativa* L., *Pentas arvensis* Hiern, and *Hagenia abyssinica* (Bruce) J.F.Gmel, for the development of novel drugs. It is believed that medicinal plants used by a large percentage of respondents for a particular disease category are more likely to be effective scientifically [15]. The need for further study is to identify and isolate their active ingredients (alkaloids, glycosides, volatile oils, etc.), responsible for their pharmacological action to prepare different dosage forms after preclinical toxicity studies and clinical trials.

6. Conclusion

To address their fundamental medical needs, the indigenous population in the Abala Abaya District mainly relies on the usage of herbs as medicine. This study established an ethnomedicinal inventory consisting of 72 plant species from 32 families, and the results showed that the region had a wide variety of therapeutic plants. As long as the scientific approach is applied to the local knowledge in terms of traditional herbal medicine, the variety of medicinal plants used for the prevention and treatment of human and livestock disorders is a good sign of the potential that exists locally. The medicinal plants with the greatest RFC and FL values were thus identified. Plants with higher FL values are those that respondents rate as being much desired. Allium sativum L., *Avena sativa* L., *Pentas arvensis* Hiern, and *Commelina benghalensis* L. are among the plants with the greatest FL values (FL = 100%), and additional research on them is strongly advised for the development of innovative drugs. The idea is that medicinal herbs that are used by a lot of people for a particular disease category are more likely to be effective from a scientific standpoint. To generate various dosage forms after preclinical toxicity studies and clinical trials, it is necessary to identify and isolate the active components (alkaloids, glycosides, volatile oils, etc.) that are responsible for their pharmacological effects.

Significance statement

Studies on traditional medicinal plants have a crucial role in a number of ways in emerging nations like Ethiopia. It first promotes understanding of the connection between biodiversity and cultural variety. Understanding the significance of plants for current medication development and human health is equally crucial. It offers efficient ways to treat human or cattle illnesses by lowering the expense of obtaining synthetic medications. Therefore, any interested botanical, ecological, pharmacological, or other ethno-scientific researcher(s) can use this work as a valuable and educational baseline. In general, the study supported the notion that traditional knowledge about plants used to heal human and animal ailments is widely accessible in indigenous communities.

Data availability

Data included in article/supp. material/referenced in article.

CRediT authorship contribution statement

Abenezer Wendimu: Writing – review & editing, Writing – original draft, Supervision, Software, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Wondimagegnehu Tekalign:** Supervision, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Elias Bojago:** Validation, Software, Resources, Funding acquisition, Formal analysis, Data curation. **Yitbarek Abrham:** Software, Resources, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.heliyon.2024.e27528.

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