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Assessment and Identification of Medicinal Plants at Habro, Gemechis and Hawi Gudina Districts, In Oromia Region, Ethiopia

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Abstract

Traditional medicinal plant species documentation is very crucial in Ethiopia for biodiversity conservation, bioactive chemical extraction and indigenous knowledge retention. The present study is initiated with an objective to assess and document medicinal plants, the knowledge and practices on use of medicinal plant species used by the by people of Western Hararghe to treat different human and livestock ailments. The study was conducted in 2020 and used descriptive field survey design. Multi stages sampling techniques were applied to collect the data. First stage, the districts in Western Hararghe zone were stratified into three (highland, midland and lowland) based on their agro-ecologies. In the second stage, 3 districts (Gemechis from highland, Habro from midland and Hawi Gudina from lowland) were selected randomly. In the third stage, from each selected districts three kebele were selected purposively based on extensive use of medicinal plants. Finally 141 informants were selected from the nine kebele Both quantitative and qualitative data were collected through semi-structured interviews, guided field walks, demonstrations, and focus group discussions with the help of guided questions. Data was organized and analyzed by descriptive statistics with SPSS version 20 and Microsoft Office Excel 2013. Most of the respondents get indigenous knowledge of medicinal plant from their father (43.57%). A total of 162 medicinal plant species within 70 families were documented to treat various livestock and human ailments. The study indicated that many of the medicinal plants are harvested from the forest (53.2%) followed by home-garden (38.8%) and the other accounts for (7.9%). Ocimum lamifolium scored the highest use frequency and highest Familiarity index, followed by Cissampeclos pareira. Sorenson and Jaccard's similarity index among the three districts were above 61.79 % which showed significant similarity/even distribution of species among the three districts. According to Jaccard's similarity indices Hawi Gudina and Gemachis were the most similar pairs. Herbs constitute the highest species representative followed by trees and 59.03% of medicinal plants were collected from wild whereas 35.68% from cultivation 5.29% both wild and cultivation. The most frequently utilized plant part was leaf (35.47%) followed by root (21.80%), Seed (12.50%). A total of 115 ailments were identified as being treated by traditional medicinal plants, among which sudden sickness was frequently reported. Allium sativum was reported for the treatment of many of the reported diseases. The processed remedies were mostly administered through oral (62.09%) and dermal (20.26%) routes. Traditional medicinal plants and associated indigenous knowledge are the main systems to maintain human and livestock health in West Hararghe Zone. But minimal conservation measures were recorded in the community. Thus, in-situ and ex-situ conservation practices and sustainable utilization are required in the Zone.

Keywords: Ethnobotany; Medicinal plants; Indigenous knowledge; West Hararghe

Introduction

Since time immemorial, humans have looked to nature for ways to improve their living conditions and increase their chances of survival. One example is the way in which humans have interacted with plants, developing various uses for them. The close relationship between humans and plants has promoted the accumulation of botanical knowledge that is transmitted through the sharing of family narratives and community experiences, that has resulted in a valuable genetic heritage, each society maintaining a knowledge base of edible and therapeutic plants (Palheta, et al., 2017) [1].

Ethnobotany is the study of the interaction between plants and people, with a particular emphasis on traditional tribal cultures. According to the World Health Organization (WHO) about 65-80% of the world's population in developing countries depends essentially on plants for their primary healthcare due to poverty and lack of access to modern medicine (Kalayu et al., 2013). In Ethiopia, about 80% of the human population and 90% of livestock is said to be dependent on traditional medicine for primary healthcare services and most of this comes from plants (Belayneh et al., 2012).

Ethiopia is endowed with a huge potential of medicinal plants(estimated to be over 700 species (Mengistu, 2004) and their uses that provide a wide contribution to the treatment of human and livestock aliments (Giday, et al., 2013). These wide and vital uses of traditional medicine in the country could be attributed to cultural diversity and acceptability, psychological comfort, perceived efficacy against certain type of diseases and economic affordability as compared to modern medicines (Tolossa, et al., 2013). Medicinal plants are viewed as the first-line treatment for most diseases, because they represent a low-cost alternative to pharmaceutical drugs (Palheta, et al., 2017) [2].

Traditional knowledge of medicinal plants and their use by indigenous healers and drug development in the present are not only useful for conservation of cultural tradition and biodiversity but also for community health care and drug development in the local people (Kalayu et al., 2013). The loss of valuable medicinal plants due to population pressure, agricultural expansion, deforestation and

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environmental degradation is widely reported by different researchers in Ethiopia for example, (Abebe, 2001 and Birhanu et al., 2015) [3].

