

## Ethnobotanical knowledge and practices of traditional healers in Harar, Haramaya, Bati and Garamuleta, Eastern Ethiopia

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### Abstract

The study was conducted to reveal and document ethnobotanical knowledge and practices of traditional healers in selected sites of Eastern Hararghie. Ethnobotanical data were collected using semi-structured interviews and field observation from 9 traditional healers in 4 study sites of Eastern Hararghie. Data were collected, quantified and summarized using graphs, tables and different ranking techniques. The study revealed 32 medicinal plants species belonging to 31 genera and 25 families. The plants were used to treat 17 major human and animal ailments, 81% used for the treatment of human disorders while the remaining 19% for both. Of the reported species 44% were herbs, and 28 % each were shrubs and trees. Leaf was the most frequently used plant part accounting 62%, followed by fruit (16%) and root (16%). Oral administration was the most commonly used route (60%), followed by topical (31%) route. The most preferred solvent added during the preparation of medicinal plants was water (50%), while 38% of the plant remedies used without any solvent. Fidelity value analysis indicated that *Allium sativum* L. (83.3%), *Gomphocarpus integer* N.E.Br (80%), *Punica granatum* L. (75%) and *Cordia africana* L. (75%) were the most preferred species used for the treatment of abdominal pain, febrile illness, evil spirit and skin lesions, respectively. Moreover, *Allium sativum* L. was the first ranked medicinal plant used for the treatment of abdominal pain followed by *Vernonia amygdalina* Del. and *Cucurbita pepo* L. This study suggested that traditional healers in eastern Hararghie zone have profound ethnobotanical knowledge and practices.

**Keywords:** Eastern Hararghie; Ethiopia; Ethnobotany; Medicinal plants; Traditional healers

## Introduction

Plants have played a central part in combating many ailments in human and livestock in many indigenous communities, including Africa (Busmann *et al.*, 2011). Traditional healers, and particularly medicinal plant herbalists, in Africa have a detailed knowledge base of traditional medicine Moshi *et al* (2009) and Sindiga *et al* (1995) which is transferred orally from one generation to the next through professional healers, knowledgeable elders and/or ordinary people (Mirutse Giday *et al.*, 2007). Medicinal plants are in great demand both in developed and developing countries as a source of primary health care owing to their attributes having wide biological and medicinal activities, high safety margins and lesser costs. Herbal molecules are safe and would overcome the resistance produced by the pathogens as they exist in a combined form or in a pooled form of more than one molecule in the protoplasm of the plant cell (Lai and Roy, 2004).

In Ethiopia the long history of using traditional medicinal plants for combating various ailments can be confirmed by referring to the medico-religious manuscripts in the country (Fassil Kebebew, 2001). Before some decades, plant remedies were the most important and sometimes the only source of therapeutics for nearly 80% of the population in the country (Dawit Abebe, 2001). Traditional medicinal plants potentials have not been investigated to a noticeable level. The Knowledge and practices of the traditional medicinal plants of Ethiopia and of their uses provides a vital contribution to human and livestock healthcare needs throughout the country (Getnet Chekole *et al.*, 2015; Mirutse Giday *et al.*, 2009; Fisha Mesfin *et al.*, 2009; Yared Yigezu *et al.*, 2014). In spite of the greater contribution of traditional healers and their plant medicines, very little effort was made to document their knowledge, practices and traditional medicinal plants. Therefore, documentation of traditional medicinal plants, knowledge, and practices is fundamental in order to expedite the future discovery of lead molecules from plants. Most ethnobotanical surveys performed before were focused through interviewing of the community members (Anteneh Belayneh, 2012). The current study was conducted using traditional healers as sole sources of information provider with the assumption that they would have sufficient and profound information about the plants and their medicinal use.

The share of medicinal plants, the value of the associated indigenous knowledge and practices of the traditional healers in eastern Hararghie are expected to be high. However, there was no comprehensive study conducted on the knowledge and practices of traditional healers' medicine in the area (Anteneh Belayneh *et al.*, 2012). Hence, the objective of this study was to reveal and document the traditional medicinal plant knowledge and practices of traditional healers, and also to provide baseline data for future pharmacological and phytochemical studies of the documented medicinal plants.

## Materials and Methods

### Study areas description

The study was conducted in selected areas of Eastern Hararghie zone, Haramaya, Bati, Garamuleta and Harar towns (Figure 1). East Hararghie zone has a total population of 2,723,850 of whom 1,383,198 are men and 1,340,652 women. While 216,943 of the inhabitants or 8.27% are urban dwellers, further 30,215 or 1.11% is pastoralists (CSA, 2007). The Zone has an area of 17,935.40km<sup>2</sup>.

