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Ethnobotanical Study of the Traditional Use and maintenance of Medicinal Plants by the People of Aleta-Chuko Woreda, South Ethiopia

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ABSTRACT

Background: Over centuries, indigenous people have developed their own locality specific knowledge on plant use, management and conservation. However, this valuable traditional knowledge on utilization of plants was not much documented and hence, most of the indigenous knowledge acquired by the local people has been passed on from generation to generation by the word of mouth. Ethnobotanical study is of the use and maintenance of traditional medicinal plant species by the people of Aleta Chuko woreda, South Ethiopia. The study made an attempt to assess the indigenous knowledge that equips the community to identify the medicinal plants, formulate the medicines and subsequently administer the curatives used to treat various human and livestock diseases as the threats that could affect their sustainable use. **Methods:** A total of 100 informants (85 males and 15 females) were selected to collect information on medicinal plant use from five selected kebeles by using non-probability sampling method. Relevant ethnobotanical information was collected through semi-structured interview, field observation and group discussion. Data was analyzed using descriptive statistics and simple linear correlation coefficient. The study was carried out from September, 2017 to July, 2018. **Results** A total of 53 medicinal plant species representing 49 genera and 30 plant families used in the treatment of 92 (81 human and 11 livestock) different ailments. The plant families Lamiaceae, Rutaceae, and Asteraceae were the most dominant groups. Out of the total recorded medicinal plant species, 79%, 11 % and 10%, were used for treating human, livestock and both humans and livestock health problems respectively. Stomachache and cough were the most common health problems of the study area affecting both humans and animals. 60% of the medicinal plant species were collected from the wild/forest and the remaining 40%were collected from the Homegardens. Herbs were the dominant medicinal plant habit, followed by shrubs and trees. Leaves are the dominant plant part used in formulating curative preparations. The most dominant methods of preparation were crushing and pounding and 70.5% is the dominant route of oral administration. *Fagaropsis angolensis* was the most effective curatives species against stomach ache, the most common human disease in the study area, followed by *Leonotis nepetifolia,* and *Ajuga integrifolia, Ocimum lamiifolium* was the most preferred medicinal plant to treat headache followed by *Echinops kebericho* and *Salvia nilotica*. **Conclusions:** The Coffee-Enset based home gardens which characterize the study area make a substantial contribution to the conservation of medicinal plants species. In order to conserve the traditional medicinal plant species of the study area, community-based in-situ and ex-situ conservation actions, awareness creation in the younger members, and strengthening home gardens and other components of the agro-forestry systems to be used as repositories of medicinal plant species and alternative conservation sites are recommended.
Key words: Ethnobotany, Indigenous knowledge, Traditional healers, Medicinal plant species.

INTRODUCTION

Over centuries, indigenous people have developed their own locality specific knowledge on plant use, management and conservation.[1] Therefore, the conservation of ethnobotanical knowledge became a part of living cultural knowledge and practices between communities and the environment which is essential for biodiversity conservation.[2,3] However, this valuable traditional knowledge on utilization of plants was not documented and hence, most of the indigenous knowledge acquired by the local people has been passed on from generation to generation by the word of mouth.[4-6] Such orally preserved information is liable to loss rather than conserved for future use, if left undocumented and in most cases some of the lore is lost at each point of transfer.[2] According to world Health Organization those traditional medicinal plants were believed principally by more than 80% of the population in Africa.[7] Hence, the need for systematic documentation of such a useful knowledge is nowadays accomplished through ethnobotanical research.[1,2,8]

Although Ethiopia is endowed with multiethnic cultural diversity that has evolved within the milieus of diverse flora, medicinal plants have not been adequately studied, tested or documented.[9] As a result, much of the traditional medicinal plant resources and the associated knowledge has not been much documented and hence face the threat of erosion and loss. The Aleta Wondo people, like many other traditional groups of Ethiopia, practice traditional medicine to treat both human and livestock ailments, and acquired knowledge accumulated over centuries. This study therefore aims to investigate plant based traditional medicinal practices among the people of the study area by focusing on communities living in Aleta-Chuko Woreda of Sidama Zone, South Ethiopia. The purpose of this study is to document traditional

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medicinal plants species, management practices and the associated indigenous knowledge of the people in Aleta-Chuko Woreda, and to identify the major threats against these plants species in the study area.

METHODS

The Study Area

The study was conducted in Aleta-Chuko Woreda, South Ethiopia, from October 2017 to May 2018. Aleta-Chuko Woreda is located in Sidama Zone, Southern Nation Nationalities people Regional State. Relative location: Aleta Chuko is bordered on the south by Dara, on the southwest by the Oromia Region, on the west by Lake Abaya, on the north by Dale, and on the east by Aleta Wendo (Figure 1). The administrative center is Chuko. Chuko was separated from Aleta Wendo woreda II. Aleta Chuko, in an absolute location, is found within 6460'- 6720' N Latitude and 3820'-3856' E Longitude. The Woreda is situated 338 km south of Addis Ababa. The Woreda has an estimated area of 91,750.2 ha and it consists of 28 Kebeles.[10,11]

Sampling and data collection

Prior to the start of the actual study, a reconnaissance observation was carried out within the Aleta-Chuko Woreda to identify potential study sites, and ultimately decide on those deemed suitable for the objective of the present study. Selection of the Kebeles were based on the number (and/or distribution) of traditional healers within each Kebele of the study Woreda. Informants and knowledgeable traditional medicine practitioners were selected using purposive sampling approaches in the manner described by.[2] 100 Respondents (85 males and 15 females; 20 Respondents from each of the 5 Kebeles) were selected in order to generate information through interviews and group discussions. The traditional healers were formally nominated by elders, local authorities, development agents and local Administrators.