Even though it is known the Zone has relatively better plant resource and associated traditional knowledge resource is expected to be significant; the continuity of practices related to the use of medicinal plants is threatened by loss of interest on traditional gardening, loss of traditional knowledge, the urbanization and destruction of green spaces which may be due to lack of conservation actions (Palheta, et al., 2017). Their traditional knowledge is not widely used as it could be because the skills are fragile and there is not written document (easily forgettable) that include medicinal plants and indigenous knowledge of the community as most of the medicinal plants are in the hands of a handful and kept as a secret (Fisseha, 2007). Although there are various Ethnobotanical researches have been carried out in Ethiopia, there is no study conducted on medicinal plants in Western Hararghe Zone. Consequently, the need to perform ethno-botanical researches and to document the medicinal plants and the associated indigenous knowledge must be an urgent task. The present study is initiated with an objective to assess and document medicinal plants, the knowledge and practices on use of medicinal plant species used by the by people of West Hararghe to treat different human and livestock ailments [4].

Materials and Methods

Description of the study area

The study was conducted in the West Hararghe Zone of Oromia, Eastern Ethiopia in 2020 at selected three Woreda, which were Habro, Gemechis and Hawi Gudina. Habro district is located about 410 Km southeast of Addis Ababa, the capital city of Ethiopia and 78 Km from Chiro town, the capital of West Hararghe Zone. Geographically, Habro district is located at 8.57° N to 8.91° N latitude and 40.34° E to 40.69° E longitude. Gelemso town is the administrative capital of the district. The elevation of the district ranges from 1400 to 2400 m.a.s.l. (HDANRO, 2014).Thirty years (1988-20017) data of Gelemso meteorological station indicates that the study area receives a mean annual rainfall of 966.7mm. The rainfall pattern in the area is bi-modal with high amount of rainfall occurring during the main rainy season between June to September (kiremt) and the short rainy season stretching from March to May (belg). The highest rainfall is received in August and fallowed by April. The mean annual temperature was 19.97°C with the hottest months being May and June and coldest month being November and December (Wasihun et al., 2019). Gemechis district elevation ranges from 1300 to 3400m above sea level (m.a.s.l). The minimum and maximum annual rainfall is 800mm and 1200mm with the average of 850mm (Sudi et al., 2018). Hawi Gudina is located at a distance of 519 km from Addis Ababa. The total area of the district is estimated to be 3,041.19 km2. The district is situated between 7˚52`15`` and 9˚25`43``N and 40˚34`13`` and 41˚9'14" E. with altitudes ranging from 976 to 2077 m.a.s.l [5].

Selection of study districts, kebele and Informants

Multi stages sampling techniques were applied to collect the data. First stage, the districts in Western Hararghe zone were stratified into three (highland, midland and lowland) based on their agro-ecologies. In the second stage, 3 districts (Gemechis from highland, Habro from midland and Hawi Gudina from lowland) were selected randomly. In the third stage, from each selected districts three kebele were selected purposively based on extensive use of medicinal plants in the area. Sample respondents were randomly drawn from sampling frame using simple random sampling based on probability proportional to size. For the drawn sample respondents, the simplified formula provided by Yamane, (1967) were employed to determine the required sample size at 95% confidence level with degree of variability = 0.5 and level of precision (e) = 7.5% [6].

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

Where n is the sample size, N is the population size (total household size), and e-is the level of precision. Finally 141 knowledgeable informants were selected from the three districts (Figure 1).