Agro-ecologically, the area is dominantly highland and lowland with some midlands. The topography is very diverse consisting of undulating landscape, hills and some mountains with gorges and plain areas. The vegetation includes bush and shrubs covering small areas and scattered trees such as *Eucalyptus* and *Acacia*. The soil type is dominantly sandy loam with pocket areas of clay loam. The area has two rainy seasons, the long rainy season (mid-June to mid-September) and the short rainy season (mid-February to mid-May). The duration and intensity of rainfall in the region vary considerably. Generally it decreases from West and North West to South East wards. The average annual rainfall ranges from 700-900mm. The mean annual maximum temperature of the region ranges from 28°C in high land and 22°C in the low lands. The mean annual minimum temperature is 10°C in high lands and 15 in low lands. The majority of the population (>95%) in Bati, Haramaya, and Garamuleta were Muslims and the remaining are christians. In Harar more than 68.99% are Muslim, 27.1% Orthodox, 3.4% Protestant, 0.3% Catholic, and 0.2% followers of other religions. Similarly, the majority (>90%) of Haramaya, Bati and Garamuleta speaks Afan oromo, while the remaining speaks Amharic. In Harar 56.84% speaks Afan oromo, 27.53% Amharic, 7.33% Harari, 3.70% Somali and 2.91% Gurage (CSA, 2007).

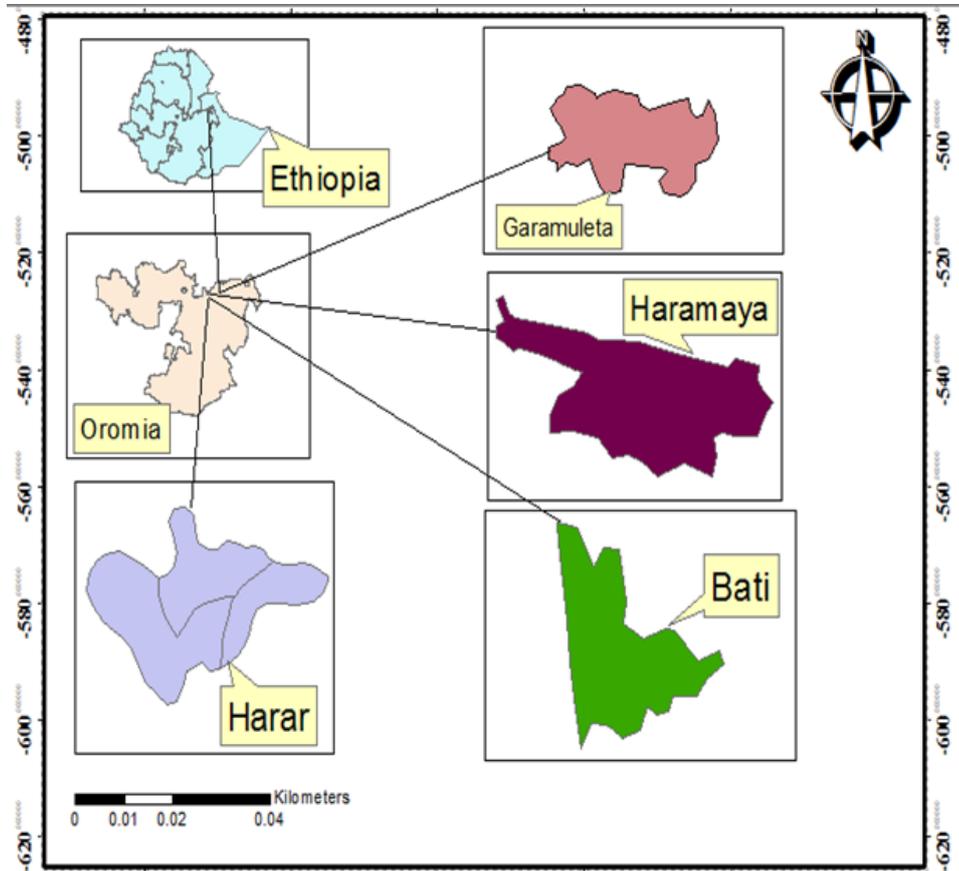


Figure 1: Map showing the geography of four study towns

### Ethnobotanical data collection

Ethnobotanical data were collected from December 2013 to February 2014. Four study towns were selected purposively from two regional states, Harar (Harari region) and Haramaya, Bati and Garamuleta (Oromia region). Ethnobotanical information was collected from 9 traditional healers. The selection of traditional healers was made based on the information of the local community leaders. The traditional healers were categorized in to three age groups in order to see how their traditional medicinal plant knowledge varies with age (Table 1).

Before starting the interview and discussion, informed consent was obtained from every traditional healer. Traditional healers were informed about their right to stop giving any information at any time. Semi-structured interviews were conducted in the local Oromo language to collect the basic information on the indigenous knowledge, for instance, traditional uses of medicinal plant species together with their local names, local name of the disease treated, clinical symptoms of diseases treated, parts of plant used, solvents or ingredients added, methods of preparation and the route of administration. Local administrators and traditional healers were asked about their willingness to allow collection of plant materials for identification and documentation in herbarium from the area. The plant specimens were collected on the spot and taken to Haramaya University, Department of Plant Science Herbarium for identification using taxonomic keys by plant taxonomic experts. The plant specimens were assigned with voucher numbers at Haramaya University herbarium.

### Data analysis

Microsoft excel spread sheet software (Microsoft Corporation, 2010) was employed to summarize and analyze the data. Data were presented in table and bar and pie charts. Moreover, Fidelity level (FL) and preference ranking techniques were performed to identify the most preferred plants species used for the treatment of certain ailments and select the best treatment for abdominal pain by traditional healers, respectively.

