



## **Ethnobotanical Study of Medicinal plants by Shenasha People in Dibati District North West Ethiopia**

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### **Abstract**

Traditional medicinal plant species documentation is very crucial in Ethiopia for biodiversity conservation, bioactive chemical extractions and indigenous knowledge retention. An ethnobotanical study of the indigenous knowledge on medicinal plants by Shinasha people in Dibati District, Northwest, Ethiopia, was conducted from October 2017 to November 2017. The study was undertaken in Dibati District in five field study areas. Ethnobotanical data were obtained using semi structured interviews, field observations, focus group discussions with people and traditional medicine practitioners and various ranking and comparison methods were employed. Data were analyzed quantitatively and by Microsoft Office Excel's informant's preference ranking, descriptive statistic Direct matrix ranking, paired comparisons, fidelity value index and Informant consensus factor (ICF) are computed to assess the degree of effectiveness of certain medicinal plants against human and animal. Information was collected from a sample of 99 informants (77 males and 22 Females) included 20 (male 16 female 4) key informants are selected to the help of kebele administration. Ethnomedicinal use of 65 plant species from in 62 genera and 39 families were documented. In terms of number of species, Fabaceae appeared as the most dominant family that contains 7 species in 7 genera, followed by Asteraceae. From the total medicinal plant species, 24 (2461.9.7%) were herbs, followed by 18 (27.69%) species of trees. The most frequently used plant parts were leaves (28.06%) followed by roots (14.06%). The most widely used method of preparation was crushed (23.07%), Pounding (20). The common route medicine administration were oral (54.4%), followed by dermal (7.69%) and other. The most commonly used application of medicinal plant was drinking (35.38%) followed by smoking (18.64%). A total of 65 plant species 48 (73.84. %) species were mentioned for the treatment of 57 human ailments while 17 (26.15) species were used to treat 15 livestock health problems. In the study area possesses diverse natural vegetation and the environment under serious threat by mainly agricultural expansion, firewood collection, population pressure, overgrazing, urbanization, household tool construction, charcoal production and medicinal purpose. Awareness rising on the use and management systems, sustainable utilization of medicinal plants and their in-situ and ex-situ conservation and establishment of forest protected areas should be recommended.

**Keywords:** Medicinal plant, Dibati Woreda, Informant, Shinasha people, Indigenous knowledge, Ethnobotanical, fidelity level index (FLI), Informant consensus factor (ICF)

## Introduction

In all part of the world traditional medicinal plant practices formed the basis of health cares for both human being and animal before the advent of modern medicine. In the Ethiopia people have been using traditional medicine to treat both human and animal disease for generations. Traditional medicine is still wildly practices in rural area where modern medicine and services available. (Tasfesse Mokonnen, 2001) Traditional medicinal plants are also used for various purpose in additional their medicinal values such as a forage, firewood, spics, construction, food, cosmetics, clothes, shelter for human habitats for wild animals and insects. Maintaining ecosystem stability export accommodation and fumigant (Gidey Yirga, 2010). Traditional herbal remedies can also be used as scientific resources to develop a new drug which are safes. It is also effectively cheapest and environmental sounds. Many of today's wonderful drugs were initially discovered through the study of traditional medicine (Tasfesse Mokonone and Mokonnen Lemma, 2001). There are large number of moderate to high value of medicinal plants herbs and species existing in the world. However, of the existing medicinal herbs species only small percent are treaded. (Endeshaw Bekele, 2007, Gidey yirga, 2010). Availability of medicinal plant has been affected by a dramatic decrease of native vegetation due to agricultural explanation, deforestation, fire, and overgrazing drought, tread of charcoal, firewood, introduction of alien invasive species and urban associated development. Globally the estimates of medicinal plant species range from 35,000-50,000 and out of this about 4, 000-6,000 species have entered the world market of medicinal plants. (Farnsworth and Soejaro, 1991). There is a number of Ethiopian medicinal plants which have undergone scientific investigation. The cultural indigenous knowledge of medicinal plant in Ethiopia in unevenly distributed among each community numbers. People in different location with different religion and culture back ground have their own specific knowledge about the use of plants which in the part has generally entered wide circulation in the country. The knowledge about the use of plants is largely oral, however, Plantations of medicinal plants can be made in degraded and degrading areas. There are many medicinal plants of Ethiopia that have good properties for land rehabilitation and erosion control which could be planted in different agro ecological settings. In-situ and ex-situ conservation strategies work well when they complement one another since what is not

achievable by one method is backed by the other method. In addition to this scheme that would enable sustainable use of medicinal plants and the associated indigenous knowledge should be developed with the best practice of benefit sharing. (Endashaw Bekele, 2007). Maintain health through traditional medicine in general and utilization of medicinal plant in particular is almost as old as the history of man kinds. This is true in Ethiopia 80 % of the population still relies on the plant to prevent and cure various health problem. (Gidey Yirga, 2010).

