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Ethnobotanical study of traditional medicinal plants used to treat human ailments by halaba people, southern Ethiopia

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Abstract

This paper aims to investigate and document traditional medicinal plants used to treat human ailments by Halaba people, southern Ethiopia. Gathering ethno botanical data on different plant parts traditionally used by Halaba ethnic group by using an ethnobotanical approach. An ethnobotanical study was conducted from December 2015 to August 2016 in Halaba special district, Southern Nations, Nationalities and people's Regional States, Sothern Ethiopia. Halaba are the dominant indigenous people living in the district. Their language is Halabanya, which belongs to Cushetic language family. The data were collected through semi-structured interview, field visit, market survey and group discussion. A total of 120 informants (80 male and 40 female) in the age of 25 and above were randomly selected from 76 kebeles and 2 sub-urban were identified and documented, of which 45 traditional healer were purposely selected for study subject based on the information given from Halaba woreda health center and local administrators. A total of 58 medicinal plants belonging to 53 genera and 34 families were documented to treat 32 human ailments. 58.3% of the preparations are made from fresh followed by dry 25%, both dry and fresh 16.6%. *Ajuja integrifolia* ranked first for treating malaria followed by *Allium sativum* and *Carica papaya*. The highest ICF was scored for malaria (0.91) followed by stress and madness (0.90) and diarrhea (0.88). Fabaceae, Lamiaceae and Solanaceae were the most commonly reported medicinal plants with 7(14.29%), 5(10.20%), and 4(8.16%) species respectively. Halaba people is the richest in traditional knowledge of medicinal plants to treat various human ailments, but the traditional medicinal plant resources were highly treated by environmental change like drought, large scale deforestation and intensive utilization of land resources for cultivation. Involving local people on conservation and management of natural resources particularly medicinal plants should be encouraged.

Keywords: Ethnobotany, Human ailments, Halaba people, Traditional medicinal plants, Traditional healers.

1. Introduction

Ethnobotany is defined as the study of local people's interaction with the natural environment: how they classify, manage and use plants available around them ^[19]. Over centuries, indigenous people have developed their own locality specific knowledge on plant use, management and conservation ^[6].

Plants have played crucial role as a source of traditional medicine in Ethiopia from the time immemorial to combat different ailments and human sufferings ^[7]. It was the only system available for healthcare prior to the introduction of modern medicine for prevention, diagnosis and treatment of social, mental and physical illness ^[1]. To date traditional medicine has become an integral part of the culture of the Ethiopian people due to its long period of practice and existence ^[15].

Plant diversity remains crucial for human well-being and still provides a significant number of remedies required in healthcare. Medicinal plants played a pivotal role in the treatment of various afflictions in Ethiopia ^[10]. For the role-played by plant-derived products in human and livestock health, systematic scientific investigation is vital ^[30]. Plants play a major role in providing prototype molecules for possible development into conventional drugs by the pharmaceutical industry ^[10]. However, only small fractions of the world's plants have been investigated scientifically so far, but, human kind has already reaped enormous benefits from it ^[9]. Traditional medication is an important health care system among Halaba communities which mainly involves locally available traditional medicinal plants. Recently, some studies were ethnobotanical study of medicinal plants used by some ethnic groups of Southern Ethiopia.

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For instance, Kambta people [20]; Gedeo people [22]; Kore people [23]; Hadiya People [3] and others more. Nevertheless, no study was done to include traditionally used medicinal plants by indigenous people of Halaba in medicinal records of Ethiopia. This study is believed to contribute to the country database of medicinal plants and to document indigenous plant based medical knowledge of Halaba people.

2. Materials and Methods

2.1 The Study Area

Halaba Special Woreda is located in Southern Nations, Nationalities and Peoples Regional State (Fig. 1). The administrative center of the special woreda, Halaba kulito is located at a distance of 315 kilometers south of Addis Ababa and 87 kilometers North West of the regional center, Hawassa. Halaba special woreda is bordered with Silte zone in the North, Hadiya zone in the North- west and south, kambata Tembaro zone in the south west and Oromia regional state in the west. The ethno-linguistic neighbors of Halaba are Kembata, Hadiya, Silte, Sidama and Oromo among others. It is located between 7° 16' 22" to 7° 33' 49" North latitudes and 38° 04' 22" to 38° 13' 05" East longitude. Halaba Special Woreda has a population of 255,984 of which 129,645 were males and 126,339 were females. There are 76 rural kebeles (lowest administrative units in Ethiopia) and two urban sub-

towns. There are about 79 health posts and 9 health centers. The people of the study area belong to the Halaba ethnic group. They speak Halabanya, which belongs to Cushitic language families of the Afro-Asiatic language group. About 90 % of the people in Halaba are Muslims and 10 % were Christian.

The topographic feature of the woreda is 3% mountains, 70% of the total area is plain level and 27% is sloppy or undulating. The soil types are chironic and orthic Luvsols, and Eutric Nitosols, which have good potential for agricultural activities. The Eutric Nitosols is the most renowned for its fertility. Regarding the soil texture of the area 80% of the soil is sandy loam. 15% is clay and 5% is sandy.

Over 80% of the woreda lies under moist (wet) woina Dega (warm temperature rainy) Climate. Which the rest stretching south to north in the dry Woina Dega climate. The annual mean temperature of the woreda ranges from 17.6 degree centigrade to 20 degree centigrade.