Fidelity level is useful for identifying the traditional healers most preferred species used for treating certain ailments. The medicinal plants that are widely used by the traditional healers have higher FL values than those that are less popular. Fidelity level shows the percentage of informants claiming the use of a certain plant species for the same major purpose. FL value was estimated using the formula  $FL = N_p/N \times 100$ , where  $N_p$  is the number of respondents who reported the utilization of medicinal plants for a specific main ailment and  $N$  is the total number of respondents who mentioned the same plant for any ailment (Friedman *et al.*, 1986). It is assumed that those medicinal plants which are used in some repetitive manner for the same disease category are more likely to be biologically active (Trotter *et al.*, 1986).

Preference ranking was conducted for six most important medicinal plants used in treating abdominal pain as the most frequently treated ailment according to traditional healers in the study area (Martin, 1995). All the nine

traditional healers were allowed to rank the best medicinal plant species for treatment of abdominal pain. Each individual was provided with six medicinal plants reported to cure abdominal pain and were asked to rank the plants based on their level of importance. The highest value (6) was assigned for plant species most preferred, against this illness and the lowest value (1) for the least preferred plant in accordance of their order for the remaining ones. These values were summed up and ranks were given to each plant species.

## Results

### Socio demographic characteristics

In this survey, a total of 9 traditional healers of which 7 male and 2 females were involved. The age of the respondent ranged from 34-81 with mean of  $50.33 \pm 13.67$  years, but the number of medicinal plants knowledge varied with age from 2-5 with mean of  $3.56 \pm 1.01$ . Educational status analysis showed that, 7(77.8%) were illiterate and contributed 23(71.87%) of the medicinal plant, whereas 2(22.2%) can read and write and contributed the remaining 9(28.13%) of the medicinal plants. Among the nine traditional healers 27(84.38%) of medicinal plants were contributed by seven male traditional healers while females knew 5(15.62%) of the medicinal plant. The highest number of medicinal plants 11(34.38%) were from Bati Town followed by Haramaya Town 9(28.13%), Table 1.

**Table 1. Demographic characteristics of traditional healers**

Factors	Category	Number of TRH	Number of plants reported
Sex	male	7	27
	Female	2	5
Age (in years)	<45	3	8
	45-60	5	19
	>60	1	5
Marital status	married	9	32
	other	0	0
Educational status	illiterate	7	23
	Read and write	2	9
Religion	Muslim	9	32
	Other	0	0
Towns	Haramaya	2	9
	Harar	2	5
	Bati	3	11
	Garamuleta	2	7

TRH= traditional Healers

## Medicinal plants reported

In this study, a total of 32 plant species (9 from Haramaya, 5 from Harar, 11 from Bati and 7 from Garamuleta towns) were used for the treatment of more than 17 types of human and livestock diseases (Table 2 and Table 3).

**Table 2. Medicinal plants with respective local names, growth habits, parts used and voucher numbers.**

Family	Scientific name	Local name of the plant	Growth form	Parts used	Voucher number
1. Verbenaceae	Lantana camara L.	Wofqolo	shrub	leaf	007606
2. Euphorbiaceae	Croton macrostachyus del.	Mekanisa	tree	leaf	017350
3. Solanaceae	Solanum incanum L.	Hidi	shrub	leaf	015593
4. Polygonaceae	Rumex nervosus Vahl.	Dengego	shrub	leaf	022321
5. Apiaceae	Foeniculum vulgare Miller	Kamona	herbs	root and leaf	010159
6. Cyperaceae	Cyperus papyrus L.	Qachu	herbs	leaf	008047
7. Asteraceae	Vernonia amygdalina del.L	Ebicha	shrubs	leaf	002213
8. Plantaginaceae	Plantago lanceolata L.	Feysa	herbs	leaf	005621
9. Cucurbitaceae	Cucurbita pepo L.	Buke	herbs	fruit	002645
10. Celastraceae	Catha edulis Vahl	Khat	shrub	leaf	021564
11. Burseraceae	Baswellia papyrifera Del.	Libanat	tree	whole plant	014361
12. Myrsinaceae	Myrsine africana L.	Katchu	shrub	fruit	018341
13. Rhamnaceae	Ziziphus mauritiana L.	Kurkura	tree	leaf	016173
14. Boraginaceae	Cordia africana L.	Wodessa	tree	leaf	018380
15. Lythraceae	Punica granatum L.	Ruman	tree	fruit	005931
16. Fabaceae	Tamarindus indica L.	Roka	tree	fruit	003658
17. Rubiaceae	Rubia cordifolia L.	Lalasa	herb	root	023264
18. Dioscoreaceae	Dioscorea quartiniana A. Rich	Geshy	shrub	leaf	008144
19. Asteraceae	Sphaeranthus suaveolens Forssk	Arashadie	herbs	leaf	018594
20. Polygonaceae	Rumex bequaertii De Wild	Meyemeo	herbs	leaf	005878