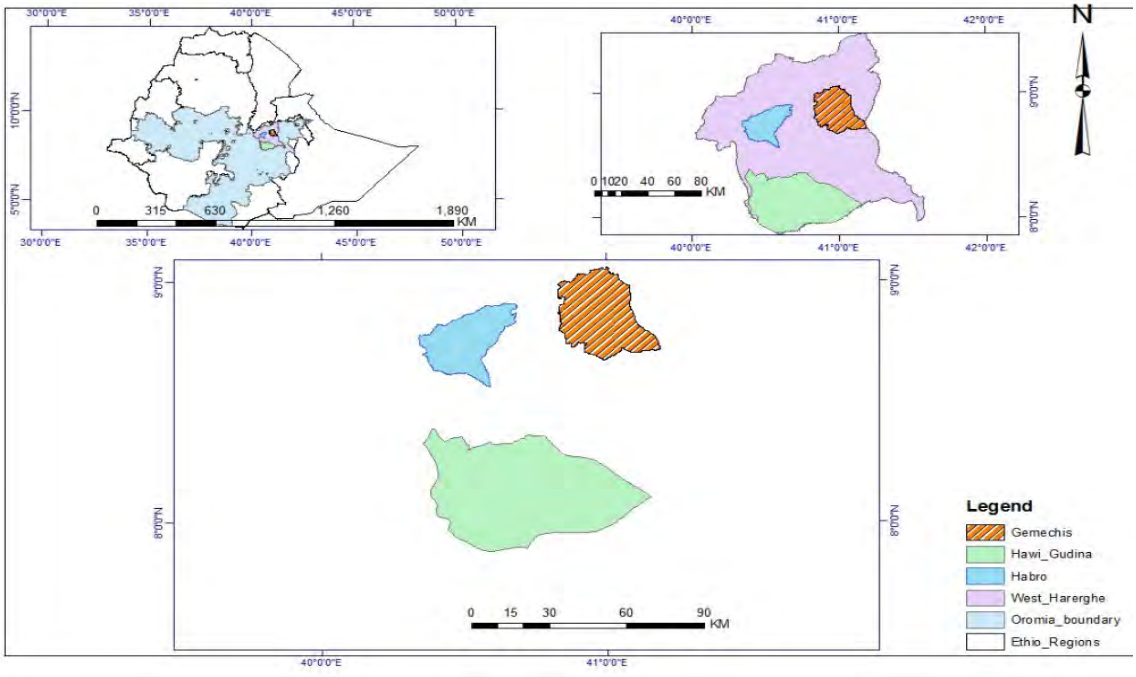

Figure 1: Study area map.

Ethnobotanical data collection and specimen identification

Ethnobotanical data were collected using semi-structured interview, group discussion and field observation. Interviews were conducted using pre-prepared questions with 141 informants after receiving their full consent. The informants who cannot read and write would be considered as illiterate while; those respondents attended formal education would be considered educated. Interviews were based on a checklist of questions prepared beforehand in English and translated to the local language [7]. The collected information include local name of the medicinal plants growth form, source of medicinal plants (wild/cultivated), diseases treated, parts used, method of preparations, routes of administration, ingredients added, indigenous knowledge transfer (oral /written) and existing threats to medicinal plants. Moreover, tours with key informants were employed to collect specimens of medicinal plant species. The collected specimens were dried and then identification of common and well known species were made using the published volumes of the Flora of Ethiopia and Eritrea, useful trees and shrubs for Ethiopia while for unknown plant specimens identification were made by the help of experts.

Data analyses

The collected Ethnobotanical data were entered into SPSS 20 software package and Excel spreadsheet 2013 and summarized using descriptive statistical methods such as frequency, percentage, tables, and graphs.

Jaccard's similarity coefficient was estimated for comparing a similarity of medicinal plant species composition among the three selected districts as they represent different ecology (lowland high land and midland). The formula J =c/(c+a +b), where J=Jacquard's similarity index, c = number of species shared by the study sites, a = number of species in study site A only and b = number of species in study site B only. The J values range between 0 and 1, whereby a value of 1 indicates complete similarity [8].

The Sørensen similarity index (Ss) is applied to qualitative data and is widely used because it gives more weight to the species that are common to the samples rather than to those that only occur in either sample (Kent and Coker, 1992). The similarity of species composition between the study districts was calculated with the Sørensen similarity index with the formula:

$$Ss = \frac{2A}{B+C} * 100\%$$

Where; A = number of species common to two village (X and Y); B = total number of species in village X; C = total number of species in village Y. The coefficient values range from 0 (complete dissimilarity) to 1 (total similarity). Familiarity index (FI) is used as an indicator of the popularity of a species (Tabuti et al., 2004). FI is defined as the number of respondents that mentioned a species for a specific use, divided by the total number of respondents. The value of FI varies between 0 and 1, whereby a value of 1 represents the highest familiarity of a medicinal plant in the study site [9].

$$FI = \frac{Frequency of a\ given\ species\ mentioned\ as\ a\ medicine}{Total\ number\ of respondents}$$

Result and Discussion

Socio demographic and knowledge characteristics of respondents

One hundred forty one informants were take part in this study. Of which one hundred twenty one (85.8%) were male and twenty (14.2%) were female, which indicated that most people continue to use traditional systems of health care including medicinal plants alone or in combination with modern pharmaceuticals. This continued reliance of many African people on traditional medicines are partly due to economic circumstances, which place modern health facilities, services and pharmaceuticals out of the reach of the majority of the population. However, in many cases, it is also attributable to the widespread belief in the effectiveness of many traditional therapies. Even where western biomedical care is available, many people still prefer traditional treatments for treating many aliments (Asfaw et al., 1999, Addis., 2001) [10].