The average annual rain fall ranges from 600 to 1000 mm. The rain fall pattern is semi-bimodal and bimodal with the highest rain fall in kiremt (summer). The woreda is poorly covered with forest and other vegetations. This is mainly attributed to large scale deforestation and intensive utilization of land resources for cultivation.

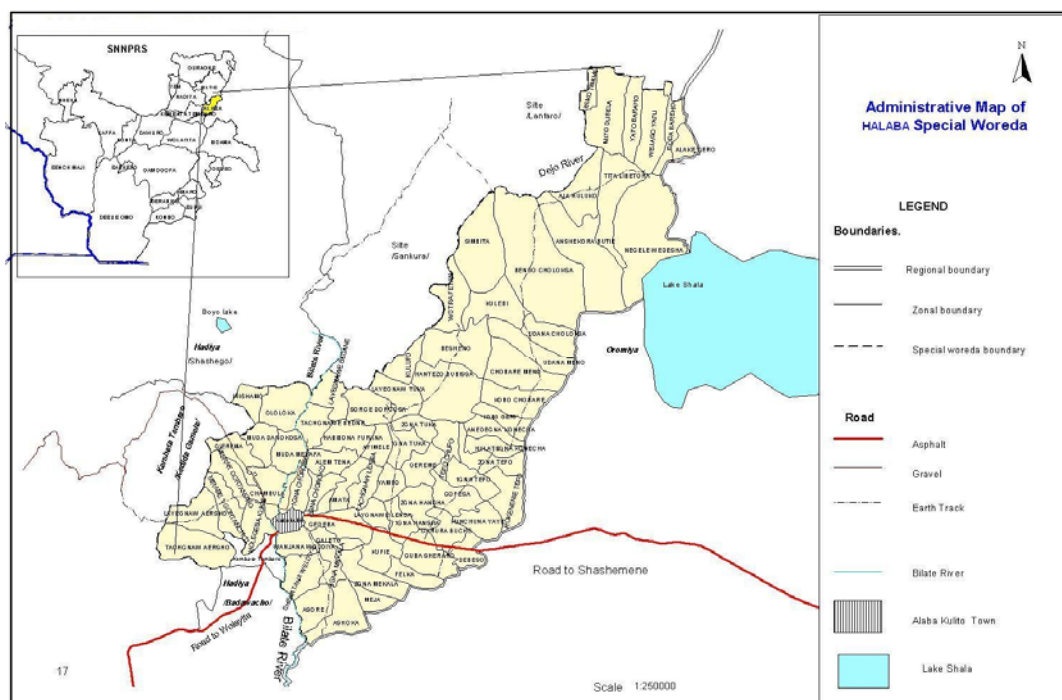


Fig 1: Map of Halaba Special Woreda showing the study kebeles [Source: 26]

2.2 Data collection

Ethnobotanical data were collected from December 2015 to August 2016. Ethical clearance was obtained from Hawassa College of teacher education academic dean office and written consent to undertake the study was sought from Halaba special woreda administrative office. Traditional health practitioner full name and residential addresses was taken from Halaba woreda health center. A total of 120 informants (80 male and 40 female) in the age of 25 and above were randomly selected from 76 kebeles and 2 sub-urban were identified and documented, of which 45 traditional healer were purposively and systematically selected for study subject based on the information given from Halaba woreda health

center and local administrators. Ethnobotanical data were collected using semi structured interview, focus group discussion, market survey and field observations. Interviews were conducted in 'Amharic language. During the study period, each informant was visited two to three times in order to confirm the reliability of the information. Information was obtained through ethnobotanic inquiries from the inhabitants, and herbal practitioners of Halaba people. Ethnobotanical techniques were employed to collect data on knowledge and management of medicinal plants used by Halaba people as described in [19, 4, 6].

2.3 Data Analysis

Microsoft office excel 2007 spread sheet were used to draw

graphs and determine proportions. The informant consensus factor (ICF) is calculated for each category of ailments to identify the agreements of the informants on the reported cures for the groups of ailments. ICF was calculated following [14]. $ICF = \frac{nur-nt}{nur-1}$, where nur = number of citation, nt = number of species used.

3. Results

3.1 Diversity of traditional medicinal plants

A total of 58 medicinal plant species, grouped within 53 genera and 35 families were identified and studied for treating 32 human ailments (Table 1). Fabaceae, Lamiaceae and Solanaceae were the most commonly reported medicinal plants with 7(14.29%), 5(10.20%), and 4(8.16%) species respectively. Family Brassicaceae, Rutaceae, Ranunculaceae, and Cucurbiaceae were represented by 2 species each, family Euphorbiaceae, and Asteraceae were represented by 3 species each, The remaining 24 families were represented by single species each (Table 2).

3.2 Habit and Plant parts used to treat various human ailments

Most of the traditional medicinal plant species documented in the studied area were herbs 26(53%), followed by trees 11(22.5 %), shrubs 10(20%), lianas 3(6%) fig. 2.

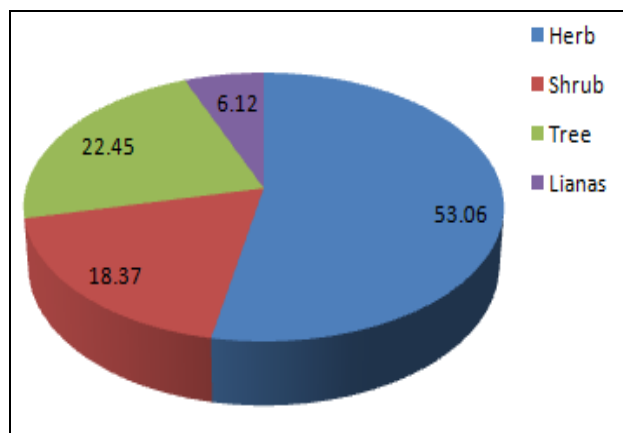


Fig 2: Habit forms of ethno medicinal plants

Traditional healers of Halaba people use different parts of medicinal plants to treat various ailments. Leaves contribute about 51.92% followed by stem (25%) and root (13.46%) Fig. 3.