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<b>Family</b>	<b>Scientific name</b>	<b>Local name of the plant</b>	<b>Growth form</b>	<b>Parts used</b>	<b>Voucher number</b>
21. Asteraceae	Senecio nanus A. Rich	Jenres	Herb	leaf	013822
22. Rutaceae	Citrus aurantiifolia Christm	Tuto	shrub	fruit	006494
23. Fabaceae	Crotalaria deserticola Baker f.	Fugul	herb	leaf	015271
24. Caricaceae	Carica papaya L.	Papaye	tree	leaf	024405
25. Apocynaceae	Gomphocarpus integer N.E.Br.	Harmel	herb	root	010616
26. Rutaceae	Ruta chalepensis L.	Telatam	herb	leaf	006546
27. Zingiberaceae	Zingiber officinale Roscoe	Zinjible	herb	root	019512
28. Anacardiaceae	Mangifera indica L.	Amba	tree	leaf	000472
29. Asteraceae	Tagetes minuta L.	Teybedi	herb	leaf	010550
30. Fabaceae	Pithecellobium dulce (Roxb.) Benth.	Qontr	tree	root	003650
31. Euphorbiaceae	Euphorbia tirucalli L.	Qncheba	shrub	leaf	016250
32. Alliaceae	Allium sativum L.	Nechshinkurt	herb	root	020062

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**Table 3. Medicinal plants used for the treatment of different human and animal ailments**

Family	Scientific name	Intended use	Local name of disease treated	Clinical symptoms	Solvent/ ingredients added	Preparation methods	Route of administration	Voucher number
1. Verbenaceae	<i>Lantana camara</i> L.	Human	Geranamaalatu	Inability to stand and curved back	water	The leaf is chopped, mixed with water and taken orally.	oral	007606
2. Euphorbiaceae	<i>Croton macrostachyus</i> del.	Human	Robi	Ring like lesion on skin	none	The juice of the leaf directly applied on the skin	topical	017350
3. Solanaceae	<i>Solanum incanum</i> L.	Human	Geranamaalatu	Inability to stand, and curved back	water	The fresh leaf is chopped, mixed with water and taken orally	oral	015593
4. Polygonaceae	<i>Rumex nervosus</i> Vahl	Human	Qebena	Shivering, headache, back pain, fever, blood coagulation and thrust	salt	The fresh leaf is chopped, the juice mixed with salt then applied on the head	topical	022321
5. Apiaceae	<i>Foeniculum vulgare</i> Miller	Human and Animal	Finchandeedebu	Inability to urinate, enlargement of urinary bladder, kidney infection and back pain.	none	The root and leaf is chopped and given for animal.	oral	010159
6. Cyperaceae	<i>Cyperus papyrus</i> L.	Human and Animal	Medahu	Fire burn on skin	butter	The leaf is dried, chopped mixed with butter and applied on skin	topical	008047
7. Asteraceae	<i>Vernonia amygdalina</i> del.	Human and Animal	Dhukuba-garaa	Abdominal pain, weight loss and dehydration	water	The leaf is chopped, mixed with water and taken orally	oral	002213
8. Plantaginaceae	<i>Plantago lanceolata</i> L.	Human	Meda	Accidental injury	none	The leaf is chopped and applied on the skin.	topical	005621
9. Cucurbitaceae	<i>Cucurbita pepo</i> L.	Human	Dhukubagaraa	Abdominal pain, weight loss and dehydration	water	The fruit is chopped, mixed with water and taken orally	oral	002645

Family	Scientific name	Intended use	Local name of disease treated	Clinical symptoms	Solvent/ ingredients added	Preparation methods	Route of administration	Voucher number
10. Celastraceae	<i>Catha edulis Vahl</i>	Human	qufaa	Cough, weight loss, disease of chest	water	The leaf is chopped, mixed with water and taken orally	oral	021564
11. Burseraceae	<i>Basuelia papyrifera Del.</i>	Human	Buda	Evil spirit	none	The plant is put on the fire at night and smoked	aerosol	014361
12. Primulaceae	<i>Myrsine Africa L.</i>	Human and Animal	Dhukubagaraa	Abdominal pain	none	The fruit is given orally	oral	018341
13. Rhamnaceae	<i>Ziziphus mauritiana L.</i>	Human	Waitgodane	Evil spirit	water	Chopping the leaf and washing the body with the juice	topical	016173
14. Boraginaceae	<i>Cordia africana L.</i>	Human	Dhukubagogaa	Herpes zoster	none	The leaf is chopped and applied on skin	topical	018380
15. Lythraceae	<i>Punica granatum L.</i>	Human	Dhukubagaraa	Abdominal pain	none	The fruit is taken orally	oral	005931
16. Fabaceae	<i>Tamarindus indica L.</i>	Human	Jartiogiratdedebi	Sexual impotence	tea	The fruit is chopped and taken orally with tea	oral	003658
17. Rubiaceae	<i>Rubia cordifolia L.</i>	Human	Dhukubaaraa	Abdominal pain, weight loss and diarrhea	water	The root is chopped, mixed with water and taken orally	oral	023264
18. Dioscoreaceae	<i>Dioscorea quarimiana A. Rich</i>	Human	Dhukubaaraa	abdominal pain	none	The leaf is chopped and taken orally	oral	008144
19. Asteraceae	<i>Sphaeranthus suaveolens Forssk</i>	Human	Dhukubameeta	Headache	none	The leaf is chopped and applied on the head	topical	018594
20. Polygonaceae	<i>Rumex bequaertii De Wild</i>	Human	Goffa	Cancer	none	The leaf is chopped and applied on the head	topical	005878