Semi-structured interviews, focus group discussions and field observation were used to collect ethnobotanical data. Informants were interviewed individually in their local language, *Sidamuu Affoo*. Semi-structured interviews (SSI) were used to collect data on personal profiles of informants, as well as all necessary information on traditional medicinal plant species (e.g. ailments treated, parts used, etc.). Voucher Specimens were collected following the standard herbarium procedures and identifications were carried out using personal expertise and experience as well as using the published books series of different volumes (Volumes 1 to 7) of the Flora of Ethiopia and Eritrea.[12-20]

Data Analysis

The quantitative data were analyzed using descriptive statistics and results were displayed by tables and graphs. Informant consensus, use value/relative importance and informant consensus factor were also computed. Simple linear correlation test was performed to assess the association between medicinal plant knowledge and age of informants as well as between medicinal plant knowledge and educational background of informants. Moreover, ranking and comparison techniques were also employed.

RESULTS AND DISCUSSION

Informants' profile

Out of the 100 respondents interviewed in the study area, 85 were belong to male category and the remaining 15 respondents were female category. As far as the sex category of the respondents are concerned, the males are high number compare with females. It is primarily due to cultural influence prevailing in Aleta Chuko Woreda, where women were very much reluctant to meet the outsiders and hence, this, at least in part, accounts for the limited participation of the same during the study. Likewise, in similar studies[21,22], males accounted for comparatively higher proportions out of the total respondents.

The age category ≥ 60 constituted the highest percentage (29%), followed by 50–59 (24%) and 40–49 (22%). On the contrary, the age groups 20–29 and 30–39 were represented by the lowest number of respondents (Table 1). Nonetheless, the size of every category of age corresponds to considerable fraction (≥ 11%) of the total number of respondents. Comparable distribution of informants in age categories was conducted by[23], in his ethnobotanical investigation of Konta special woreda, SNNPRS, Ethiopia.

As regards to educational background, the majority (59%) of the respondents were illiterate, while 33%, 5%, and 3% of the informants had primary, secondary and above secondary education respectively. Although most of the participants were illiterate which coincided mainly with age group above 40, they are generally considered as important repository of traditional medicinal knowledge (Table 1).

Distribution, Diversity and Therapeutic Worths of Medicinal Plants in the Studyarea

A total number of 53 medicinal plant species distributed over 30 plant families and 49 genera, were recorded in this study in Aleta Chuko Woreda. Among these plant families, Lamiaceae represented by the highest species (8) followed by Rutaceae (5), Asteraceae (4), Rosaceae (3), Fabaceae (3) and Solanaceae (3). While Myrtaceae, Oleaceae, and Boraginaceae had two species each, the remaining 21 families were represented by single species (Table 2). [24], also reported that the family Lamiaceae had highest number of species represented by (19). Similarly,[23] reported that Lamiaceae and Asteraceae were the second and third most important families containing high number of medicinal plant species in Konta special woreda, SNNPRS, Ethiopia. [25], in his appraisal on the indigenous knowledge of medicinal plants use in Hawassa City, indicated that Lamiaceae, Rutaceae, and Asteraceae were among the families that contributed more to the medicinal species. Whereas[26], reported Fabaceae, Rosaceae, and Solanaceae were among the important families of medicinal plant species. This essentially suggests that there is wider utilization of the top six families in the present study (Lamiaceae, Rutaceae, Asteraceae, Fabaceae, Rosaceae, and Solanaceae) for medicinal purpose by diverse communities across the different corners of Ethiopia, which eventually can substantiate their efficacy levels. The consumption of such a large number of medicinal plants by people in the study area indicates that the majority of the local people is still employing and possibly may continue to use indigenous

Table 1: Background of Respondents (n=100).

Variables	Frequency	Percentage (%)
Sex		
Male (M	85	85
Female (F)	15	15
Age Category		
20–29	11	11
30–39	14	14
40–49	22	22
50–59	24	24
≥ 60	29	29
Educational Background		
Illiterates	59	59
Primary (First cycle (1–4 grade))	17	17
Primary (Second Cycle (5–8 grade))	16	16
Secondary High School (9–10 grade)	5	5
Above grade 10 (>10th)	3	3

knowledge on medicinal practices for their therapeutic effects against different ailments in the study area.

Medicinal plant species used for humans, livestock and both health problems

Out of the total 53 medicinal plant species recorded in this study, the majority (79%) of medicinal plant species were used to treat 81 human diseases, while 11% of the same were used to treat 11 livestock ailments and 10% for both (Figure 2 and Table 3).

In line with the present study, a number of studies[23,25,27-31], reported that most of the medicinal plants are commonly used for the treatment of human ailments than therapeutic applications of medicinal plants that are intended to relieve illness or injury of livestock.

Health problems identified in the study area

On the other hand, the most common Human and Livestock Diseases in Aleta Chuko Woreda are indicated in Table 4. The most common human ailment was Stomachache followed by headache, wound, and common cold. Conversely, important livestock diseases reported in the study area are cough, poor milk yield, and stomachache (Table 4). As [30], pointed out that the traditional healers in the study area were knowledgeable of diseases and medicinal plants used to treat them.

Source habitats of traditional medicinal plant species

The majority i.e., 32 (60%) of the medicinal plant species were collected from the wild (natural and semi-natural habitats), whereas the remaining 21 (40%) were collected from home-gardens. Our study was found to have similarity with [21,25,27,32,33], which showed that medicinal plants were commonly collected from the natural habitats. The high number of natural environment medicinal plant species collection from natural or wild habitats may indicate that there is little or no attempt to conserve or deliberately cultivate by the traditional healers. Consequently, local practitioners of the study area have to considerably rely on the wild source or the natural environment rather than Home gardens to obtain the medicinal plants and hence, the activity of managing wild medicinal plants is ineffectual. According to[27] and[34], local practitioners depend on the wild source of medicinal plants and hence, the activity of managing and conserving natural environments medicinal plants in a particular area is not easy, especially if the plants are over exploited.