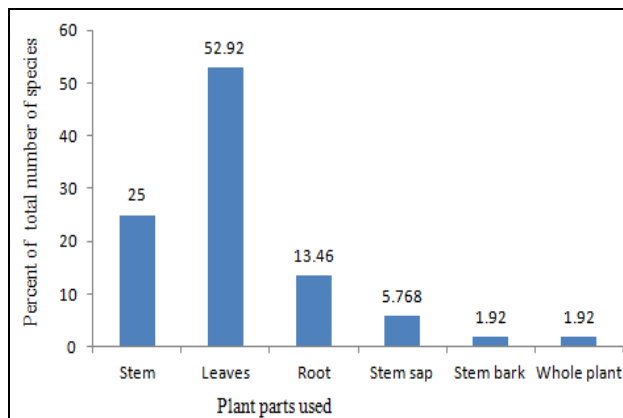


Fig 3: Medicinal plant parts used to treat human ailments

Table 1: List of medicinal plants used to treat human ailments by Halaba people

No	Scientific name	Family	Halaba name	Habit	Parts used	CPU	Method of preparation & application	RA	Source	Ailment treated
1	<i>Ajuga integrifolia</i> Buch-Ham ex-D.Don	Lamiaceae	Anamuro	H	L	fresh	The whole plants was crushed the liquid is filtered & drunk	Oral	C	Malaria, pneumonia, stomach pain, Swelling
2	<i>Acacia seyal</i> Del.	Fabaceae	Wacce	T	Stem sap	fresh	Sap of stem is heated on fire and smelling	Dermal	W	Head ache
3	<i>Acacia nilotica</i> (L) Wild.ex.Del.	Fabaceae	Gamballa adoora	T	L	fresh	Chewing the leaf applied to the affected area	Dermal	W	Wound
4	<i>Aloe gilbertii</i> Reynolds	Aloaceae	kurunda	H	Stem sap	fresh	Squeezed leaf sap on affected area for wound, taking the sap orally for malaria, tonsillitis	Dermal Oral	W	Malaria, intestinal parasite, Tonsillitis, wound, stomach pain, Sudden disease, Constipation, eye problem
5	<i>Allium sativum</i> L.	Alliaceae	Tuma	H	root	dry, fresh	Crush the bulb and swallow it for stomach ache, crush the bulb add some spoons of honey then take every morning to treat common cold, pneumonia, and malaria	Oral	C	Sunstroke, common cold, pneumonia, stomach ache, malaria, wound
6	<i>Asparagus africanus</i> Lam	Asparagaceae	Sariitii	H	L R	fresh	The leaf is crushed mixed with water and drunk for bleeding of blood, rushing with the wound. Root bark crushed, pound mixed with water and drunk for sterility.	Oral Dermal Oral	W	Evil spirit, Scabies, Sterility, bleeding of blood, wound
7	<i>Argemone ochroleuca</i> L.	Papaveraceae	Bulla calago	H	Stem sap	fresh	Stem sap is applied to the wound	Dermal	W	Wound
8	<i>Artemisia afra</i> Jacq. ex Wild.	Asteraceae	Fanfe	H	L	fresh	Pounding the leaves and smelling the through the nose	Dermal	C	Evil spirit
9	<i>Brassica nigra</i> (L.)Koch	Brassicaceae		H	Se	dry	Dried seeds and <i>Lepidiumsativum</i> seeds, powdered together, and diluted with water is given orally	Oral	C	Abdominal pain
10	<i>Balanites aegyptica</i> (L.)Del.	Balanitaceae	Badana hanqabato	T	Bark	dry	Heating the stem bark on fire and steaming the heat	Oral	W	headache
11	<i>Caesalpinia decapetala</i> (Roth)Alston	Fabaceae	Gora	Sh	Tip of leaf(3	fresh	Chewing the leaf applied to the area (for children)	Dermal	W	Tonsillitis
12	<i>Calpurnia aurea</i> (Ait.) Benth.	Fabaceae	dgixa	Sh	S,L	Dry/fresh	Chewing and swallowing, Leaf is crushed and the fluid is drunk	Oral	W	Diarrhea
13	<i>Catha edulis</i> (Vahl)Forssk.exEndl	Celastraceae	Cati	Sh	Tip of L	fresh	Chewing the tip parts of the leaf	Oral	C	Tonsillitis
14	<i>Carica papaya</i> L.	Caricaceae	Papaye	sh	L	fresh	Squeezed the leafs juice and drunk	Oral	C	Malaria
15	<i>Capparis tomentosa</i> Lam	Capparidaceae	Gimero	Sh	R	dry	Heating on fire and steaming, crushing the dry root powered and sneezing through nose	Dermal	W	Stress
16	<i>Capsicum frutescens</i> L	Solanaceae	Kariya	H	Se	dry	Eating the seeds mixing with foods		C	Malaria
	<i>Citrus aurantium</i> L.	Rutaceae	Komxxaxe	Sh	fluid	fresh	Appling the juice on the affected area, attaching to the selling parts		C	Wound, dandruff, swelling
17	<i>Citrus limon</i> (L)Burn.f.	Rutaceae	Lomi	Sh	fluid	fresh	The fluid is Squeezed and drunk	Oral	C	Stomach ache, evil spirit
18	<i>Clematis simensis</i> Fresen.	Ranunculaceae	Azoharge	liana	R	fresh	Root is crushed, pounded, the powder is mixed with butter applied to the wound	Dermal	W	Swelling