Family	Scientific name	Intended use	Local name of disease treated	Clinical symptoms	Solvent/ ingredients added	Preparation methods	Route of administration	Voucher number
21. Asteraceae	<i>Senecio nanus</i> A. Rich	Human	Dhibeehedduu	For many clinical symptoms	water	The leaf is chopped, mixed with water, taken orally and washing the body	oral and topical	013822
22. Rutaceae	<i>Citrus aurantiifolia</i> Christm	Human	Dhibeehedduu	For many clinical symptoms	water	The fruits is chopped mixed with water, taken orally and body washing	oral and topical	006494
23. Leguminosae	<i>Crotalaria deserticola</i> Baker f.	Human and animal	Bokoka	Bloat, enlargement of abdomen	water	The leaf is chopped, mixed with water and taken orally	oral	015271
24. Caricaceae	<i>Carica papaya</i> L.	Human	Dhukubausa	Malaria (sweating, fever, shivering)	water	The leaf is chopped, mixed with water and taken orally	oral	024405
25. Apocynaceae	<i>Gomphocarpus integer</i> N.E.Br.	Human and animal	Hadoytu	Vomition, fever	water	The root is chopped, boiled with water then taken orally	oral	010616
26. Rutaceae	<i>Ruta chalepensis</i> L.	Human	Dhukuba onae	Heart diseases	water	The leaf is chopped, mixed with water and taken orally	oral	006546
27. Zingiberaceae	<i>Zingiber officinale</i> oscoe	Human	Dhukuba onae	Heart disease	water	The root is chopped, mixed with water and taken orally	oral	019512
28. Anacardiaceae	<i>Mangifera indica</i> L.	Human	Dhukuba kale	Kidney infections	water	The leaf is chopped, mixed with hot water and taken orally	oral	000472
29. Asteraceae	<i>Tagetes minuta</i> L.	Human	Dewacheto	Skin disease	none	The leaf is chopped and applied on the skin	topical	010550
30. Fabaceae	<i>Fithecallobiu dulce</i> (Roxb.) Benth.	Human	Gogogagera	Constipation	water	The fruits is chopped, mixed with hot water and taken orally	oral	003650

Family	Scientific name	Intended use	Local name of disease treated	Clinical symptoms	Solvent/ ingredients added	Preparation methods	Route of administration	Voucher number
31. Euphorbiaceae	<i>Euphorbia tirucalli</i> L.	Human	Buro	Injury, skin lesion	none	The leaf is chopped and the juice applied on the skin	topical	016250
32. Amaryllidaceae	<i>Allium sativum</i> L.	Human	Dhukubaagara	Abdominal discomfort, diarrhoea and headache	Water and tea	The root is chopped and soaked with hot water or tea and taken orally	oral	020062

### Growth forms and plant parts used

The results of growth form analysis of reported medicinal plant showed that, herb constitute the largest proportion 14(44%), followed by trees and shrubs with 9(28%) each. The analysis of percentage of plant parts used revealed that 20(62%) were used for their leaves, 5(16%) fruits, 5(16%) root, 1(3%) whole plant and 1(3%) both leaf and root.

### Route of administration and solvents or ingredients added

Different routes of administration were used by traditional healers. The majority of medicinal plants (60%) were applied orally, followed by those applied topical (31%), orally and topically (6%) and taken in smoke form (3%).

In preparation of the medicine the traditional healers used various additives and solvents, 16(50%) of them used water, 12(38%) prepared their remedies without any solvent or ingredient (Figure 1).