The current plant use trend in Dibati district shows that the environment is facing problems of resource depletion and loss of indigenous knowledge like other areas of the country. Thus, intensive ethnobotanical research plays a vital role to draw information on plants and related indigenous knowledge for conservation and sustainable utilization. Like many other parts of the country, there is no such ethnomedicinal research and documentation carried out in Dibati District, Metekele Zone, Northwest and Benshangul Gumuz Region. This study therefore, aimed at documenting indigenous knowledge on ethobotanical use of medicinal plants by herbalists to treat human and livestock ailments as well as assessing of the existing threats to these medicinal plants in Dibati district. Dibati district is one of our research areas which are a very high amount of Shinasha people lives. In this woreda there is no any research which is done on the use and management of medicinal plants in the Shinasha peoples.

## Materials and Methods

### Study Area:

The research was conducted at Dibati district particularly which is found in Metekele zone, Benshangule Gumuze Regional State that is found at 586km northern west of Addis Ababa, the capital City of Ethiopia. The Benishangul Gumuz Regional State (BGRS) was established in 1994 as one of the nine regional states of Ethiopia. The BGRS borders the Republic of Sudan in the west, Amhara region in the North, Oromiya in the South east and Gambella region in the South. Administratively, it is divided in to 3 zones (Metekele, Assosa, and Kemashi) that are divided in to 19 Woreda, and one special Woreda. Metekel Zone is divided into 7 Woreda out of which Dibatie Woreda, the study area is located North 100 55'-110 90' latitude North and 300 12'-300 36' longitude East. (Source BGRS, 2008).

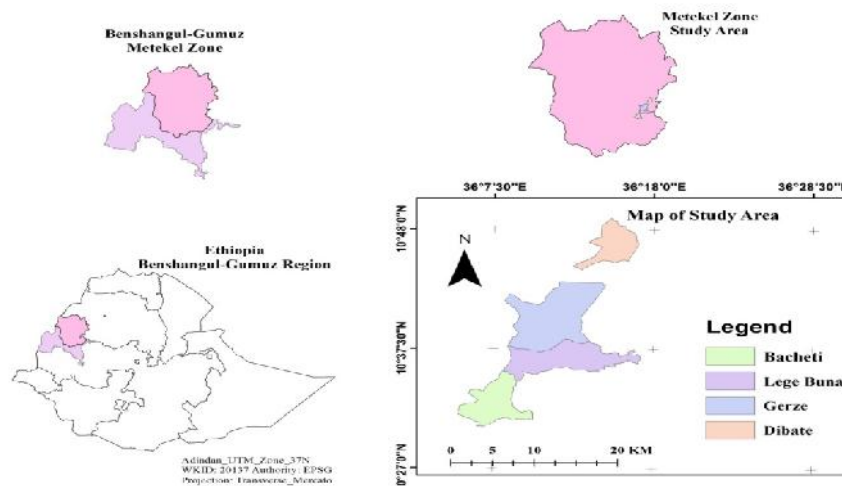


Figure: 1 Maps of study area

Based on the central statistics data (CSA, 2007), the total population for this woreda of 66,654, of whom 33,452 were men and 33,202 were women; 7,399 or 11.1% of its population were urban dwellers of all 12,446 were children's. The vegetation of the study district is predominantly composed of different woody and herbaceous species. The natural vegetation of Dibate is mainly composed of various lowland and midland species such as *Acacia sp.*, *Ficus spp.* (Such as *Ficusthonnigi*, *Ficussur*, *Ficusvasta*, *Ficuschosttery*, *e.t.c.*, *Cordia affricana*, *Albizia spp.*, *Coroton macrostachyus*, *Adonsoniadigitata*, *Dombeya spp.*, *Ekeverglacapensis*, *Carissa*, *Sizigum spp.*, and other trees, shrub and herbaceous species

### Study Design:-

#### Reconnaissance Survey and Selection of Study Sites

Dibati Woreda has a total of 29 kebeles. Out of these, 5 kebeles were selected those are Modorem, Gerze, Zegehe, Legbuna, and Bechati due to the have high amount of shinasha peoples found in kebele. Additional to that they have larger vegetation cover and presence of key informants, different altitudinal ranges are selects for ethnobotanical data collection. The traditional healer, used as key informants, was identified by with the assistance of local authorities, elders and knowledgeable persons.

### Informant selection

Information regarding to each peasant association leaders the total household of Shenasha people in the study area of five kebele from the age of twenty and above is (N) is male 651 female 141 total 792. To obtain total sample size from the total targeted household, the researcher was use the usual known formula. (Yemane, 1967) that were calculated as follows:

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

Where n is sample size of the study area

N is targeted population size (total population of five kebele in study area.)

e: is the level of precision or sampling error= (0.05)

For the above formula,

$$n = \frac{792}{1 + 792(0.05)^2} = 99$$

A total 99 informants five to seven individuals from each study kebele from the age of twenty and above were included. From the five studies kebele twenty key informants were purposively selected based on recommendations from local authorities (kebele administrators and local guides) peasant association leaders and other members of the local communities.