							and covered			
19	<i>Clutia abyssinica</i> Jaub. and Spach.	Euphorbiaceae	Fiyeye Fej	Sh	L	fresh	Crushed and the fluid is taken	Oral	W	Intestinal parasite
20	<i>Croton macrostachyus</i> Del.	Euphorbiaceae	Mesana	T	Stem bark Tip of leaf	Dry fresh	Dry stem is crushed, powdered, mixed with <i>Hagenia abyssinica</i> powder added to boiled coffee drunk. Tip of leaf is squeezed the liquid is applied to the area. Inserting the tip(bud) of the leaf in the nose for 2 hours or cooking the tip(bud) leaves with coffee leaf and drunk	Oral Dermal	W	Tapeworm Tonsillitis Wound Asthma
21	<i>Coffea arabica</i> L.	Rubiaceae	Qawi habala	Sh	L	dry	Dry leaf is crushed, powdered, then the powder is boiled and drunk	Oral	C	Anemia Gastritis
22	<i>Coriandrum sativum</i> L.	Apiaceae	Wedimama	H	Se	fresh	Crushed mixed with water and drunk		C	Malaria
23	<i>Cucumis ficifolius</i> A. Rich	Cucurbitaceae	Yemidire emboy	H	Root	Dry	Powdered,mixed with water, drink	Oral	C	Sudden illness
24	<i>Cymbopogon citralus</i> (DC)Stapf	Poaceae	Haxicho	H	L	fresh	Chewing the leaf and swallowing the liquid	Oral	C	Stomach pain
25	<i>Dovalis abyssinica</i> (A. Rich.) Warb	Flacaurtiaceae	Koshimi	Sh	Se	dry	Chewing 3 seeds and swallowing	Oral	W	Toothache
26	<i>Echinops amplexicaulis</i> Oliv.	Asteraceae	Hare omicho	H	R	Fresh/dry	The root is washed, crushed, squeezed adding salt to the liquid and taken	Oral	W	Stomach pain
27	<i>Ehretia cymosa</i> Thonn.	Boraginaceae	Ulaagaa	T	L	F	The leaves is crushed and rushing the skin	Dermal	W	Skin dryness
28	<i>Eucalyptus globulus</i> Labill	Myrtaceae	Nechi bairzaf	T	L	fresh	The leaf is boiled and bathing	Dermal	C	Common cold
29	<i>Euclea divinorum</i> Hiern	Ebenaceae	Dedeho	T	R	dry	Root bark crushed,pound the powder is applied to the eyes		W	Eyes problem
30	<i>Euphorbia tirucalli</i>	Euphorbiaceae	Azefulla	Sh	Se	fresh	The sap (milk) of the stem is taken and drunk	Oral	W	Hemorrhoid
31	<i>Girardina diversi folia</i> (Link) Friis	Urticaceae	Doobii	H	L	fresh	The leaf is crushed, filtered the liquid is taken	Oral	W	Gastritis
32	<i>Hagenia abyssinica</i> (Brace) J.F. Gm	Rosaceae	Xemuu	T	L	dry	The dry leaf is crushed, powdered mixed with water drunk	Oral	C/W	Tapeworm
33	<i>Impatiens tinctoria</i> A. Rich.	Balsaminaceae	Angabisha	H	R	F/dr	Crushed and the juice is taken Crushed and washing the body	Oral/optical	W	Gonorrhea Evil eye
34	<i>Kalanchoe petitiata</i> A. Rich.	Crassulaceae	Hancuule	H	L,Se	fresh	The stem and leaves are heated on fire applied on the place	Dermal	W	Children stomach pain, penumonia
35	<i>Lagenaria siceraria</i> (Molina) Standl	Cucurbitaceae	Qulle habarra	Cl	L	fresh	Leaf is pound and			
36	<i>Lepidium sativum</i> L.	Brassicaceae	Shunninaa	H	Se, L	dry, fresh	Chewing the seeds and swallowing, adding the seeds or leafs with coffee and drunk, applying the powder to the affected area.	Oral	C	Sun stroke, Stomach ache Tooth ache
37	<i>Leucas martinicensis</i> (Jacq.) R.Br.	Lamiaceae	Sofamee	H	Whole plant	fresh	The whole plant is crushed, pound, the powder is mixed with water,filtered and drunk	Oral	W	Eyes problem
38	<i>Malva parviflora</i> L.	Malvaceae	Siito	H	L	dry	The leaf is crushed, powder mixed with	Oral	W	Tuberculosis