Habits of the medicinal plants

The assessment on the habits of the medicinal plants depicted that Herbs constituted the highest fraction (34%) of the total species collected closely followed by both Shrubs and Trees (32%). Conversely, climbers accounted for only a tiny fraction (2%) of medicinal plants assayed under the present study (Figure 3). Saving climbers [35], reported comparable fractions of herbs (37%), trees (32%) and shrubs (31%) in his study of medicinal plants from Ghimbi District, Southwest Ethiopia. Evidently, the present data suggested that herbs are still considered as the most important source of therapeutics for the treatment of both Human and Livestock ailments. In line with the present data, various studies[21,25,26,28,30,35-37], found that Herbs were the most harvested plant forms for the treatment of diseases of humans and their stocks. The key informants as well as the traditional healers revealed that collection of medicinal plants usually carried out during rainy season. On the other hand, it is worth noting that the shrubs and trees are also key contributors towards the traditional Ethnomedicine and Ethnoveterinary practices of the Aleta Chuko Woreda. It may also be noted that the woody plants could serve as important sources of curatives even during both wet and dry seasons.

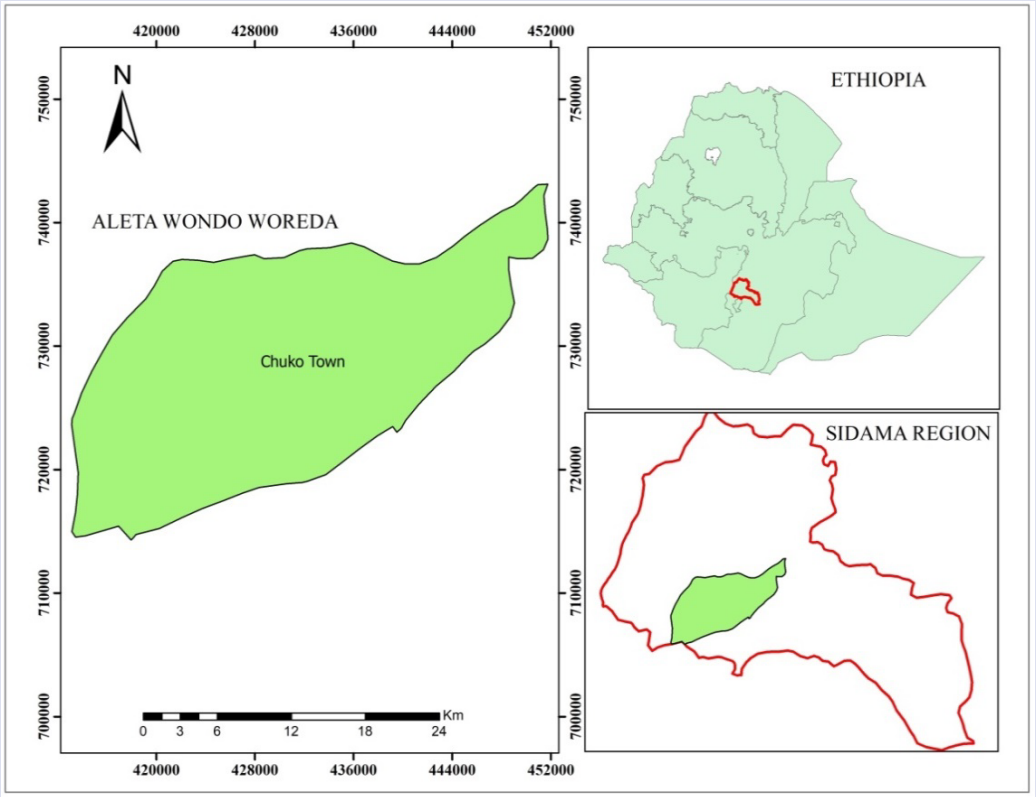

Figure 1: Map of the study area. Location of Alete Chudo Woreda Zone in Sidama Area, Ethiopia. Data Source: Ethio-GIS collected by ECSA (Ethiopian Central Statistics Authority, 2014), Software Arch-GIS 9.2 used.

Table 2: Distribution of the Medicinal Plant species among the plant families and percentage.

Family	Number of Species	Percentage
Alliaceae	1	1.9
Aloeaceae	1	1.9
Anacardiaceae	1	1.9
Apiaceae	1	1.9
Askraceae	1	1.9
Asteraceae	4	7.5
Boraginaceae	2	3.8
Caricaceae	1	1.9
Commelinaceae	1	1.9
Cucurbitaceae	1	1.9
Euphorbiaceae	1	1.9
Fabaceae	3	5.7
Icacinaceae	1	1.9
Lamiaceae	8	15.1
Lauraceae	1	1.9
Linaceae	1	1.9
Meliaceae	1	1.9
Melianthaceae	1	1.9
Musaceae	1	1.9
Myrtaceae	2	3.8
Oleaceae	2	3.8
Passifloraceae	1	1.9
Polygonaceae	1	1.9
Rhamnaceae	1	1.9
Rosaceae	3	5.7
Rubiaceae	1	1.9
Rutaceae	5	9.4
Sapindaceae	1	1.9
Solanaceae	3	5.7
Zingiberaceae	1	1.9

Table 3: List of Medicinal Plants used for the Treatment of Human and Livestock Ailments in the Study Area. GH=growth habit, Part Used=PU, H=herb, S=shrub, L=leaf, B=bark, R=root, St=stem, Fl=flower, Flr=flower&root, Sd=seed, L&Sd=leaf and seed Bb=bulb, StR=stem & root, Ft=fruit, Route= Route of administration.