### Plant specimen collection and identification

At the end of the interview, the reported medicinal plants were collected from natural vegetation and home garden. Sample specimens of the plants cited for their medicinal use was collected, numbered, pressed and dried for identification. Plant identification was performed both in the field, and at the National Herbarium of AAU. Preliminary identification was done in the field and reconfirmed at the National Herbarium. Identification of other plant specimens using the Flora of Ethiopia and Eritrea and also by comparison with authenticated specimens.

### Ethnobotanical data collection

Ethnobotanical data was collected between Octobers to November, 2017 on three field trips. The data was collected based on prepared questionnaires, semi-structured interviewees, observation, focus group discussion, and guided field walks with informants were employed to obtain indigenous knowledge of the local community of shinasha people. The study was carried out by interview in there habitants in different village. The informants include the various data sets such as local names, disease treated, parts of the plant used, and method of preparation dose and rote of application was obtained from local people through individual interviews. A list of question was prepared that covers the discussion with the informants in particular orders. All of the interviews will be held in Amharic and Shinasha language of the local people. The place and time for discussion were set based on the interest of the informants. (Cotton, 1995)

### Ethnobotanical data Analysis

The Ethnobotanical data collected was analyzed following survey and analytical tools for ethnobotanical methods which are Informant's preference ranking, descriptive statistic (Microsoft excel spreadsheets soft wore), Direct matrix ranking and paired comparisons conducted following (Martin, 1995), (Cotton, 1996) and (Nemarundwe and Richards, 2002). Were computed to assess the degree of effectiveness of certain medicinal plants against human and animal.

### Medicinal Use Value

The use value (UV), a quantitative method that demonstrates the relative importance of species known locally (Luiz *et al.*, 2005), was calculated using the following formula.

$UV = U/n$  where:

UV = use value of a species;

U = number of citations per species; n = number of informants

### Fidelity level Index

Fidelity level index quantify the importance of a given species for a particular purpose in a given cultural group (Friedman *et al.*, 1986; cited in Cotton, 1996). The relative healing potential of individual medicinal plants used against human or livestock ailments using an index called Fidelity Level Index (FLI) based on the proportion of informants who agreed on the use of a given medicinal plant against a given ailment category.

The formula for FL is given as  $FL\% = Ip / Iu \times 100$ , where Ip the number of informants who independently indicated the use of a species for the same major ailments and Iu the total number of informants who mentioned the plant for any major ailment (Friedman *et al.*, 1986).

### Informant Consensus Factor

Informant consensus factor (ICF) was calculated for categories of ailments to identify the agreements of the informants on the reported cures using the formula used by Luiz *et al.* (2005) and (Tilahun Teklehaymanot and Mirutse Giday, 2007). ICF was calculated as follows: number of use citations for each ailment (nur) minus the number of species used (nt) for that ailment, divided by the number of use citations for each ailment minus one (Table 25).

$ICF = nur\_nt / nur\_1$  Where:

ICF: Informant consensus Factor,

Nur: number of use citation

Nt: number of species used

## Results and Discussion

### Ethnomedicinal Plant species used by Shinasha People in Dibati Woreda

In the study area a total of 65 medicinal plant species 62 genera and 39 families were gathered and documented that are used for the treatment of human and livestock ailments. From these, 48(73.8%)

species were used as human medicine, 1 species only (1.54%) as livestock medicine and the remaining 16 species (24.62%) were used for treating both human and livestock ailments (seen in figure 3). Of these 65 medicinal plants studied, 48 species were gathered from the wild and 17 species from home garden. This result indicates that the local communities mostly depend more on medicinal plants collected from the wild than those from home garden.

In my result family distribution, Fabaceae stood first dominant 7 (10.76%) followed by Asteraceae,

Euphorbiaceae and Cucurbitaceae four (6.13%) species and next family, Combretaceae three species and other families consist of one representative species in each (appendix XI) This agrees with the finding of (Mirutse Giday and Gobena Ameni, 2003; Kebu Balemie *et al.*, 2004; Haile Yineger and Dilnessaw Yewhalaw, 2007; Endalew Amenu, 2007; TesfErmias Luleka *et al.*, 2008; aye Hailemariam *et al.*, 2009; Moa Megersa, 2010; Mulegeta Kebebew, 2016; Muluken Wubetu *et al.*, 2018; Bizuneh Woldeab *et al.*, 2018; and Ayeni and Barsirc, 2018).