							water drunk			
39	<i>Moringa stenopetala</i> L.	Moringaceae	Halako	T	L	dry, fresh	Dry leaf is boiled and taken as a tea. The fresh leaf is cooked and the juice is taken	Oral	C	Blood pressure, malaria, stomach pain
40	<i>Nicotiana tobacum</i> L.	Solanaceae	Timbaho	H	L		Crushing the seed with salt and taken orally. Covered with small piece of cloth sneezing through nose	Oral	C	Headache, stomachache, intestinal parasite
41	<i>Nigella sativa</i> L.	Ranunculaceae	Gebla anjanta	H	Se	dry	One spoon of <i>Nigella sativa</i> (cumin) oil was taken morning and evening	Oral	C	Common cold, pneumonia
42	<i>Ocimum lamiifolium</i> Hochst ex Benth	Lamiaceae	Demakase/Mareza	H	L	fresh	Crushed, pound & mixed with coffee drink, applying the fluid in the eyes	Oral	C	Sunstroke, common cold, eye problem, headache
43	<i>Olea europea ssp. cuspidata</i>	Oleaceae	Weyira	T	L	fresh	Chewing the leaf & swallowing	Oral	C/W	Gastritis
44	<i>Polygonum senegalense</i> Meisen	Polygonaceae	Gumma mila(A)	H	W	fresh	The whole plant is crushed and the juice was taken, rubbing the affected area for fungus	Oral	W	Gastritis, fungus
45	<i>Rosmarinus officinalis</i> L.	Lamiaceae	Sigametebesha	H	L	fresh	The leaf is crushed, boiled and taken as a tea	Oral	C	Blood pressure
46	<i>Ruta chalepensis</i> L.	Rutaceae	Charote	H	L	fresh	Leaf is squeezed smelling, taken oral for stomach ache	Oral	C	Abdominal pain, evil eye
47	<i>Senna didymobotrya</i> (Fresen.) Irwin & Barneby	Fabaceae	Sanamiki	Sh	L	dry	Crushed, powdered, boiled and drunk		W	Intestinal parasite, gastritis, gonorrhea
48	<i>Solanum incanum</i> L.	Solanaceae	Mahee/looreta	Sh	Se	dry	Seeds liquid are applied to eyes, tongue and ears.	Dermal		Eye problem Ear problem Tonsillitis
49	<i>Solanum incanum</i> L.	Solanaceae	Mahee/looreta	Sh	Se	dry	Seeds liquid are applied to eyes, tongue and ears.	Dermal		Eye problem Ear problem Tonsillitis
50	<i>Stephania abyssinica</i> (Dillon & A. Rich.) Walp.	Mensipermaceae	Hidda kalaala	H	R	fresh	Root of female is crushed, pounded the juice is taken in empty stomach in the morning	Oral	W	Stomach pain, evil eye
51	<i>Taverniera abyssinica</i> A. Rich.	Fabaceae	Dingetegna Zabuu	T	Se	dry	Crushed, powdered, mixed with water taken orally	Oral	W	Stress, sudden illness
52	<i>Trigonella foenum graecum</i>	Fabaceae	Shuqoo	H	se	dry	The seed is crushed, powdered, mixed with lemon liquid and water drunk the juice, the powder is mixed with cheese for cold	Oral	C	Typhoid, pneumonia
53	<i>Thymus schimperi</i>	Lamiaceae	Tosnyi	H	L	Dry, fresh	Fresh leaf is crushed squeezed the fluid is taken, dry leaves is boiled taken in the form of tea	Oral	W	Blood pressure
54	<i>Urtica simensis</i> Steudel	Urticaceae	Sanamik	H	L	dry	Crushed powdered, boiled and taken as tea	Oral	W	Intestinal parasite, gastritis, sexual transmitted disease
55	<i>Vernonia amygdalina</i> Del.	Asteraceae	Hebba	T	L	fresh	Crushed, pounded & powder is mixed with water & drunk	Oral	C/W	Intestinal parasite
56	<i>Withania somifera</i> (L.) Dunal in DC	Solanaceae	Gizawa	H	R L	Dry fresh	Crushed, powdered mixed with water drunk, washing the body with leaf for	Dermal	C	Evil spirit (likift)

							5 days			
57	<i>Zingiber officinale</i> Rosc.	Zingiberaceae	Janjabela/zanjabila	H	Se	Fresh/dry	Stem is crushed and chewing	Oral	C	Tonsillitis, Mouth odor, stomach pain
58	<i>Ziziphus mucronata</i> (Willd)	Rhamnaceae	Kurkura	Sh	L	fresh	The leaf is added to water for one night then wash the body for 3 days	Dermal	W	Madness

Key: CPU = Condition of Plants used, RA = Route of Application, Habit: T= Tree, S= Shrub, H= Herb; C= Cultivated, W= Wild, L= Leaf, R= Root, Se= Seed

Table 2. Medicinal plant families in the study area with the corresponding number of species

No	Families	Species	Proportion (%)	No	Families	Species	Proportion (%)
1	Fabaceae	7	14.29	19	Myrtaceae	1	2.04
2	Lamiaceae	5	10.20	20	Ebenaceae	1	2.04
3	Solaneaceae	4	8.16	21	Aloaceae	1	2.04
4	Euphorbiaceae	3	6.122	22	Urticaceae	1	2.04
5	Asteraceae	3	4.08	23	Rosaceae	1	2.04
6	Brassicaceae	2	4.08	24	Crassulaceae	1	2.04
7	Rutaceae	2	4.08	25	Malvaceae	1	2.04
8	Ranunculaceae	2	4.08	26	Moringaceae	1	2.04
9	Cucurbitaceae	2	2.04	27	Oleaceae	1	2.04
10	Alliaceae	1	2.04	28	Anacardiaceae	1	2.04
11	Asparagaceae	1	2.04	29	Mensiperaceae	1	2.04
12	Papaveraceae	1	2.04	30	Zingiberaceae	1	2.04
13	Cleastraceae	1	2.04	31	Boraginaceae	1	2.04
14	Caricaceae	1	2.04	32	Rhamnaceae	1	2.04
15	Rubiaceae	1	2.04	33	Balanitaceae	1	2.04
16	Apiaceae	1	2.04	34	Capparidaceae	1	2.04
17	Poaceae	1	2.04	35	Balsaminaceae	1	2.04
18	Flacaurtiaceae	1	2.04				

3.3 Source and condition of medicinal plants

The majority of medicinal plants collected were indigenous and adapted to agroclimatic of the study area. Among 58 medicinal plants 24 (48.98%) were collected from wild, 22 (44.89%) were collected from homegardens and 3 (6.124%) are collected from both wild and homegardens. Traditional healers of Halaba people use different conditions of medicinal plants. The majority 58.33% of the preparations are made from fresh followed by dry 25%, both dry and fresh 16.67% (Fig.4).