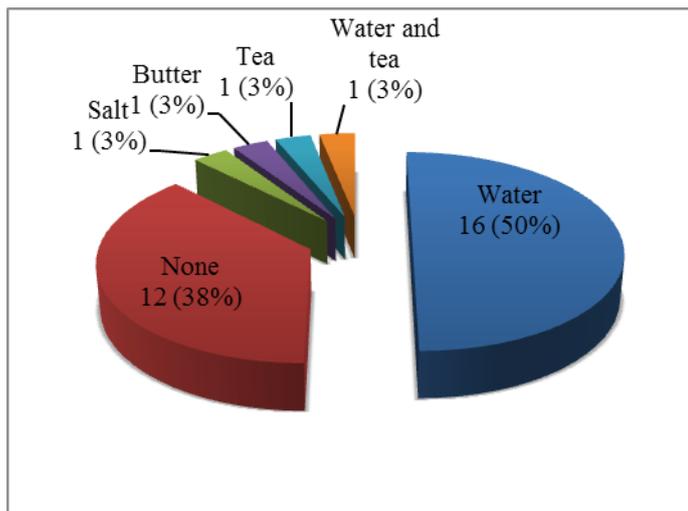
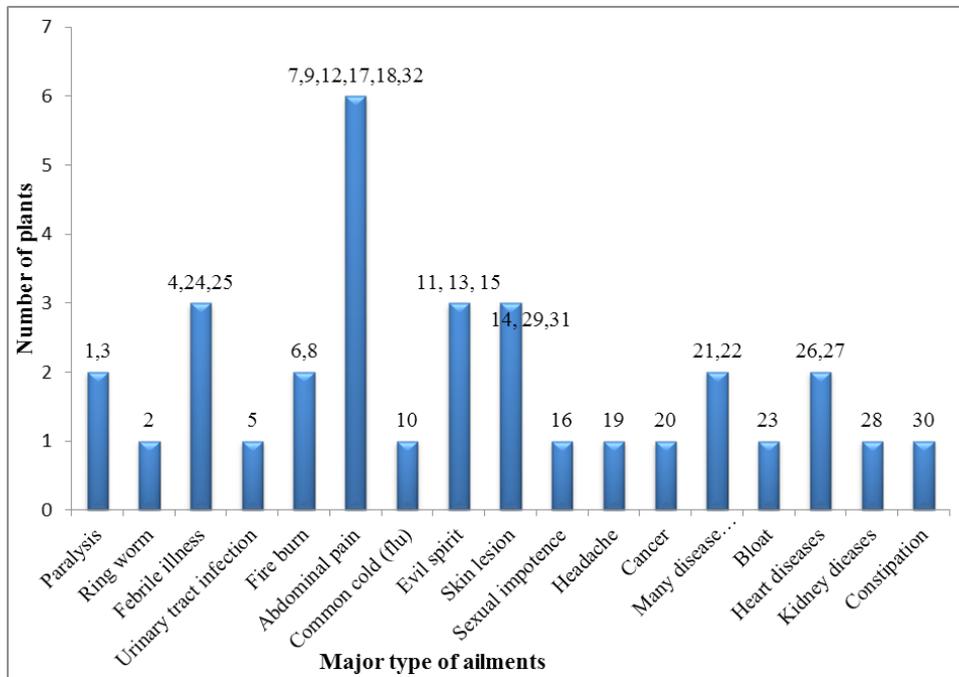


Figure 2. Solvents and ingredients added during preparation of the medicinal plants.

### Ailments treated

Analysis of data on medicinal plants showed that 81% were used for human use only and 19% both for human and animals. Concerning human ailments, the highest proportion of medicinal plants were used to treat abdominal pain 6 (35.3%) followed by febrile illness, evil spirit and skin lesions with 3 (17.6%) each. For the remaining ailments either two or single medicinal plants was used. However, the traditional healers reported two of the medicinal plants to have multipurpose roles for the treatment of many disease conditions. As it is indicated in figure 3, the traditional healers reported that, *Senecio nanus* was used for the treatment of at least 11 ailments, and *Citrus aurantifolia* for the treatment of at least 8 ailments.



**Figure 3. The types of major health problems of the area and the plant species used for the treatment the ailments.**

Number at the top of bar graphs (1-32) indicates genus and species name of medicinal plants given in Table 2.

### Fidelity level

Fidelity level value analysis of the most frequently used traditional medicinal plants against different disease condition indicated that, *Allium sativum L.* was found to have the highest value for the treatment of abdominal pain (83.3%). From the plants claimed for the treatment of febrile illness *Gomphocarpus integer* N.E.Br. had the highest value (80%), followed by *Carica papaya L.* For the treatment of Evil spirit the highest score was for *Punica granatum L.* (75%) followed by that for *Baswellia papyrifera* Del, (66.7%). *Cordia africana L.* had the highest FL value among three plants used for the treatment of skin lesions (Table 4).

**Table 4. Fidelity level value of traditional medicinal plants for the most frequently reported diseases.**

No	Disease treated	Medicinal plant	NP	N	FL (%)
1	Abdominal pain	<i>Vernonia amygdalina Del.</i>	3	8	37.5
		<i>Cucurbita pepo L.</i>	2	3	66.7
		<i>Myrsine Africa L.</i>	1	2	50
		<i>Rubia cordifolia L.</i>	2	4	50
		<i>Dioscrea quartiniana A. Rich</i>	4	5	80
		<i>Allium sativum L.</i>	5	6	83.3.5
2	Febrile illness	<i>Rumex nervosus Vahl.</i>	2	3	66.7
		<i>Carica papaya L.</i>	3	4	75
		<i>Gomphocarpus integer N.E.Br.</i>	4	5	80
3	Evil spirit	<i>Baswellia papyrifera Del.</i>	4	6	66.7
		<i>Ziziphus mauritana L.</i>	2	5	40
		<i>Punica granatum L.</i>	3	4	75
4	Skin lesion	<i>Cordia africana L.</i>	3	4	75
		<i>Tagetes minuta L.</i>	2	3	66.7
		<i>Euphorbia tirucalli L.</i>	4	6	66.7
5	Many disease conditions	<i>Senecio nanus A. Rich</i>	2	8	25
		<i>Citrus aurantiifolia Christm</i>	2	9	22.2

Np is the number of respondents, who reported the utilization of medicinal plants for a specific main ailment; N is the total number of respondents who mentioned the same plant for any ailment.