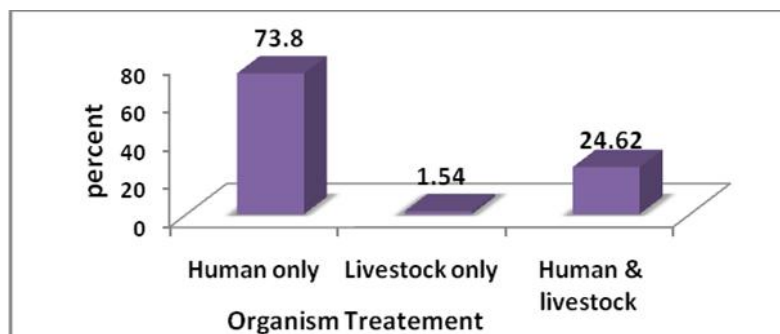


Figure: 2 Proportion of medicinal plants used to treat human, livestock and both human and livestock ailment

**Medicinal Plant Habit, Habitat, Part(s) Used and Preparation Rout of administration both in human and livestock ailments**

**1. Habit of medicinal plant in the study area**

In the study area there are many habits of medicinal plant those are herb, shrub, tree and climber. The result shows that analysis of growth forms of medicinal plants revealed that herbs constitute the largest category 24(36.9%) followed by tree 18(27.69%), 16(24.61%) shrub and 7(10.76%) Climbers were recorded. The record of the highest number of herbs medicinal plant species in the study could be dominated. This may be due to their relative

better abundance, accessibility in nearby areas as compared to other life forms, there is presence bimodal rainfall and extended availability of moisture and herbs can grow everywhere compar toother plant habits. This Habit distribution of medicinal plants has also been reported by some researchers previously (Bayafers Tamene, 2000; Debela Hundie, 2001; Njau, 2001; Tizazu Gebre ,2005; Endalew Amenu, 2007; Mirutse Giday 2007; Tilahun Teklehaymanot and Mirutse Giday ,2007; Seyoum Getaneh ,2009; Moa Megersa ,2010; Balcha Abera, 2014; Getnet *et al.*, 2015; Getaneh, 2016; Mulugeta Kebebew, 2016; Getent Chekole, 2017; Nigussie Amesalu *et al.*, 2018; Bizuneh Woldeab *et al.*, 2018).

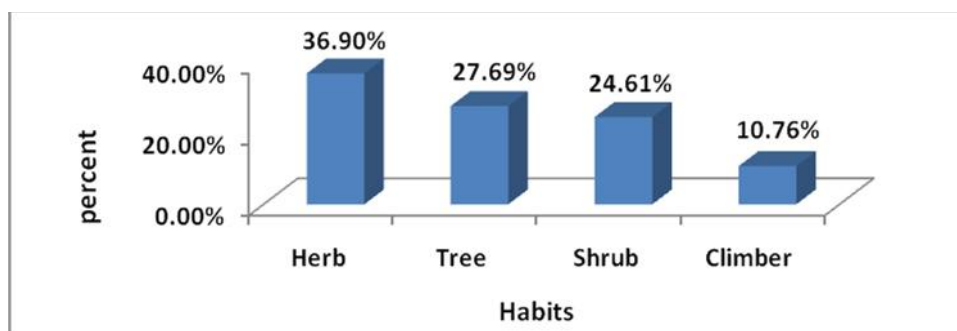


Figure: 3 Habit of medicinal plants both human and livestock ailment in the Dibati woreda



## 2. Habitats and abundance of medicinal plants in the study area.

In this study area medicinal plants were collected from various habitats including wild and home garden. As the result shows that most of the medicinal plants used by the communities were collected from wild 48(73.86%) and Home garden 17(26.15%). This finding is similar to the general pattern seen in most medicinal inventories for example, (Haile and Delensaw, 2007; Ermias *et al.*, 2008; Balcha Abera, 2014; Abiyu Enyew *et al.*, 2014; Getnet Checkole *et al.*, 2015; Meaza *et al.*, 2015; Tadesse Birhanu *et al.*, 2015; Getaneh, 2016; Mulugetakebew, 2016; Nigatu Tuash *et al.*, 2018; Yihewew Simegniewbirhan *et al.*, 2018) where wild medicinal plants dominate. This indicated that the practice of cultivation of medicine plants for their medicinal purpose in home gardens of most of the country is low although many plants are cultivated for other purposes, mainly for food. In a similar way people in the study area have less effort to cultivate medicinal plants in their home gardens rather go to the nearby or far places and harvest the plants. The local people cultivate some popular medicinal plants in their home garden for the purpose of medicine such as *Allium sativum*, *Schinus molle*, *Ocimum lamiifolium*, *Rhamnus prinoides* and *Nicotiana tabacum*.

This and field observation during data collection clearly confirmed that some traditional healers do not have interest to grow in their home garden some plant species that are used to treat specific ailments in order to keep the secret of their medicinal value. This means that most of the medicinal plants found in the home gardens are those also known to have other uses particularly as food.