Most of the informant were found between age of 20-65 (88.7%) followed by ages of 65(9.2%) and bellow the age of (2.1%). From the total respondents, 94.3% were farmers, (5.7%) other.

Regarding educational status, the majority of respondents (58.7%) were illiterate while (38.4%) and (2.9%) respondents attended primary and secondary school, respectively (Table 1).

Indigenous knowledge of medicinal plants

Mainly the respondents get indigenous knowledge of medicinal plants from their father (43.57%). Most informants' transfer their Indigenous knowledge for their son (41.4%) and the transfer way of this knowledge is through oral and showing that accounts (92.4%). This agrees with the previous reports of Ethnobotanical studies in northern and southern Ethiopia (Asfaw et al. 1999, Addis., 2001 and Teklehaymanot, 2007). This is because the traditional knowledge in the family or community is passed from male parent to his first-born son (Bishaw, 1990, Tesfu, 1995 and Teklehaymanot, 2007) (Table 2).

Conservation and threats of medicinal plants

The study indicated that most of the informants who have had knowledge on traditional medicine utilization give priority to the immediate use of the medicinal plants than to its sustainable future uses, as a result of that their harvesting style is destructive. However, some plants have been protected for their spiritual and cultural purposes. Thus, these places are good sites for the protection of the medicinal plants since cutting and harvesting are not allowed in such particular areas. This was indicated that a good practice for the conservation of

Table 1: Socio demographic and knowledge characteristics of respondents.

Characteristic	Number of respondents	Percent
Districts		
Habro	54	38.3
Gemachis	47	33.33
Hawi Gudina	40	28.37
Sex of respondents		
Male	121	85.8
Female	20	14.2
Age of respondents		
<20	3	2.1
20-65	125	88.7
>65	13	9.2
Occupation of respondents		
Farmer	132	94.3
Other	8	5.7
Education of respondents		
Illiterate	81	58.7
Primary school	53	38.4
Secondary school	4	2.9

Table 2: Indigenous knowledge source, transfer and transfer way.

Characteristic	Number of respondents	Percent
Source of IK of Medicinal plants		
Father	61	43.57
Other	40	28.57
Grandfather	20	14.29
Uncle	10	7.14
Mother	5	3.57
Relative	4	2.86
IK medicinal plants transfer		
Yes	134	95.04
No	7	4.96
IK transfer to		
Son	55	41.4
All person	51	38.3
Relative	12	9
Daughter	10	7.5
Wife	4	3
Friends	1	0.8
IK transfer way		
Oral and showing	121	92.4
Written	6	4.6
Oral	2	1.5
Oral and Written	2	1.5

Table 3: Conservation and Threats of Medicinal Plants.

Variables	Number of respondents	Percent
Sources of Plants		
Forest	74	53.2
Home garden	54	38.8
Intercropping	10	7.2
Mono cropping	1	0.7
Medicinal plants conservation niche		
Home garden	57	48.7
Forest	46	39.3
Intercropping	13	11.1
Mono cropping	1	0.9
Trends Medicinal plants in the Forest		
Decrease	96	70.1
No change	25	18.2
Increase	16	11.7
Trends Medicinal plants in the farm		
Decrease	89	65.9
No change	24	17.8
Increase	22	16.3
Presence of Deforestation in the area		
Yes present	96	68.6
No deforestation	44	31.4
Treats to medicinal plants		
Human being	69	67.65
Natural disaster	22	21.57
Animals	11	10.78
Training		
Have not gain training on medicinal plants	138	97.87
Gain training	3	2.13

medicinal plants through cultivation. The study revealed that there were a number of threats that affect the medicinal plants in the study area. The threats include agricultural expansion (47.7%) followed by deforestation (32.7%) and overgrazing (12.1%).The study indicated that many of the medicinal plants are harvested from the forest (53.2%) followed by home-garden (38.8%) and the other accounts for (7.9%). This indicated the effort to conserve medicinal plants in the district was observed to be poor. Some traditional practitioners have started to conserve medicinal plants by cultivating at home-gardens, though the effort was minimal [11]. Traditional beliefs in the area also have their own unintentional role in conservation and sustainable utilization of medicinal plants. Giving conservation priority for identified threatened medicinal plants, promoting in-situ and ex-situ conservation of medicinal plants in West Hararghe Zone helps to conserve the fast eroding medicinal plants of the study area.

Most of the informants (81.02%) say there is medicinal plants' conservation in their area where home-gardens, is the most conservation niche (48.7%) of the medicinal plants followed by forest (39.3%) (Table 3).