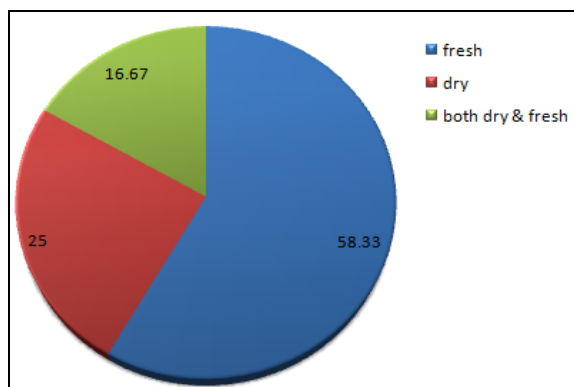


Fig 4: Condition of plant parts used

3.4 Age distribution, education and source of wisdom of traditional healers

The distribution of informant's age class showed that the majority of informants were laid in the age of 41-45 (49.5%) followed the age of 51- 60(47%) and 31-40(25%). The average

age of the traditional healers was 55 years old (Figure 5). The educational status of traditional healers, 50 % were attended grade 1-4, 25% attend grade 5-8, 5% were attended grade 10-12, 25% were illiterate. The source of wisdom for traditional healers were from God, 35%, father 25%, friend with payment 5%, religion 10% and other 6%.

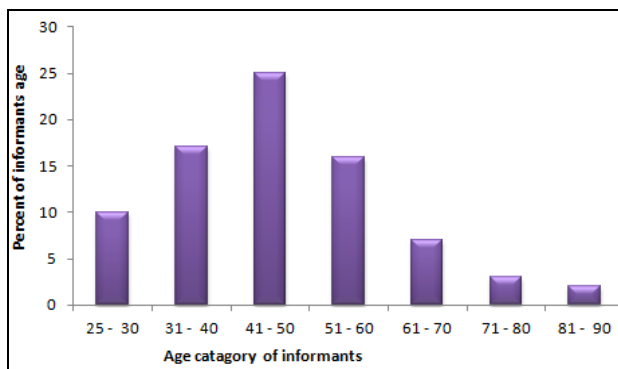


Fig 5: The distribution of informants in age classes

3.5 Pair wise comparison of medicinal plant to treat malaria

The result of pair wise comparison of ethno medicinal plants used to treat malaria indicates that *Ajuga integrifolia* ranked first for treating malaria *Allium sativum* and *Carica papaya* ranked second and third for treating malaria respectively. *Capsicum frutescens* and *Aloe gilbertii* are ranked least for treatment of malaria (Table 3).

Table 3: Preference ranking of eight (8) ethno medicinal plants used to treat malaria by Halaba people

Plant species	Informant labeled from I ₁ to I ₁₀										Total	Rank
	I ₁	I ₂	I ₃	I ₄	I ₅	I ₆	I ₇	I ₈	I ₉	I ₁₀		
<i>Ajuga integrifolia</i>	4	3	1	5	2	2	4	3	4	2	30	1
<i>Aloe gilbertii</i>	3	4	1	2	0	3	2	2	1	4	22	4
<i>Allium sativum</i>	5	3	3	1	2	2	4	1	2	3	26	2
<i>Carica papaya</i>	4	2	4	2	3	1	2	4	0	2	24	3
<i>Capsicum frutescens</i>	2	1	0	3	2	4	1	3	1	4	21	5
<i>Coriandrum sativum</i>	4	2	1	2	3	0	1	1	2	3	19	7
<i>Trigonella foenum graecum</i>	3	1	3	1	0	2	3	3	1	1	18	8
<i>Securidaca longepedunculata</i>	1	4	3	5	2	3	5	2	1	3	20	6

3.6 Medicinal plants sold in the local market

Halaba kulito market is the biggest local market in the southern regional state in particular and in Ethiopia in general. It is usually on Thursday. The majority of traditional healers and indigenous people were selling medicinal plants in the local market near the road side under shade (Fig. 6). Some traditional healers have legal licensed for treating various

human ailments. Although there is accessibility of health centers in their locality indigenous people of Halaba predominantly based on traditional medicinal plants for the treatment of various ailments. Some of the traditional medicinal plants sold in the market are Arabian origin which includes minerals and solvents.



Fig 6: Photographs illustrating some traditional medicinal plants sold in open markets of Kulito

3.7 Traditional medicinal plants used to treat various human ailments

Among the traditional medicinal plants species reported to treat various human ailments the highest number of plant species was reported to treat stomach ache (13 species), malaria and evil eye (8 species each); wound and tonsillitis (6

species each); eye disease and intestinal parasite (5 species each); hemorrhoid, diarrhea, skin dryness, spider bite, blood bleeding, scabies, mouth smell, anemia, asthma, constipation, tuberculosis, typhoid and ear disease are treated by one plant each(Fig. 7).