## 3. Medicinal plants parts used treatment both human and livestock in the study area

The result of the survey showed that various parts of medicinal plants resources were employed to prepare remedies by local practitioners. The most widely used plant part for the preparations of remedy were leaves, which accounted for 28.06% followed by roots (14.06%), seed (10.39%) bark (9.39%) bulb (6.25%) and others. In this study, leaves are the most frequently utilized part of plant organs; It was ease of accessibility to leaves explains their frequent inclusion in most of the preparations. It was also observed that residents have been using leaves to identify. Additionally, leaves are the main photosynthetic organs in plants, and photosynthates are translocated to other parts, such as the root, stem, fruit, and seed. These can act as toxins for protection of predators and some are of medicinal value to humans.

On the other hand, the results of the study showed that harvesting of roots has great impact on the plants and leads to the dearth of the medicinal plants. Fortunately, the plant parts which are mostly used for the preparation of the remedies in the study area were leaves and harvesting of leaves has less impact on the plant than harvesting of roots.

Within my finding, similar studies agreement to in other parts of Ethiopia reported and documented that leaf are the most commonly used medicinal plant parts followed by root.

(Mirutse Giday and Gobena Amanu, 2003; Gidey Yirega, 2010; Moa Megersa, 2010; Balecha Abera, 2014; Abiyu Enyew *et al.*, 2014; Getnet *et al.*, 2015, Tadesse Birhanu *et al.*, 2015; Mulugetakebew, 2016; Getnet Chekole, 2017; Bizuneh Woldeab *et al.*, 2018; Yehewew Simegniew Birhan *et al.*, 2018; Nigatu Tuasha *et al.*, 2018; and Nigussie Amsalu *et al.*, 2018)

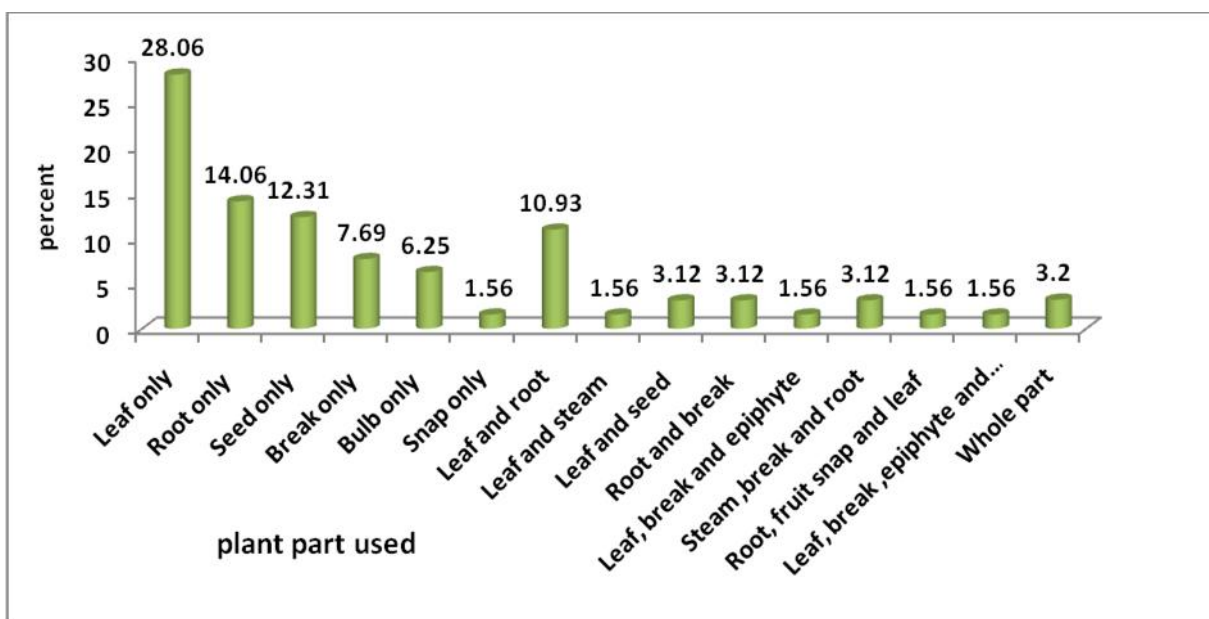


Figure: 4 Plant Parts used in preparation of both human and livestock ailments in the study area

#### 4. Method of preparation

The result that shows the preparation of medicinal plant for human and livestock of local community employs various methods of preparation of traditional medicines for different types of ailments. The preparations vary based on the type of disease treated and the actual site of the ailment. The principal methods of plant parts remedy preparation forms were reported to be through crushed, which accounts for 15 (23.07%), followed by pounded 13 (20%), squeezing 10 (15.4%), chewing 7 (10.71%), crashing and pounded 5 (7.7%), cocking 4 (6.15%), eating

3 (4.61%), smoke/burning 3 (4.61%) crushed squeezed 2 (3.07%), pounded squeezed 2 (3.07%) and pounding powder 1 (1.5%) respectively. The most dominate method of preparation is crushed. Based on the informants' information the most popular method of preparation of remedy in the study area was crushing.