### Preference ranking

Preference ranking of six medicinal plants used for the treatment of abdominal pain showed that *Allium sativum L.* was the most preferred plant, followed by *Vernonia amygdalina Del.* and *Cucurbita pepo L.* (Table 5).

**Table 5. Preference ranking of six medicinal plants on the degree of preference in treating abdominal pain**

List of medicinal plants	R1	R2	R3	R4	R5	R6	R7	R8	R9	Total	Rank
<i>Vernonia amygdalina Del.</i>	4	5	6	2	2	3	1	3	5	31	2 <sup>nd</sup>
<i>Cucurbita pepo L.</i>	2	3	1	4	2	1	6	1	4	24	3 <sup>rd</sup>
<i>Myrsine Africa L.</i>	1	2	1	3	4	1	5	2	2	21	5 <sup>th</sup>
<i>Rubia cordifolia L.</i>	2	1	2	3	2	1	3	2	2	18	6 <sup>th</sup>
<i>Dioscrea quartiniana A Rich</i>	1	2	1	3	4	1	5	2	3	22	4 <sup>th</sup>
<i>Allium sativum L.</i>	6	4	4	3	4	6	5	2	5	39	1 <sup>st</sup>

R1-9 represents respondents.

## Discussion

In the present study the majority of traditional healers were between 34 and 60 years old since it is very difficult to disclose their traditional medicinal knowledge in which they considered as professional secret endorsed from their ancestor. The trend is to transfer the traditional knowledge at old age to one of the most preferred descendant. This tradition creates a problem to disclose all their traditional medicinal knowledge during the interview. For instance, if the healers considered that the plant is very effective in treating very important disease conditions in the society, they would refuse to convey the medicinal plant information because of their perception that as the main sources of income.

The gender distribution of medicinal plant knowledge indicated that among the nine traditional healers 7(77.8%) were males while 2(22.2%) females. Similar findings were reported in a study done in Jimma zone, Ethiopia (Yared Yigezu *et al.*, 2014) and in Karak district, Pakistan, (Murad *et al.*, 2013). The reasons were as a tradition, women generally not expected to appear in public or discourse with strange men both by the society and family (the husbands and the religious rules did not allow in most cases). Additionally, it was customary that, the transfer of medicinal plant knowledge must be done within the male family tree which guarantees the secrecy of traditional knowledge property. The majority of traditional healers were illiterate 7(77.8%) whereas those which can read and write 2(22.8%) had insufficient knowledge of traditional medicine which might be the impact of modern education and information to modern medicine, which was in agreement with the findings in other areas of Ethiopia (Mirutse Giday *et al.*, 2009).

The present study identified 32 medicinal plants that have been used for the treatment of more than 17 human and animal disease conditions by the traditional practitioners. Different studies documented relatively higher number of medicinal plants than this finding, in Jimma zone 74 medicinal plants Yared Yigezu *et al* (2014), in North West Ethiopia 163 medicinal plants Getnet Chekole *et al* (2015) had been documented to the national herbarium. Similarly, 53 plant species from Raya-Azebo districts, Ethiopia had been documented for the treatment of 37 types of human and livestock ailments (Mirutse Giday *et al.*, 2009). The top two families (Asteraceae and Fabaceae) reported in this study were in agreement with other findings Getnet Chekole *et al* (2015) and Fisseha Mesfin *et al* (2009). This might be due to possession of large number of species distributed in almost all ecological areas in which the Fabaceae and Asteraceae were the first and the third largest families of angiosperm in the Ethiopian flora (Hedberg *et al.*, 2009).

From the total of 32 plant species investigated in this study, some of them were reported by other researchers in different areas; 5 species in South Western part of Ethiopia, Jimma zone Yared Yigezu *et al* (2014), 5 plants in Benchi Maji zone South west Ethiopia Mirutse Giday *et al* (2009), 7 plants in wonago District Southern Ethiopia Fisseha Mesfin *et al* (2009), 11 plants in Libo kemkem district, South Gondar Zone, Ethiopia (Getnet Chekole *et al.*, 2015). This study confirmed the importance of such medicinal plants in the healthcare system of different regions and cultural groups in Ethiopia.

Previous laboratory and clinical trial studies conducted in Ethiopia and other parts of the world indicated the activity of some of the medicinal plants reported by the current study. These include *Croton macrostachyus* Del for its antimalarial activity Tigist Mohammed *et al* (2014), *Vernonia amygdalina* Del for its antihelminthic, antimalarial, antibacterial and laxative effects Ifeoma *et al* (2011), *Punica granatum* L. for its antihyperlipidemia, antiatherosclerosis, antidiabetic, antioxidant, anticancer and anti-inflammatory effect Julie, (2008), *Zingiber officinale* Roscoe for its antimalarial, antiviral, antiemetic, anti-inflammatory and antiulcerogenic effect Samir and Amrit, (2003) and *Allium sativum* L. for its antimicrobial, anticancer, antioxidant, immune boosting, antidiabetic, hepatoprotective, antifibrinolytic and antiplatelet aggregatory activity and cardiovascular protective effect (Santhosha *et al.*, 2013). Generally, 81% of the medicinal plants were used for the treatment of human ailments whereas 19% for both, this might be due to the reason that people give more attention to human ailments than livestock diseases. Traditional

healers confirmed that, first they try to find medicine for humans then for animal disease having similar clinical symptoms as it was reported in other areas too (Tinsae Bahru *et al.*, 2011). The greater use of medicinal plants to cure abdominal pain febrile illness, evil spirit and skin lesions could be attributed to the high prevalence of these ailments in the area. Some medicinal plants like *Senecio nanus* A. Rich and *Citrus aurantifolia* Christm have multipurpose medicinal value which might indicate the wide range of activity of the plants.