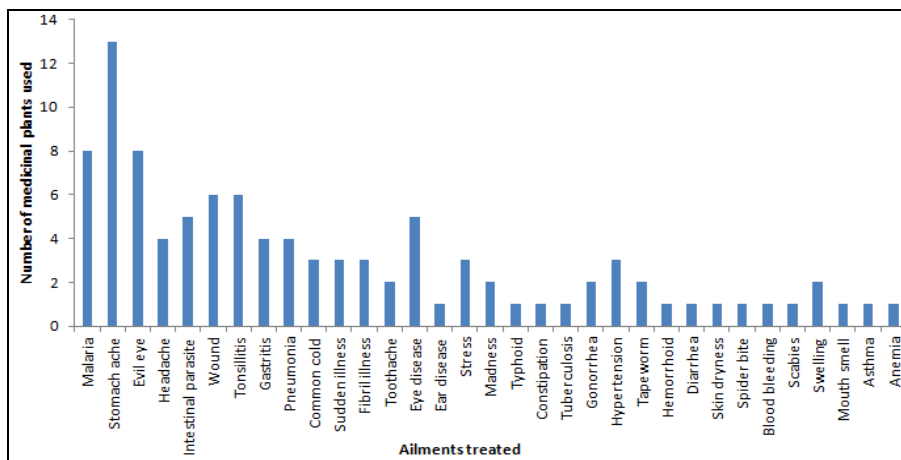


Fig 7: Ailments treated and the numbers of medicinal plants used by Halaba people

3.8 Treats of Traditional medicinal plants

The major threats to traditional medicinal plants in the Halaba special woreda according to the informants response were agricultural expansion (89%), deforestation (80%), drought (45%), intensive use of natural resources for cultivation (59%), firewood (37%), charcoal production (20%), climate change (15%).

3.9 Mode of preparation, dosage and routes of application

Traditional healers of Halaba people use different methods of preparation of medicinal plants to treat various types of human ailments like crushing, chewing, squeezing, pounding, powdering, burning and steaming, heating and bath, juice. Crushing is the highest and the most commonly used medicinal plant preparation methods which constituted 39.24% followed by chewing 13.9% and squeezing 10 % (Table 4).

Table 4: Methods of preparation of traditional medicinal plants used by Halaba people

Method of preparation	Number of preparation	Percentage
Crushing	31	39.24
Chewing	11	13.92
Squeezing	8	10.13
Pounding	7	8.86
Powder	7	8.86
Burning and steaming	5	6.33
Heating and bath	6	7.59
Juice	4	5.06

3.10 Informant consensus

The informant consensus factor value ranges from 0.77- 0.91 per illness category. The ICF provides a range of 0 to 1 where a high value acts as a good indicator for a high rate of informant consensus. Malaria scored the highest informant consensus factor of 0.91, stress and madness (0.90) followed

by Diarrhea, Typhoid, Gonorrhea (0.88), Toothache, eye disease, ear disease, mouth smell (0.87), Blood bleeding, Anemia, hypertension (0.86). The lowest informant consensus factor was recorded for Stomachache, constipation, gastritis, sudden illness (0.77) and Wound, Swelling, skin dryness, Spider bite, Scabies, tonsillitis (0.79) Table 5.

Table 5: Informant consensus factor by categories of ailments treated by traditional medicinal plants of Halaba people

Ailments category	Species used	Percentage of all species	Use citation	ICF
Stomachache, Constipation, Gastritis, Sudden illness	21	35 %	90	0.77
Pneumonia, Common cold, Tuberculosis, Asthma	9	15.3 %	55	0.85
Intestinal parasite, Tapeworm	7	11.9 %	39	0.84
Diarrhea, Typhoid, Gonorrhea	4	6.78 %	28	0.88
Wound, Swelling, Skin dryness, Spider bite, Scabies, Tonsillitis	17	28.8 %	79	0.79
Toothache, Eye disease, Ear disease, Mouth smell	9	15.3 %	67	0.87
Stress, Madness	5	8.5%	42	0.90
Blood bleeding, Anemia, Hypertension	5	8.5%	30	0.86
Malaria	8	13.6%	77	0.91
Evil eye/evil spirit	8	13.6%	47	0.847

4. Discussion

4.1 Diversity of traditional medicinal plants

The present study collected and studied 58 traditional medicinal plant species belonged to 53 genera and 35 families for treating 32 human ailments. This diversity of traditional medicinal plants was comparable with other ethnobotanical study of traditional medicinal plants conducted in other areas of Ethiopia. For instance, [17] documented 54 traditional medicinal plant species belonging to 48 genera and 35 families in Dega Damot Woreda, Amhara region to treat 38 ailments. It is also comparable with [23] which recorded 56 medicinal plant species within 52 genera and 31 families to treat 31 human ailments by Korre ethnic group. It is higher when compared with Bench ethnic group which documented 35 medicinal plants to treat both human and livestock ailments [11]. Family Fabaceae was the most commonly reported medicinal plants represented by 7 species (14.3%) followed by Lamiaceae 5 species (10.2%) and Solanaceae 4 species (8.2%). The dominance of family Fabaceae for medicinal uses were also reported in other ethnobotanical studies elsewhere in Ethiopia [21, 23, 5]. Other researchers reported that Lamiaceae is the leading family with highest number of medicinal plants. For example, [29] reported that family Lamiaceae was the most frequently used medicinal plants with a total of 12 species followed by Solanaceae with 8 species in South Omo and [16] research conducted in Dire Dawa city, eastern Ethiopia also reported that Lamiaceae had a relatively high number of species (5 species), followed by *Fabaceae* with 4 species.