.In agreement with this study, similar researcher of medicinal plant species method of preparation are reported from different parts of the country by ( Getent Chekole,2017; Muluken Wubetu *et al.*,2018; Nigussie Amsalu *et al.*,2018; Bizuneh Woldeab *et al.*,2018; and Yihenew Simeagniew Birhan *et al.*,2018 ).

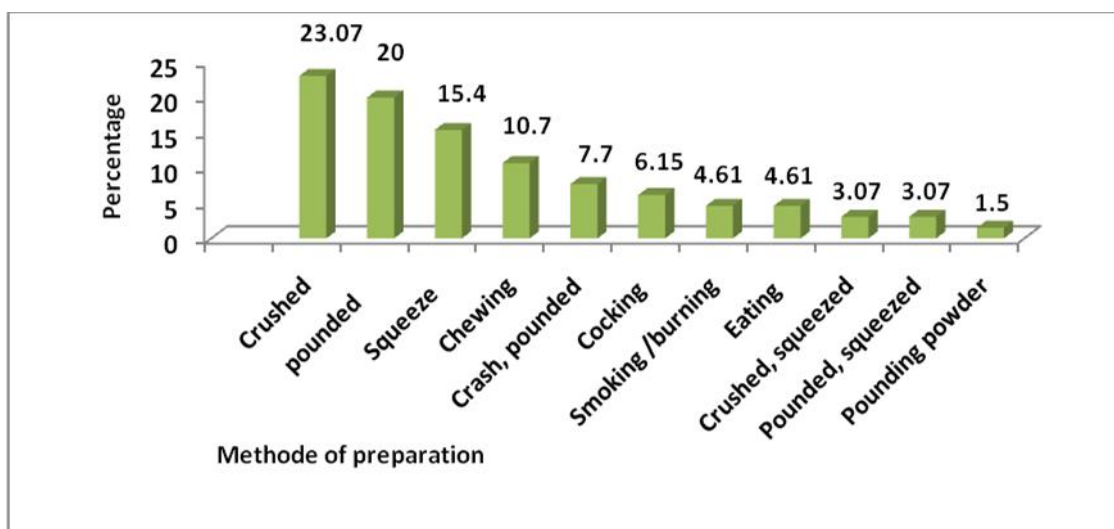


Figure: 5 preparation methods both in human and livestock ailments in the study area

**5. Route of administration**

There are various routes of administration of traditional medicinal plants prepared products by the local community. The major routes of administration in the study area are oral, dermal, nasal, anal, tide; ear and fumigated. People of the study area mostly administer traditional medicine orally. Oral accounts 38(58.46%) followed by dermal5 (7.69%), oral and dermal 6(9.23%) and others (Figure 8).Due to they may indicated the higher prevalence of internal ailments in the study area. However, the dose should be given in great care in the oral system than in the dermal since it might cause other severe internal

problems. Similarly, various research findings mentioned oral application as the primary route of administration in traditional plant medicines. This fact that has been documented by different authors in the other part of Ethiopia. (Addiseet *et al.*,2012; Balcha Abrea, 2014; Getent Chekole 2015; Abiyu Eneyew *et al.* 2015;Tadess Birhanu *et al.*,2015; Mulugeta kebebew, 2016; Getent Chekole ,2017; Bizuneh Woldeab *et al.*,2018; Yehenew simegniew Birhan *et al.*,2018; Nigatu Tuasha *et al.*,2018; and Nigusie Amsalu *et.al.*,2018). Local people also reported that various additives were given during administration of traditional medicine.

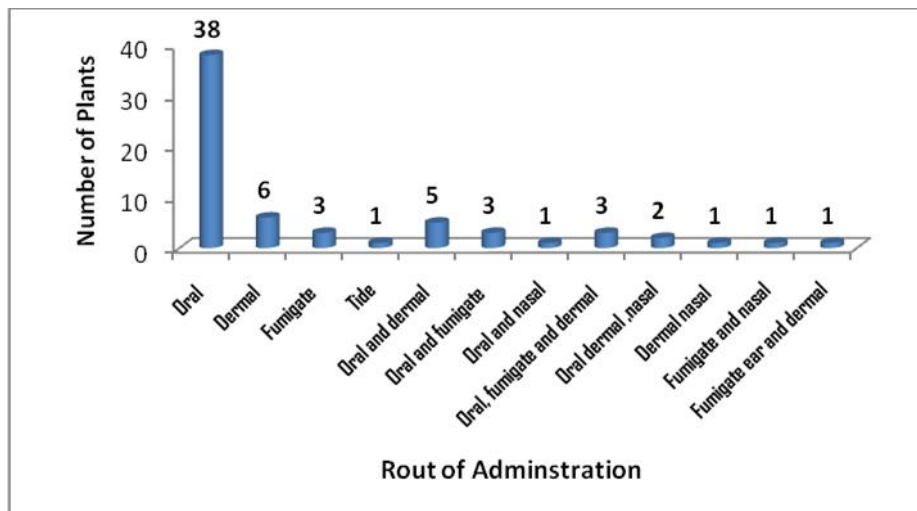


Figure: 6 Route of administration both in human and livestock ailments in the study area