In the present study the most widely sought plant part in the preparation of remedies were the leaves (62%), followed by fruit and roots with 16% each. The current findings are consistent with the findings by different researchers in Ethiopia and elsewhere (Balcha Abera, 2014; Anteneh Belayneh *et al.*, 2012; Getnet Chekole *et al.*, 2015; Abiyu Enyew *et al.*, 2014; Murad *et al.*, 2013; Yared Yigezu *et al.*, 2014). Different from the current findings, studies conducted elsewhere indicated that the root parts were frequently used in preparation of pharmacological substances to cure various human and livestock ailments (Mirutse Giday *et al.*, 2009; Fisseha Mesfin *et al.*, 2009; Haile Yinger *et al.*, 2007). The good reason why plant leaves are the most frequently used in the extraction of pharmacologically active ingredients for the treatment of different ailments is the fact that leaves contain many metabolites with anti-illness effects. Besides, from the ecological point of view, harvesting of leaves compared to roots, stem and whole plants has minimum negative influence on the survival and continuity of useful medicinal plants and hence does not affect the sustainable utilization of the plants (Haile Yinger *et al.*, 2007).

Among the medicinal plants reported, the majority (44%) were herbs followed by trees (28%) and shrubs (28%). The possible reason might be herbs are mostly available during the wet season and late rainy season compared to shrub and tree species. The other reasons could be, in the current study area, farmers planted in their farmland *Catha edulis* Vahl, locally known as “Khat” the main source of income for farmers in which the farmers provide great care even by drawing underground water using water drawing machine. This would have created conducive growing environment for herbs under the “Khat” shrubs almost throughout the year, similar findings were reported in Ethiopia (Abiyu Enyewu *et al.*, 2014; Tesfaye Awas *et al.*, 2009).

Analysis of the mode of administration showed that oral route (60%) was the most common mode of administration followed by topical (31%), both topical and oral (6%) and aerosol (3%). The current findings were in agreement with

many findings done in Ethiopia (Anteneh Belayneh *et al.*, 2012; Getnet Chekole *et al.*, 2015; Abiyu Enyew *et al.*, 2014; Mirutse Giday *et al.*, 2009; Fisseha Mesfin *et al.*, 2009; Yared Yigezu *et al.*, 2014). The current study showed most of the ailments were related to abdominal pain and systemic disorders, this could be the possible reasons that traditional healers prescribe the remedies through oral route.

In preparation of the medicinal plants different solvents/ingredients were used, water (50%), crushed plant material only (38%), and followed by the use of salt, butter and tea. The healers believed that medicinal plants crushed and soaked in different solvents or ingredients enhanced efficacy. Healers explained that, the use of such solvents would extract the active compounds which are comparable to the modern phytochemical extraction techniques. Moreover, additives were used to improve the flavor as it was documented in similar findings reported on study done in different parts of Ethiopia (Getnet Chekole *et al.*, 2015; Moa Megersa *et al.*, 2013; Yared Yigezu *et al.*, 2014).

The fact that plants *Allium sativum L.* (for the treatment of abdominal pain), *Gomphocarpus integer* N.E.Br. (for the treatment of febrile illness), *Punica grantum L.* (for the treatment of evil spirit), *Cordia Africana L.* (for the treatment of skin lesions) had the highest FL values could be an indication of their good healing potential. Plants which are used in some repetitive fashion are more likely to be biologically active (Trotter and Logan, 1986).

Among the six medicinal plants used for the treatment of abdominal pain, *Allium sativum L.*, was the best ranked plant for the treatment of abdominal pain followed by *Vernonia amygdalina Del.* and *Cucurbita pepo L.* In another study in Southern Ethiopia, *Vernonia amygdalina Del.* was the second most preferred plants for the treatment of diarrhoea (Fisseha Mesfin *et al.*, 2009). *Allium sativum L.* was third ranked plant medicine for the treatment of tapeworm infestation in a study done in Western Ethiopia (Balcha Abera, 2014).

## Conclusion

This study suggested that traditional healers in eastern Hararghie zone have profound and comprehensive ethnobotanical knowledge and practices. The use of traditional healers as a primary source of information provider in ethnobotanical survey permitted to document adequate and in-depth information. In this study, ethnobotanical knowledge, practices and 32 species of medicinal

plants that have been used for the treatment of more than 17 types of major human and animal ailments were documented. The indigenous knowledge and practices of traditional healers in the four towns should be complemented by scientific methods to evaluate the safety, efficacy and dosage of the commonly reported medicinal plants.

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