Among 58 traditional medicinal plants species documented 24 were collected from wild, 22 were from homegardens and 3 were from both wild and homegardens. This shows that the traditional healers of Halaba people were mostly harvested medicinal plants from wild. This is in line with other ethnobotanical studies in Ethiopia where the majority of traditional medicinal plants were collected from wild [21, 8]. Traditional medicinal plants used by Halaba people were also reported medicinally by other parts of Ethiopia. Among 58 traditionally used medicinal plants 15 were reported by [21]; 12 were reported by [27]; 20 were reported by [20], and 20 were reported by [8] to treat human ailments.

4.2 Habit of medicinal plants and parts used

The present study showed that Halabla people use herbs for traditional medicinal plant which accounts 52 % of the total plant species documented followed by trees and shrubs which accounts 22 % and 20 % respectively. Similar study is reported from Konta people where 68 species were used for remedy preparation are herbs [13]. Similar results were also reported by [8, 28, 18]. Leaves are the most commonly used plant parts for remedy preparation to treat various human ailments by Halaba people followed by stem and root. Similar finding was also reported by [8, 28, 32]. The use of leaves for remedy preparation reduces the risk of destruction of mother plants. This is also in line with [24] in Monpa ethnic group, Arunachal Pradesh, India where leaves are the most widely used for remedy preparations. The use of stem and root next to leaves for remedy preparation by traditional healers of Halaba people may be effect on survival of traditional medicinal plants.

4.3 Condition, Mode of preparation and Route of application

The study result indicated that the condition of medicinal plants is largely processed in fresh form. Similar result was reported from other parts of Ethiopia [20, 2, 12, 31]. Additive

substances like water, honey, coffee, butter and salt are widely used for preparation of remedies by traditional healers of Halaba people. Water was the most frequently used diluents in the preparation of remedies. Similar result was also reported by [33] where the majority (94%) of preparations is drawn from mixtures of different plant species with different additive substances like honey, butter, oil, milk, salt, bread for the treatment of single ailments. Traditional healers of Halaba people use different measurement of dosage to treat various ailments like finger lines and finger nails. Measuring materials like spoon, coffee cup, tea cup and glass cups were commonly used. Crushing was the most frequently used remedy preparation by Halaba people. This result is in agreement with the findings of [13, 16, 21, 3]. Oral application is the most widely used route of administration in the study area. Similar results were reported by [8, 28, 18]. This is in agreement with other ethno medicinal studies elsewhere in Ethiopia [21, 2, 5].

4.4 Ailments treated and ICF

The consensus factor analysis shows that Malaria (0.91), Stress, Madness (0.90), Diarrhea, Typhoid, and Gonorrhea (0.88) have the highest informant consensus factors among the category of ailments treated. The higher the ICF value indicates that the medicinal plant had effective in treating the given ailments. The highest informant consensus was reported for treating Gonorrhea among traditional healers of Hawassa city [25]. The preference ranking exercise was used to identify the most preferred traditional medicinal plant species to treat malaria. *Ajuga integrifolia*, *Allium sativum* and *Carica papaya* scored highest values and the most preferred for treating the disease.

4.5 Medicinal plants and the associated knowledge

The study revealed that traditional healers' of Halaba were prepared and administrated remedies at household level. As in other parts of Ethiopia the traditional healers of Halaba kept their traditional medicinal plants knowledge secret. The transfer of knowledge is only possible within family especially from fathers to sons or the best loved family members. This finding was reported by [25, 11, 20]. Older traditional healers of Halaba ethnic group had greater knowledge and use of ethnomedicinal plant species than younger traditional healers. This indicates that the younger traditional healers might have given less attention to the value of indigenous knowledge due to the secrecy, unwillingness of older traditional healers to share the indigenous knowledge to the younger generation.

4.6 Conservation and treats of medicinal plants

Similar with other parts of Ethiopia, the major threats to medicinal plants of Halaba people were agricultural expansion, deforestation, firewood, charcoal production, construction and population pressure [22, 5, 7].

5. Conclusion and Recommendations

The present study identified and documented 58 traditionally used medicinal plants used to treat 32 human ailments by Halaba ethnic group. The result of the present study indicates that traditional medicinal plants can play a great role in the health care systems of Halaba ethnic group similar with other parts of Ethiopia. Some human ailments such as Hemorrhoids, evil eye, sudden illness, fibrile illness (mich), stomach ache, headache and wound were locally preferable treatments by traditional healers rather than modern treatments. There is no

written document of traditional medicinal plants knowledge of Halaba people for the next generation. The transfer of traditional medicinal plants knowledge was only takes place through oral communication. The lack of documented information erodes the indigenous knowledge and existence of medicinal plants of the study area. There are some traditional healers in Halaba town which practices medicinal plants illegally and sold on open market without any permission. Therefore, organizing the traditional healers, awareness creation, establishing traditional healers association, providing land for insitu conservation in the homegardens, popularizing their indigenous knowledge on traditional medicinal plants will ensure sustainability of medicinal plants. Further ethno pharmacological and phytochemical investigations should be conducted on medicinal plants used by Halaba ethnic group particularly on conservation strategies and sustainable use of medicinal plants.

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Competing Interests

Authors have declared that no competing interests exist.

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