In West Hararghe Zone various factors that considered as main threats for medicinal plants were recorded by interviewing the informants. The major factors claimed were human being (67.65%), natural disaster (21.57%) and animals (10.78%) (Table 3). Other research on threats to medicinal plants used by Kereyu pastoralists in Ethiopia (Balemie et al., 2004) indicates similar investigation [12].

Diversity of medicinal plant species and healers' indigenous knowledge

A total of 162 medicinal plant species were used by local people of the West Hararghe Zone to treat various livestock and human ailments. Ocimum lamifolium 95 (5.89%) was the frequently used plant species having highest Familiarity index (FI=0.67), followed by Cissampeclos pareira 88 (5.45%) (FI=0.62), Otostegia integrifolia 64 (3.97%) (FI=0.45), Lepidium sativum 56(3.47%) (FI=0.40), and Withania somnifera 49(3.04%) (FI=0.35) (Table 4). The total number of plant treatments cited in this study could indicate that the general culture of ethno-medicinal knowledge secrecy was slightly lower with few exceptions (Lulekal et al., 2008) compared to some ethno-medicinal studies in other parts of the country (Giday et al., 2003; Fassil, 2003; Giday et al., 2007; Teklehaymanot et al., 2007; Teklehaymanot and Giday, 2007 and Yineger et al. 2008) [13].

On average a female respondents reported 3.55 medicinal plant species; while a male reported 1.33 medicinal plant species (Table 4).

Medicinal plants were distributed across 70 families (Table 5). The family and Fabaceae were represented by 15 species (9.26%), Asteraceae 14 species (8.64%) Lamiaceae 10 species (6.17%), Cucurbitaceae 6 species(3.70%), Euphorbiaceae, Myrtaceae, Rosaceae, Rutaceae and Solanaceae represented by 5 species (3.70%) each and the other 61 families consist of 1-4 representative species 92 species (56.79%) (Table 5).

From 162 collected medicinal plants 16(9.88) were found only in Hawi Gudina, 26(16.05) only in Habro, 21(12.96) only in Gemechis, 60 (37.04) were commonly found in 3 districts, 13(8.02) in only Hawi Gudina and Habro, 10(6.17) in only Hawi Gudina, and 16(9.88) only in Habro and Gemachis. In other words 99 MPS were found in Hawi Gudina 115 found in Habro and 107 from Gemechis district (Table 6 and Table 7) [14].

Species similarity between survey sites

Sorenson and Jaccard's similarity index among the three districts

Table 4: Species diversity of medicinal plants in West Hararghe zone.

Scientific Name	Frequency of report	Percent	Familiarity index
Ocimum lamifolium Hoschst. ex. Benth.	95	5.89	0.67
Cissampeclos pareira L.	88	5.45	0.62
Otostegia integrifolia Benth	64	3.97	0.45
Lepidium sativum L.	56	3.47	0.4
Withania somnifera (L.)	49	3.04	0.35
Foeniculum vulgare Mill.	47	2.91	0.33
Solanecio gigas (Vatke) C. Jeffrey	47	2.91	0.33
Croton macrostachyus Del.	42	2.6	0.3
Ruta chalepensis L.	41	2.54	0.29
Citrus aurantiifolia (Christm.) Swingle	38	2.35	0.27
Allium sativum	36	2.23	0.26
Vernonia anygdalina	36	2.23	0.26
Cucumis pustulatus Naud. ex Hook.f.	35	2.17	0.25
Moringa oleifera Lam.	30	1.86	0.21
Rhynchosia malacotricha Harms	30	1.86	0.21
Other 147 plant species	882	54.58	6.26
Total	**1616**	**100**	**11.46**

Table 5: Family of medicinal plants in West Hararghe Zone.

Family Name	No of species	Percent
Fabaceae	15	9.26
Asteraceae	14	8.64
Lamiaceae	10	6.17
Cucurbitaceae	6	3.7
Euphorbiaceae	5	3.09
Myrtaceae	5	3.09
Rosaceae	5	3.09
Rutaceae	5	3.09
Solanaceae	5	3.09
Other 61 families	92	56.79
Total	**162**	**100**

were calculated and the results ranged from 67.96% to 68.47% for Sorenson and 61.79 % to 65.42 % for Jaccard's it was higher than 0.5 which showed significant similarity/even distribution of species among the sampling areas. Sørensen similarity index it gives more weight to the species that are common to the samples rather than to those that only occur in either sample (Kent and Coker, 1992). The most similar pair was Habro and Gemachis districts according to Sørensen similarity index. Higher values of Jaccard`s similarity coefficient indicates a higher similarity in medicinal plant species composition between the paired study areas [15].