Botanical/Scientific Name	Local Name	Plant Family Name	GH	PU	Preparation Method	Route	Disease Treated
Chyrospermum shinger (Hochst ex Briq.)	Bulancho	Lamiaceae	H	L	Crushing fresh Leaf to get the juice	Oral	Liver (human)
Ehretia cymosa Thonn.	Gidincho	Boraginaceae	S	L	Fresh Leaf Extract	Oral	Liver (Human), Tuberculosis, Stomachache (Livestock)
				B	Decoction		
Passiflora edulis Sims.	Hopicho	Passifloraceae	C	L	To chew and swallow the juice	Oral	Hypertension
Pyscnostachys abyssinica Fresen.	Malasincho	Askraceae	S	R	Decoction	Oral	Lumpy Skin Disease
Olea capensis subsp. *macrocarpa*	Setamo	Oleaceae	T	R	Chew the Root in order to let the sap drip on the affected tooth	Oral	Toothache (human)
Croton macrostachyus Del.	Masincho	Euphorbiaceae	T	L	Topical application of the sap	Dermal	Wounds (2° Skin Infection) (human)
						Dermal	Chirt
					Grind the leaves and mix the same with water and butter and filter.	Oral	Malaria, Gonorrhea (human)
Vernonia amygdalina Del.	Hecho	Asteraceae	T	R	The root is crushed and pound along with the leaves of *C. macrostachyus* and *E. cymosa*. The water is added to the pounded stuff and the filtrate is drunk.	Oral	Coughing, Retained Placenta (Livestock)
Ocimum urticifolium Roth S. Lat.	Damakase	Lamiaceae	S	L	Fresh Leaf Extract	Oral	Allergy, Headache (human)
Ocimum lamiifolium	Damakase	Lamiaceae	S	L	Pound the leaves and extract the juice	Oral	Diarrhea, Poor Appetite, Flatulence (both human and livestock)
					Inhalant prepared by smashing	Nasal	Headache (human)

Ajuga integrifolia D Don.	Anamuro	Lamiaceae	H	L	The extracted juice is mixed with water or milk	Oral	Stomachache (both human and livestock)
Commelina benghalensis L.	Lalunte	Commelinaceae	H	St	Sap extracted from the Stem	Dermal	(Chirt) (human)
Leonotis nepetifolia (L.) R. Br.	Bokola	Lamiaceae	S	L	Leaf extract	Oral	Headache, Allergy (both human and livestock)
				Fl r	Chewing the Flower	Oral	Stomachache
Dichrocephala integrifolia (Lifio) Kuntze	Dinbilal	Asteraceae	S	Fl	Extract fluid from the Flower by squeezing	Oral	Headache (both human and livestock)
						Dermal	Skin Allergy
Ocimum lamifolium	Yewisha Damekese	Lamiaceae	S	L	Leaves are squeezed to extract the juice	Oral	Headache, Stomachache (human)
Cynoglassum cooruleum Steud. Ex DC	Bartatusa	Boraginaceae		L	Leaves are squeezed and the juice mixed with Coffee	Oral	Headache (human)
Salvia nilotica	Hulgeb	Lamiaceae	S	L	Leaves are squeezed and the juice mixed with Coffee	Oral	Headache (human)
					Rubbing the affected area with the leaf extract/juice	Dermal	Wound (both human and livestock)
Apodytes dimidiata E. Mey. Ex. Benth	Dongicho	Icacinaceae	T	St	Debark the Twigs and pound. The water is then added to the crushed twigs	Oral	Cough (Livestock)
				L	Leaves are pound and mixed with water		Poor Milk Yield (Livestock)
				L	Decoction made with Tea		Blood Pressure (Humans)
Fagaropsis angolensis (Engl.) Del.	Godicho	Rutaceae	T	Sd	Chewing the Seeds and swallowing the juice—for humans Crush the seeds and then add water to it—for livestock	Oral	Stomachache (Human)
Syzygium guineense (Willd.) DC.	Duwancho	Myrtaceae	T	St	Crushed and homogenized in water to drink	Oral	Low Milk Yield (livestock)
				L	The fresh leaves are chewed and its juice is left to drip and later spit—for humans (toothache)	Oral	Toothache (Human)
Rubus steudneri.	Gadda	Rosaceae	T	L&Sd	The same as above but the juice is drunk	Oral	Rheumatic (Human) Pain
				Sd	Mixing the powder with water and drinking the filtrate—for humans and livestock	Oral	Aqim asatito yemiyangedagid beshita (Livestock) Physical deterioration?
Albizia gummifera (J. F. Gamel.) C. A. Sm.	Matticho	Fabaceae	T	St	Debark the Twigs and pound. The water is then added to the crushed twigs	Oral	Low Milk Yield (Livestock)
Rosa abyssinica Lindl.	Gao	Rosaceae	S	L	Chew the fresh leaves and swallow the juice	Oral	Stomachache (Human)
					Crush the leaves and mix it with water and the filtrate is given to the sick stock	Oral	
Olea europaea subsp. *cuspidata*	Ejersa	Oleaceae	T	L	Chew the fresh leaves with the aching tooth	Oral	Toothache (Human)
					Crush the leaves and apply the sap on the diseased eye/s	Ocular	Ophthalmia (Human)
Ekebergia capensis Sparrman	Oloncho	Meliaceae	T	St	Pound the Twigs and the water added to get the infusion	Oral	Cough (Human)
Teclea nobilis Del.	Hadessa	Rutaceae	T	L	The juice is mixed with water and drunk	Oral	Stomachache, Gastritis (Human)
Dodonaea angustifolia L. F.	Itancha	Sapindaceae	S	L	Fresh leaves are pounded and juice prepared	Oral	Helminthiasis (Human)
Coffea arabica L.	Buna	Rubiaceae	S	L	The roasted and ground powder mixed with Honey	Oral	Diarrhea (Human)
						Topical	Wound (Human)
Zingiber officinale	Janjibelo	Zingiberaceae	H	R	Remove the epidermis, crush then boil and serve it with sugar	Oral	Common Cold; Influenza (Human)
Allium sativum L.	Tuma/ Wajo Shunkurte	Alliaceae	H	Bb	Cloves of Garlic and Ginger pound up and mixed with honey	Oral	Blackleg (Livestock)
						Topical	Dermatophilosis (Livestock)
						Topical	Skin problems (Livestock)
						Nasal	Leech (Livestock)