**Application**

The prepared traditional medicines are applied in a number of methods, drinking accounted for the largest 23 (35.38%), followed smoking11 (16.76%) creamed and snaffid7 (10.76%) and others (Figure 6).Internal ailments were commonly treated by making the patient drink herbal preparations; tooth infection were treated by crushing and put on the remedial plant part on the tooth surface; skin infections such as ringworm were

treated by painting herbal preparations on an infected skin. Some plants do have different applications for different disease types. This preparation is used for different diseases by diverse application techniques. For instance, putting the leaves on tooth surface is used to cure toothache, and to tie on swollen body part is used to cure swelling. Similar results were reported elsewhere in Ethiopia by (Bayafer Tamene, 2000; Kebu Balemie *et al.* 2004; Endalew Amenu, 2007; Ermias Lulekal *et al.*, 2008; and Moa Megersa, 2010).



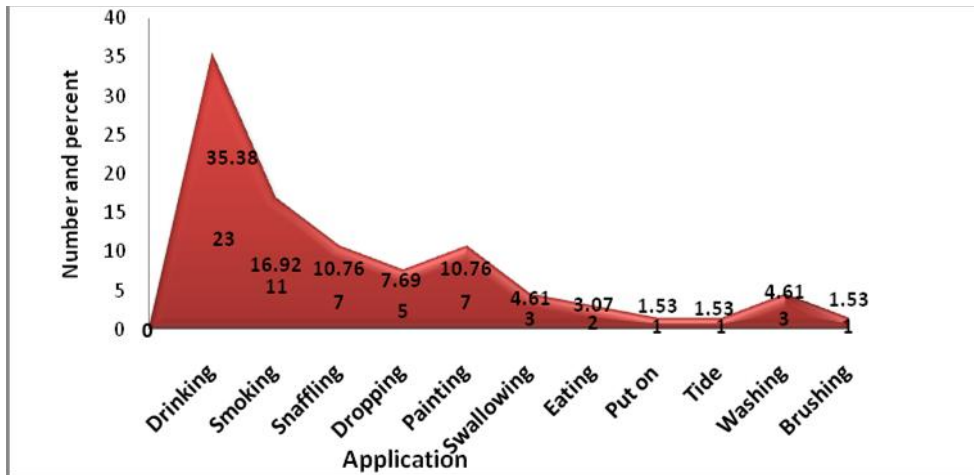


Figure: 7 Graph showing ways of application of plant remedies in both human and livestock ailment treatment

### 6. Conditions of Preparation of Herbal Remedies

The results showed that herbal remedies are prepared using fresh material 45 (69%), while 8 (12%) were used in the case of dried plant material and 21 (18.46 %) in both condition. (Figure 7). The informants in the study area prefer fresh plant materials (69%) to prepare effective and efficient remedies due to the fact that, most of the bioactive phytochemicals are retained in fresh plant materials as compared to dry ones. Although frequent collection of fresh plant materials in dry seasons has a devastating influence on the conservation statuses of medicinal plants, it is common to use fresh plant materials for the preparation of remedie. In addition to that they believe

that using fresh materials increases efficacy compared with the dry one. This is because of the fact that the content or ingredients may be lost or reduced when the plants became dry. Similarly, various studies in Ethiopia has reported by (Teshale Sori *et al.*, 2004; Etana Tolessa, 2007; Tilahun Teklehaymanot and Mirutse Gidey, 2007; Haile Yiniger *et al.*, 2008; Fisseha Mesfin, 2009; Mirutse Giday *et al.*, 2009; Seyoum Getaneh, 2009; Teferi Flatie *et al.*, 2009; Tesfaye Hailemariam *et al.*, 2009; and Gidey Yirga, 2010; Abiyu Enyew, *et al.*, 2014; Getnent Chekole.2015; Mulugeta kebebew, 2016; Yiehnw Simegniew Birhan *et al.*, 2018; Bizuneh Woldeab *et al.*, 2018; and Negatu Tuasha *et al.*, 2018).