These results agree with the case reported by (Shimelis et al., 2019) from home-gardens of Habro district where Sorenson and Jaccard's ranged from 69.03% to 81.82% and 52.70% to 69.23% respectively. When similarity is higher than 0.5 it shows even distribution of species among the sampling areas.

Life forms (habit) of medicinal plants

Herbs constitute the highest species representative by 76 species (46.91%), trees 39(24.07%), shrubs 38(23.46%) and Tree/Shrub 9 (5.56%), species.

The plant life form use pattern by traditional healers for remedy preparation in this study was consistent with the use patterns noted by other studies in Ethiopia (Teklehaymanot et al., 2007; Yineger et al., 2007 and Yineger et al., 2008) where herbs and shrubs were consistently preferred life forms (Figure 2) (Table 8).

Source of medicinal plants

The majority of the reported species (59.03%) were wild; whereas some (35.68%) were reported as cultivated and others (5.29%) both wild and cultivated. This indicates that the practitioners depend on the wild source or the natural environment rather than home gardens to obtain the medicinal plants, and the activity of cultivating medicinal plants is very poor in the study area. It also indicates that the natural forest of West Hararghe Zone is being over exploited by traditional practitioners for its medicinal plants composition (Figure 3).

Table 6: Number of Medicinal plants in the districts.

Districts	OnlyHG	OnlyHa	OnlyGe	3Distiricts	OnlyHG&Ha	OnlyHG&Ge	OnlyHa&Ge	Total
	16(9.9)	26(16.1)	21(13)	60(37)	13(8)	10(6.2)	16(9.9)	162
HG	16			60	13	10		99
Ha		26		60	13		16	115
Ge			21	60		10	16	107
*HG= Hawi Gudina, Ha=Habro, Ge= Gemechis Districts, The Number in brackets were percent								

Table 7: Jaccards and Sørensen similarity index of plant species between the three Districts.

Districts	Habro	Gemachis
Hawi Gudina	63.48% (68.22%)	65.42% (67.96%)
Habro		61.79% (68.47%)
*Index outside brackets was calculated using Jaccards index (J) while the index inside brackets was calculated using Sørensen similarity index (S).		

Table 8: Habit of medicinal plants in the study area.

Habit	Number of Species	Species Percent	Use Frequency	Use Percent
Herb	76	46.91	864	53.47
Shrub	38	23.46	455	28.16
Tree	39	24.07	269	16.65
Tree/Shrub	9	5.56	28	1.73
Total	**162**	**100**	**1616**	**100**

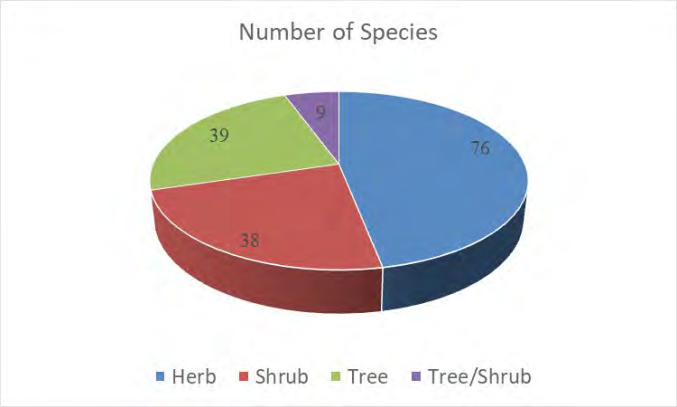

Figure 2: Life forms (habit) of medicinal plants.

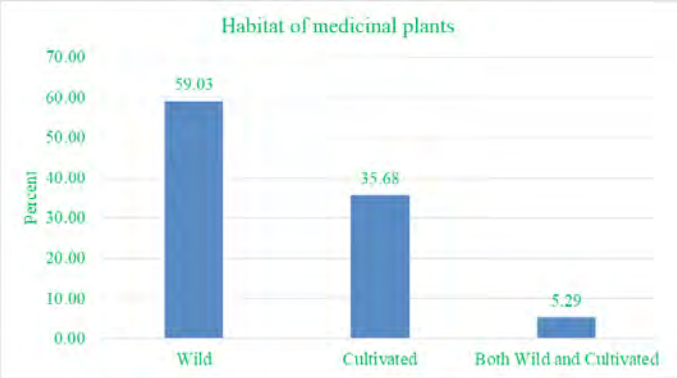

Figure 3: Source (habitat) of medicinal plants.