Echinops kebericho Mesfin	Qabaricho	Asteraceae	H	R	Smoking the root to get the inhalant	Nasal	Headache, Common Cold, Influenza, (Human)
Nicotiana tabacum L.	Arado	Solanaceae	s	L	Dry leaves are ground and powdered then drunk for Livestock	Oral	Common cold (Human) (Livestock)
					Inhaling the powder through nose for Humans	Nasal	Headache (Human)
Aloe vera	Erret	Aloeaceae	H	L	Mix 1 tablespoon of pulp with honey, eaten 2 times a day	Leaves	Cancer and Laxative (Human)
					spikes removed, pound with some water to make pulp	Dermal	Wound healing (Human)
					Apply liquid from pulp to wound	Topical	Dandruff (Human)
					Massage pulp into scalp, sit under sun for 30 min, wash hair	Topical	Chicken Pox (Human)
					Crushed leaves and apply topically		
Artemisia absinthium	Inare	Asteraceae	H	L	Wrap leaves in Enset leaves and put over fire, squeeze liquid out of bundle, drink on empty stomach	Oral	Stomachache (Human)
					Decoction of leaves given to infants under six months who are too small	Oral	Infant growth (Human)
Bersama abyssinica subsp. *abyssinica*	Teberako	Melianthaceae	S	St	Stem peelings chewed	Oral	Dingetegna (Human)
Capsicum annuum/ frutescens	Berebere/ Mitmitta	Solanaceae	H	Fr	Used as spice in food	Oral/ eaten	Malaria; Swollen Lymph Nodes; Stomachache (Human)
Carica papaya	Papaya	Caricaceae	T	Sd	Chew 7 seeds three times a day	Oral	Amoebic Dysentery (Human)
					Maceration of young leaves in cold water	Oral	Abortion (Human)
Citrus aurantifolia	Lome	Rutaceae	S	Fr	Drink fruit juice to stop vomiting	Oral	(Anti-Emetic) Stops vomiting (Human)
Citrus medica	Turungo	Rutaceae	S	Fr	Fruit eaten for high blood pressure	Oral	High Blood Pressure (Human)
Discopodium peninervum	Rejicho	Solanaceae	S	St	Stem juice applied to wounds to stop bleeding	Dermal	Stop bleeding (Human)
				L	Insert leaf into nose to stop nose bleed	Nasal	
Ensete ventricosum	Wesse	Musaceae	H	St&R	Specific varieties eaten	Oral	Bone Fractures, Aiding Placental Discharge After Birth, (Livestock) Diarrhea, Inducing Abortion and Wound Healing (Human)
					Bulla (made from liquid squeezed from processing) drink as tonic		Strength and Improved Immune Function (Human)
Erythrina brucei	Welako	Fabaceae	T	St	Cold water maceration of stem	Oral	Stimulate milk flow in cows; treat coughing (Livestock)
				L	Chew leaves		Stomach Problems (Human)
				Fr	Chew top part of fruit	Oral	Stomachache (Human)
Eucalyptus globulus	Wajjo Barzafe	Myrtaceae	T	L	Rub leaves on skin to reduce fever	Dermal	Fever (Human)
				L	Boil Eucalyptus and Damakasse in water and the vapor inhaled	Nasal	Common Cold (Human)
Foeniculum vulgare	Insilale	Apiaceae	H	L	Added to soup	Oral	Diuretic (Human)
					Chew		Clean Stomach (Human)
Hagenia abyssinica	So'icho	Rosaceae	T	Fl	Infusion of the female flowers	Oral	Tapeworms (Human)
Linum usitatissimum	Shalala	Linaceae	H	Sd	Seed soaked in water and drink for gastritis	Oral	Gastritis (Human)
Ocimum grattissimum	Damakese	Lamiaceae	H	L	Cold water maceration	Drink/Oral	General Malaise (Mitch) (Human)
Peponium vogelii	Surupa	Cucurbitaceae	H	Ft	Chewing	Eaten/Oral	Stomach Trouble (Human)
Persea americana	Abocato	Lauraceae	T	Ft	Apply to Wound	Dermal	Cease bleeding (Human)
					Apply to Scalp	Topical	Dandruff

Rhamnus prinoides	Ta'do	Rhamnaceae	S	L	Mix 7 flowers of Yellow Aster with young leaves of Tado chewed in a quid wrapped with cloth or Enset leaves. Juice swallowed for swollen tonsils/lymph nodes	Oral	Swollen Tonsils/Lymph Nodes
Rumex abyssinicus	Shishone	Polygonaceae	H	R	Root decocted, drink or chewed for Balaamo	Oral	Balaamo (Ibatch) (Human)
Ruta chalepensis	Tenadame	Rutaceae	H	L	Cold water maceration and drink to relieve stomachache	Oral	Stomachache (Human)
Schinus molle	Qundo	Anacardiaceae	T	Sd	Fruit chewed for sore throat	Oral	Sore Throat (Human)
Vicia faba L.	Baqella	Fabaceae	H	Sd	Raw seed chewed for gastritis	Oral	Gastritis (Human)

Table 4: The most Common Human and Livestock Diseases in Aleta Chuko Woreda.

Disease Type	Disease name	Local Name	Frequency	Percentage
Human	Stomachache	Godowu Game	13	*16*
	Headache	UmuDamume	9	*11.1*
	Wound	Mada	5	*6.2*
	Common Cold	Ganshu	4	*4.9*
	Gastritis	Chogara	3	*3.7*
	Toothache	HinkoteTiba	3	*3.7*
	Skin Allergy	GoguTiba	3	*3.7*
	Total		40	49.4
Livestock	Cough	Busaano	3	*27.3*
	Poor Milk Yield	Ado Fula Holtano	3	*27.3*
	Stomachache	Godowu Game	2	*18.2*
	Total		8	72.7

Table 5: Preparation methods of Traditional Medicinal Plants.