Plant parts used to treat human and livestock ailments

People of the study area harvest different plant parts for preparation of traditional drugs (e.g. leaves, roots, seeds, barks and fruit). In the study area, the most frequently utilized plant part was leaf (35.47%) followed by root (21.80%), Seed (12.50%) [16].

The diversity of plant parts found by this study agrees with the results obtained from other Ethno-medicinal studies; (Lulekal et al., 2008, Yineger et al., 2008, Mesfin et al., 2009 and Mesfin et al., 2014) and all reported that leaves were the plant parts most used in medicine preparations. Another similar result was shown in the work of Huai and Pei (2005) where the frequencies of harvest for leaves and roots were reported to be 35.47and 21.80%, respectively. The preference of leaves to other plant parts could be due to (1) ease of collection and preparation, (2) preparation of medicinal teas (Gazzaneo et al. 2005), and/or (3) the presence of more bioactive ingredients in leaves developed in response to phytophagous organ- isms since leaves are the most vulnerable parts of a plant (Bhattarai et al. 2006).

Such wide harvesting of leaf and the most harvested habit is herbs, which are important for survival of plants has a negative influence on the survival and continuity of useful medicinal plants and hence affects sustainable utilization of the plants (Lulekal et al., 2008) (Table 9) [17].

Disease types, treatment methods and herbal preparations used to treat human and livestock health problems

Though 115 different disease types were recorded as human and livestock health problems in the districts, the major and most widespread diseases according to the informants include Sudden sickness, Febrile illness, Skin disease/Tufaa/, Evil eye and Stomachache. In addition to these the practitioners were also visited for diseases like Blotting, Dysentery, Toothache, Gonorrhea, rheumatoid arthritis and hemorrhoids (Table 10) [18].

Internal ailments were commonly treated by making the patient drink herbal preparations; skin infections such as ringworm treated by rubbing and painting herbal preparations on an infected skin; sores by chewing and spitting remedial plant part on the sore; headaches and fever by steam bath and vapor inhalation. Similar results were reported elsewhere in Ethiopia by (Balemie et al., 2004 and Lulekal et al., 2008) [19].

Though special care was taken, some herbal preparations had side effects and resulted in diarrhea and vomiting. When such conditions happened, antidotes like milk, honey and powder of roasted barley were used or ordered by most of the practitioners to reverse the condition. Most of the medicinal plant preparations given did not

Table 9: Plant parts used to treat human and livestock ailments.

Parts used	Frequency of respondents	Percent
Leaf	122	35.47
Root	75	21.8
Seed	43	12.5
Stem	24	6.98
Leaf and Root	20	5.81
Fruit	11	3.2
Latex	8	2.33
Bark	7	2.03
Leaf and Seed	7	2.03
Leaf and Stem	7	2.03
Rhizome	7	2.03
Bulb	3	0.87
Root and Stem	3	0.87
Bark and Stem	2	0.58
Seed and Root	2	0.58
Husk	1	0.29
Leaf, fruit and Root	1	0.29
Oil	1	0.29
Total	**344**	**100**

Table 10: Common diseases affecting human and livestock health in West Hararghe Zone.

Disease type	No. plant used to treat	Percent
Sudden sickness	45	5.94
Febrile illness/Mich/Ajii/	35	4.62
Skin disease/*Tufaa/*	32	4.22
Evil eye	26	3.43
Stomachache	26	3.43
Blotting	26	3.43
Dysentery	25	3.3
Toothache	23	3.03
Swelling	22	2.9
Gonorrhea	20	2.64
Heart disease	20	2.64
Kidney problem	19	2.51
Diuretic/For blocked urination	18	2.37
Rheumatoid arthritis	18	2.37
Swollen body part (*GOFLA*)	18	2.37
Total	**757**	**100**