Preparation Methods	Frequency	Percentage (%)
Pounding and Crushing	33	42.3
Chewing	15	19.2
Squeezing	11	14.1
Maceration	7	9.0
Decoction	7	9.0
Powdering	5	6.4
Total	**77**	**100**

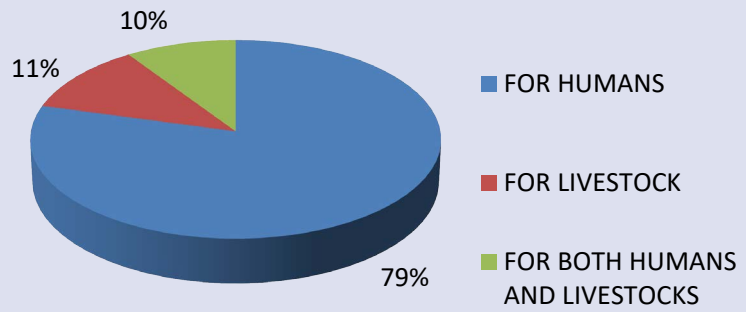

Figure 2: Percentage of the total plants used for treating human, livestock or both human and livestock ailments.

Percentage and frequencies of used parts of the plants

The results showed that the most dominant plant parts used during the preparation of curatives were leaves (49.2%) followed by roots, fruits, and seeds (9.2% each) (Figure 4). In agreement with the present study, several ethnobotanical investigations[22,25,30,34,37-40], carried out in different parts of Ethiopia and elsewhere across the globe[41,42], reported that leaves were the most utilized plant part in the preparation of remedies of plant origin. Whereas, studies found that roots were the most widely used plant parts in the preparation of traditional curatives.[27,32,43,44 29],indicated that the widespread usage of leaf in the preparation of remedies may possibly depict the comparative ease of harvesting/ collecting this plant part. Moreover, as to[21], the preference of leaves over other plant parts could be attributable to the simplicity of remedial preparations compared to remedy preparations from roots, stem barks, whole plants and seeds. Accordingly, collecting leaves do not pose a greater danger to the existence of an individual plant as compared with the collection of roots, barks, stems or whole plants and hence do not

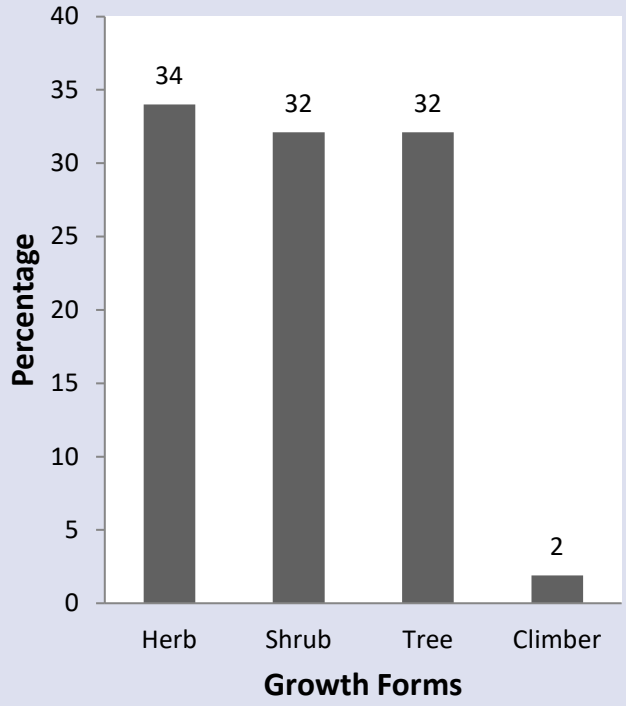

Figure 3: Percentage distribution of growth forms of medicinal plants used to treat human and livestock ailments.

affect sustainable utilization of the plants. [30], pointed that the use of leaves than roots, barks, stems and whole plant minimize the threat to the destruction of medicinal plants. Stems, and flowers accounted for 7.7 and 4.6%, respectively, while sap, leaf and seed each constituted for 3.1% of the total preparations. The bark, bulb, and a combination of stem and root contributed for the remaining fraction (4.5%) of the preparation of the therapeutics (Figure 4).

Modes of preparation of medicinal plants

According to the informants of the study area, medicinal plants were formulated in the fresh forms 66% while 18% were prepared after drying. On the other hand, 16% of the remedies were reported to be used in either fresh or dry forms to treat human and livestock ailments. In agreement with the present study, similar studies[29,30,34,33,37,39], reported in their ethnobotanical investigation that high proportions of the respective medicinal plants were used in fresh form during curative preparations. In a line with[29], the common use of freshly processed remedies may signify the availability of comparatively good stock of plant materials in the study area that could be collected whenever the need arises. [30], reported that widely held belief by local people that fresh materials are efficacious in treatment over their dry counterparts as the active ingredients. Similarly[29], suggested that the frequent use of fresh materials could proceed from an effort not to lose volatile oils, the concentration of which could deteriorate during drying.

Methods of preparations of remedies from medicinal plants: Frequency and percentages

The dominant methods of preparations were pounding and crushing (42.3%) followed by chewing (19.2%) and squeezing (14.1%) for the treatment of various diseases affecting humans and their stock in the study area. On the other hand, principally powdering (6.5%) but also maceration and decoction (each with 9%), were the least employed method during preparation of the curatives from medicinal plants (Table 5). Similar findings about crushing and pounding as the predominant method of medicinal preparations were also reported by.[34,37] Apart from this[38], indicated that the principal methods of remedy preparation were crushing (37.31%), squeezing (29.85%) and powdering (16.42%) of the various parts of medicinal plants.

Dosage measurement of medicinal preparations

In Aleta Chuko Woreda, traditional medicine practitioners employ various measurement units and durations to determine the dosage of curatives. The amounts of remedy and prescription rates were generally dependent on the degree and duration of the ailments. The data obtained from respondents revealed that traditional medicines dosage were employed by various units of measurement like numbers (e.g. for leaves, seeds and fruits), pinch (e.g. for powdered plant parts) and finger length (e.g. for root, root bark, stem and stem bark) to estimate and fix the measured quantity of the medicine which depends on the perception of healers/herbalists. Similar findings pertaining to the traditional medicinal dosage were reported by.[25,33,45,46] In congruence with similar studies[25,27], most of the medicinal plant preparations given did not have standardized doses. Accordingly, in most cases dosages were determined according to the age and physical appearance of the patient, sociocultural explanation of the illness, diagnosis and experience of individual traditional medicine practitioner.[45]

Routes of applications/administration of the plant remedies

The results of the study revealed that oral application (70.5%) was the most widely used route of administration followed by dermal or topical (20.5%), and nasal (7.7%) routes (Figure 5). The present findings is in accordance with study of.[37] The reason for the dominance of oral application of remedies may be due to it is painless and unproblematic way of taking the medicines. On the other hand, ocular route accounted only for about a percent of the total reported administration route. Likewise[45], found that ocular application of traditional remedies was the least (accounting only for 2.1%) of all employed administration routes.