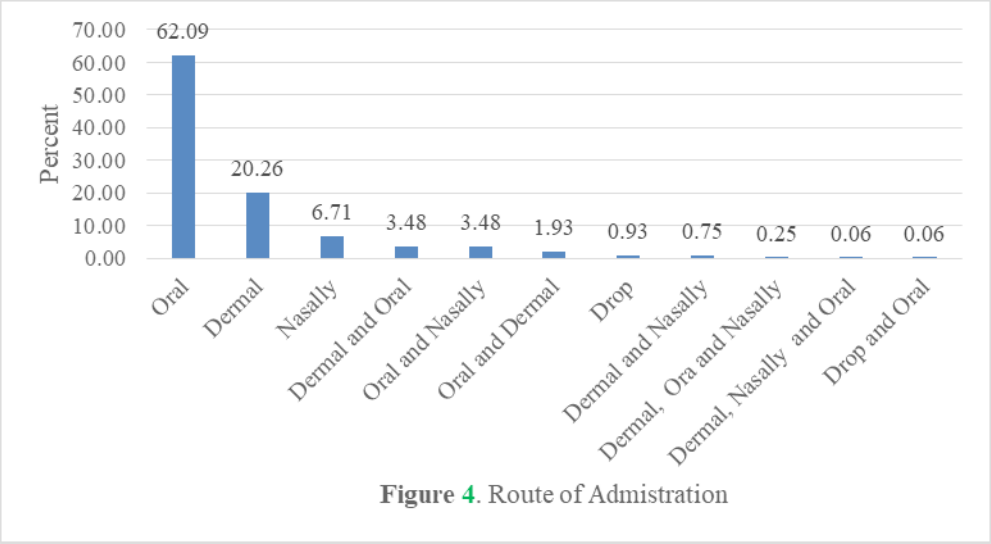

Figure 4: Medicinal plants used to treat human, livestock and both human and livestock ailments.

have standardized doses. In most cases dosages were determined according to the age, sex and physical appearance of the patient. Some of the medicinal plant preparations were measured in a small cup, a jug, while others as handful, or spoonful. Proper care is needed for sanitation of herbal preparations and their containers. Some preparations were placed in unclean containers and areas which may result contamination and seriously affect users when drunk. Patients suffered from overdose and contaminations were believed to recover by application of antidotes [20].

Substances like cold water, tea, honey, coffee, butter, olive oil, salt, sugar, meat, ash and milk were reported to be mixed with the plant materials during the preparation of remedies. The processed remedies were mostly administered through oral (62.09%) and dermal (20.26%) routes. These were followed by nasal (6.71%), the rest in total (10.96%) administrations [21]. These results are consistent with the findings of various Ethnobotanical researches elsewhere in Ethiopia, such as that of (Giday et al., 2003, Hunde et al., 2004 and Lulekal et al., 2008) (Figure 4).

Among the collected medicinal plants, 86(53.09%) used to treat Human disease, 69 (42.59%) used to treat livestock ailments and 7 (4.32%) used to treat both human and livestock ailments (Table 11) [22].

Table 11: Number of medicinal plants treat human, livestock and both human & livestock disease.

Category	Number of plant	Percentage
Human	86	53.09
Livestock	69	42.59
Both Human and Livestock	7	4.32
Total	**162**	**100**

Conclusions and Recommendation

Traditional healers of West Hararghe Zone were found to be rich in their indigenous knowledge on the use of Ethno-medicinal plant species to manage various human and livestock ailments within the study area. This was evidenced with the result that a total of 114 human and livestock ailments were reported to be treated using 162 Ethno-medicinal plant species. The total number of plant treatments cited in this study could however indicate that the general culture of Ethno-medicinal knowledge secrecy was slightly lower with few exceptions.

Traditional healers dwelling in the three districts varied significantly in their indigenous knowledge on management of human and livestock ailments. This could on the one hand be attributed to the individual knowledge differences as a result of their background or indeed the depth of indigenous knowledge inherited. On the other hand it could be because of the ecological and environmental variations of the three districts, in other words there may be variations in species richness of the three districts. According to our result; male uses few plants for different human and livestock diseases; where females uses many plant for few human and livestock disease.

Most of the Ethno-medicinal species were reported to be collected from wild sources. The majority of Ethno-medicinal plant species reported in this study were repeatedly harvested for their leaves and roots. Similar result was shown in the work of Huai and Pei (2005) where the frequencies of harvest for leaves and roots were reported to be 35.47and 21.80%, respectively. The plant life form use pattern by traditional healers for remedy preparation in this study was consistent with the use patterns noted by other studies in Ethiopia (Fassil, 2003; Teklehaymanot et al., 2007; Yineger et al., 2007, Yineger et al., 2008) where herbs and shrubs were consistently preferred life forms.

Most medicinal plant species were reported to be threatened by several factors such as human being, natural disaster and animals. In addition, traditional healers significantly cited the absence of efforts to conserve the reported Ethno-medicinal plant species. Urgent measures should therefore be taken so as to involve the traditional healers residing in West Hararghe Zone in the conservation and sustainable use of Ethno-medicinal plant resources as these were found to have significant contribution to meet the primary health cares of the local people in the zone. Any benefits arising from use or application of the indigenous knowledge reported in this study accrues equitably to traditional healers residing in the zone. Traditional medicinal plants and associated indigenous knowledge are the main systems to maintain human and livestock health in West Hararghe Zone. But minimal conservation measures were recorded in the community. Thus, in-situ and ex-situ conservation practices and sustainable utilization are required in the Zone.

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