Relationships between the ages of informants and their knowledge of traditional medicinal plants

Pearson Correlation analysis revealed that age of informants and the knowledge of traditional medicinal plants were positively correlated, r = 0.74812 (Figure 6). Thus, elderly people have more knowledge of traditional medicine and traditional medicinal plant species than the youngsters. In agreement with the present study, various studies[25,33,45,46], reported that as people become older and older their knowledge of traditional medicine would essentially become better and better. On the other hand, the relatively lower medicinal plant knowledge exhibited by the more youthful segment of the community could stem from the relative difficulty in its transfer from the elders to the young generation.[23]

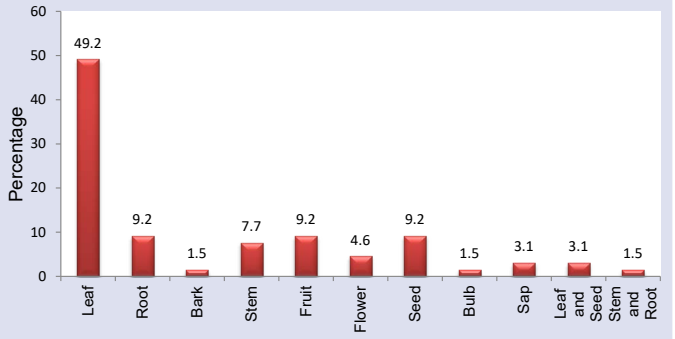

Figure 4: Percentage distribution of plant parts used in preparation of therapeutics for human and livestock diseases.

Relationships between the educational levels of informants and their knowledge of traditional medicinal plants

In order to assess the relationship between educational background of respondents and the number of medicinal plants they have managed to report, Pearson Correlation was carried out (Figure 7). Accordingly, there is a negative correlation between educational background and traditional knowledge of medicinal plants of the study area (r = -0.87029). [47]also reported that there is a negative relationship between the educational level of informants and their ethnobotanic knowledge.

CONCLUSION

The present study was conducted in selected Kebeles of Aleta Chuko Woreda in order to assess the indigenous knowledge that equips the community to identify the medicinal plants, formulate the medicines and subsequently administer the curatives used to treat various human and livestock diseases, as well as to characterize the threats that the medicinal plants are facing in the study area. The study revealed that the Aleta Chuko community observably used traditional medicine to treat both human and livestock diseases.

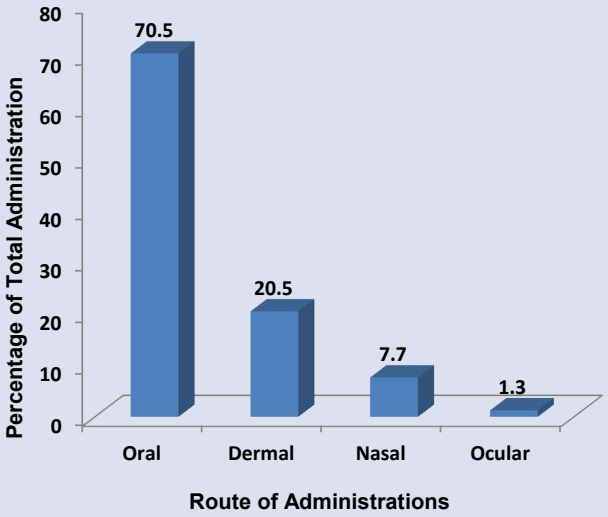

Figure 5: Routes of administration and percentages.

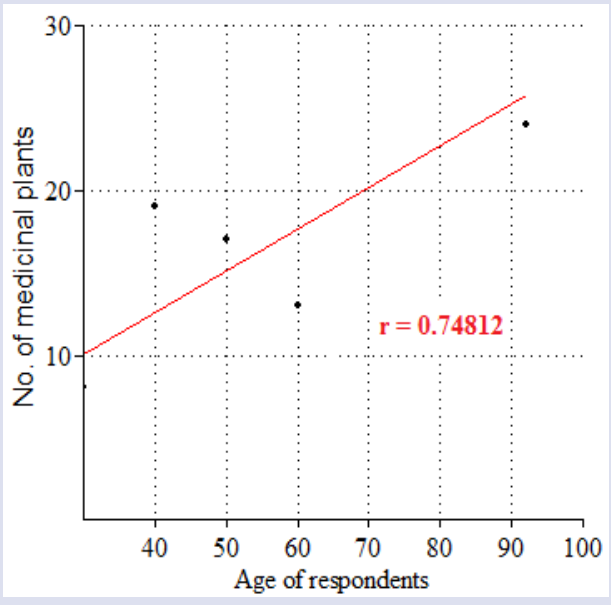

Figure 6: Age of respondents versus number of medicinal plants collected in the Aleta Chuko Woreda.

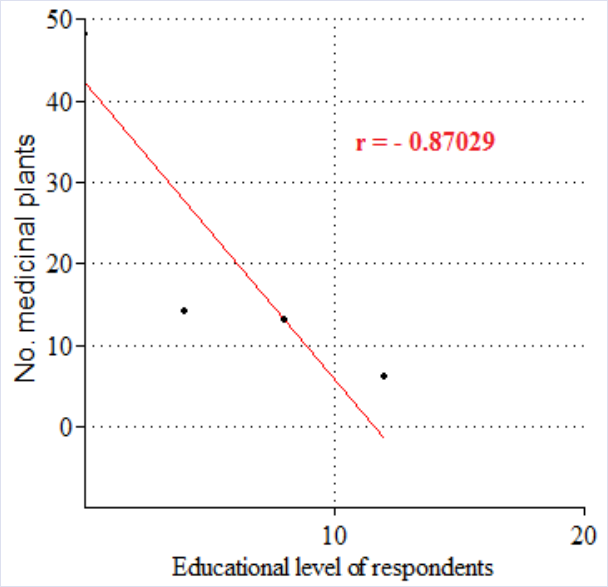

Figure 7: The association between number of medicinal plants identified and Educational level of respondents in Aleta Chuko Woreda.

A total of 53 wild and cultivated medicinal plant species which are herbs, shrub and tree species distributed into 30 families and 49 genera. Lamiaceae (8) followed by Rutaceae (5), and Asteraceae (4) were the predominant families observed. 79, 11, and 10% of the total species were used for treating humans, livestock, and both humans and livestock diseases, respectively. The most common diseases affecting humans and animals were stomachache and cough, in that order. Sixty percent of the medicinal plants were collected from the wild while the 40% of the same were harvested from home gardens. Herbs constituted the highest fraction (34%) of the total species and the most commonly used plant parts during the preparation of remedies were leaves. Freshly harvested plant materials are mostly used in the preparation of remedies which show about the availability of plant materials in the vicinity.

Our study recommends that the attention should be given to the standardization of the unit measurement, antidotes and cleanliness of these medicines prepared from plants by improving the traditional medicines and creating awareness among the younger members of the community on the importance and conservation of traditional medicinal plant species and the associated indigenous knowledge which is the need of the hour. Finally, further scientific investigations are to be initiated for the isolation of the bioactive principles from those traditional medicinal plant species reported to be the most effective way to treat the most common health problems of the study area.

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AUTHOR CONTRIBUTIONS

TG and BC conceived and designed the study. TG analyzed the data. TG and BC contributed to the writing of the manuscript. TG and BC

agree with manuscript results, conclusions and developed the structure and arguments for the article. Both authors reviewed and approved the final manuscript.

DECLARATION OF CONFLICTING INTERESTS

The authors declare there are no competing interests.

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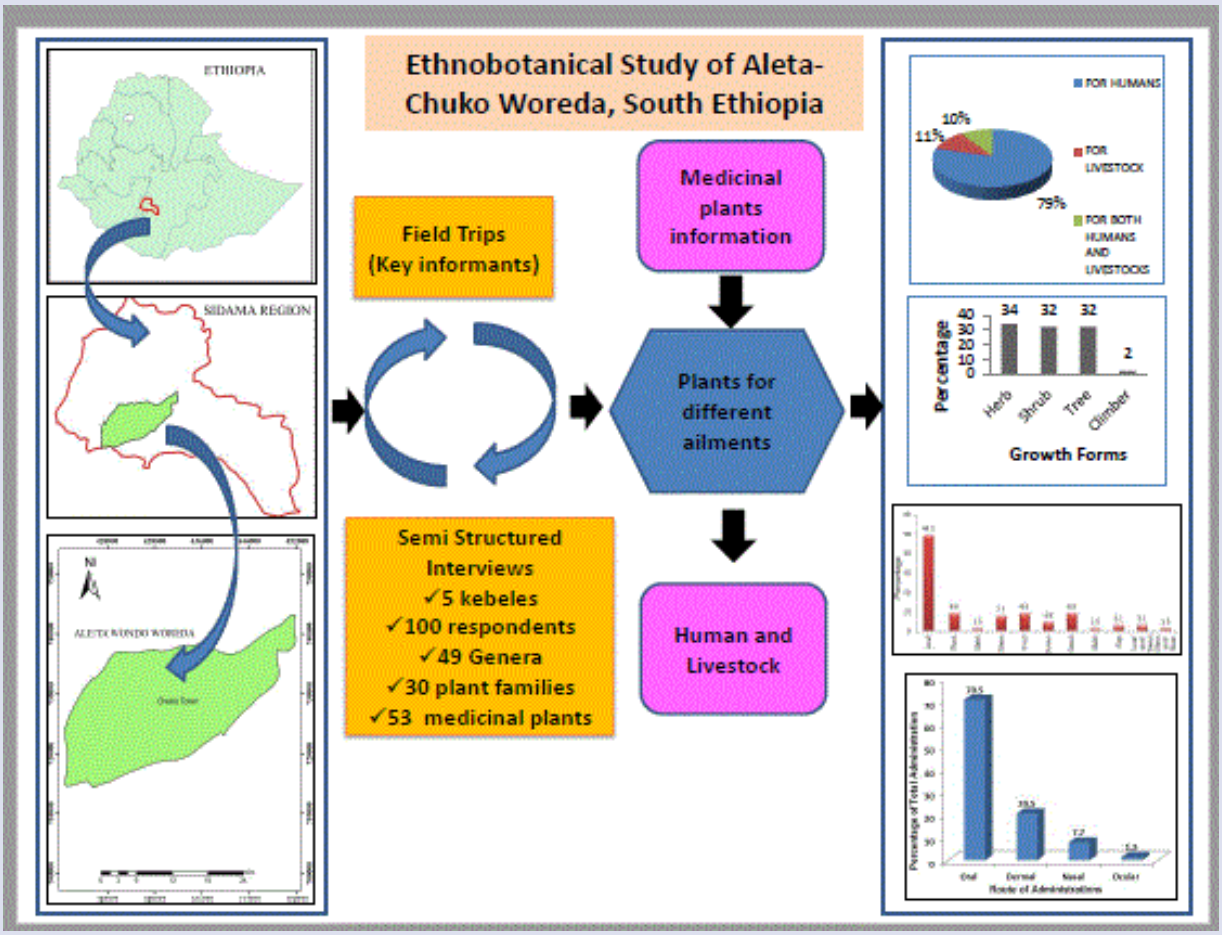
GRAPHICAL ABSTRACT



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