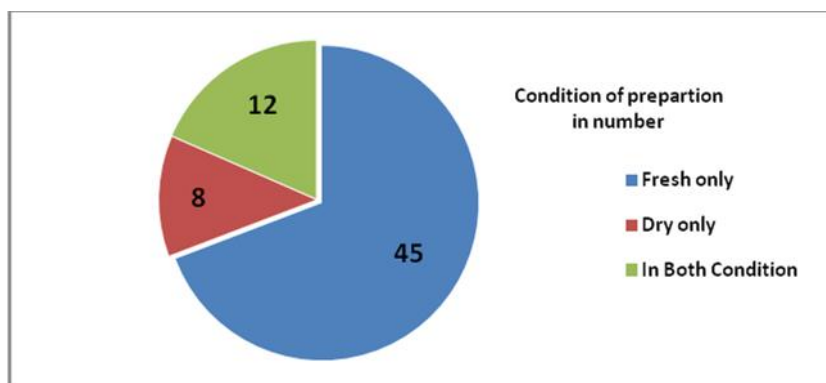


Figure: 8 Conditions of Preparation both in human and livestock ailments

### 7. Solvents and additives

Some of the remedies are taken with different additive and solvents, the solvent used is water. The additives include butter, honey, milk, sugar, ‘teff’ flour, boiled coffee or tea, hen wote, hyena liver, bordee and meat

(Table 5). These additives have importance in reduction of pain, to get better taste and reduce adverse effects such as vomiting and diarrhea and enhance the efficacy and healing conditions as explained by informants.

For example, the seed of *Coffea arabica* is roasted crushed powdered boil and the filter one cup of tea, mixed with a few drop of oil then drink for treatment of diarrhea. The roots *Justicia schimperiana* is crashed pouded and mixed with the honey and drink one glass

for 3-5 days for treatment of stabbing pain. The who part *Clematis hirsuta* is pounded powder and mixed with butter and creamed affected part until recover for 5 days to treat wound.

**Table 5: Solvents and additives used in medicinal preparation**

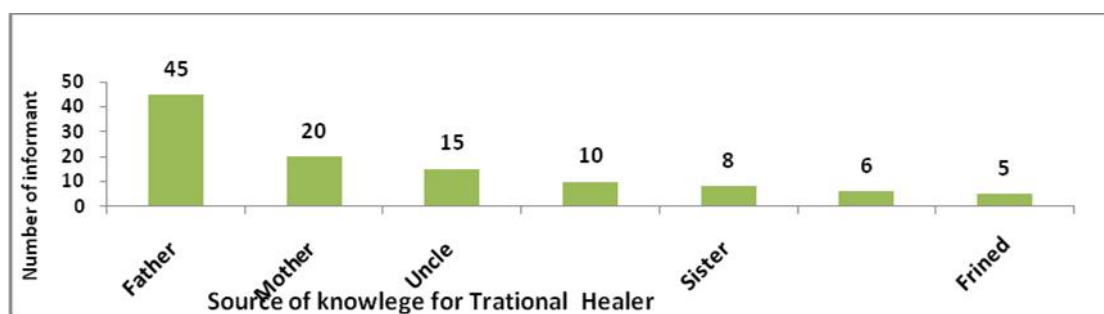
Solvents and additives	No- of informants who cited the species	Percent (%)
Water	85	85.8
Honey	73	75.76
Better	61	61.6
Milk	59	59.5
Sugar(tea)	42	42.4
Tefee powder	31	31.3
Hen wote	29	29.2
hyena liver	18	18.1
Coffee powder	15	15.1
Bordee	14	14.1
Meat	13	13.1

## 8. Sources and Transferring of Indigenous knowledge

### 8.1 Sources of Traditional knowledge practices

The highest number of traditional medicinal plant knowledge gain from to be 45 (45.4%) Father followed by 20 (2.02%) form Mother and 15 (15.1%) form Uncle 10(10.1%) from Brother, 8(8.08%) from Sister 6 (6.06) from Neighborhood and 5 (5.05%) form

Friend. The great majority of respondents (90%) reported that most of their knowledge was received from their family members and friends secretly by oral. The secret practices of traditional medicines came from their ancestors .Within my finding simlary studies are agreed by (Tena regassa 2015; Tadess Birhanu et al., 2015; and Getnet Chekole, 2017;Yihenew Simegniew Birhanet al., 2018; Nigussie Amesalu et al., 2018; and Yihenew simegniew Birhan et al., 2018) (Figure 11).



**Figure: 9 Sources of knowledge on the practice of traditional medicine**

### 8.2. Transferring knowledge of traditional medicinal plants

According to the survey, knowledge transfer of medicinal plants follows vertical transfer to the most selected family member orally with great secrecy. The

findings of the study showed that as people become older and older their knowledge of traditional medicine becomes better and better. Most of the informants were elders that indicated the trend of transferring knowledge is usually at old age.

The highest number for the ways of transferring knowledge on traditional medicinal plants by elder son who received 56 (56.5%) votes followed by the elder daughter 12 (12.1%), for the brother 10 (10.1%) for the sister 7 (7.07%) for the not to all 5 (5.05 %) for all went to known 4 (4.04%) to all the member of my family 3 (3.03%) and other to friend

2(2.02%)(Figure 12). Therefore most way of indigenous knowledge transfer in the study District was by word of mouth to a family member (especially to an elder son). Similar findings were reported for other communities in Ethiopia (Tadess Birhanu *et al.*, 2015; Nigussie Amesalu *et al.*, 2018; and Yihenew simegniew Birhan *et al.*, 2018)

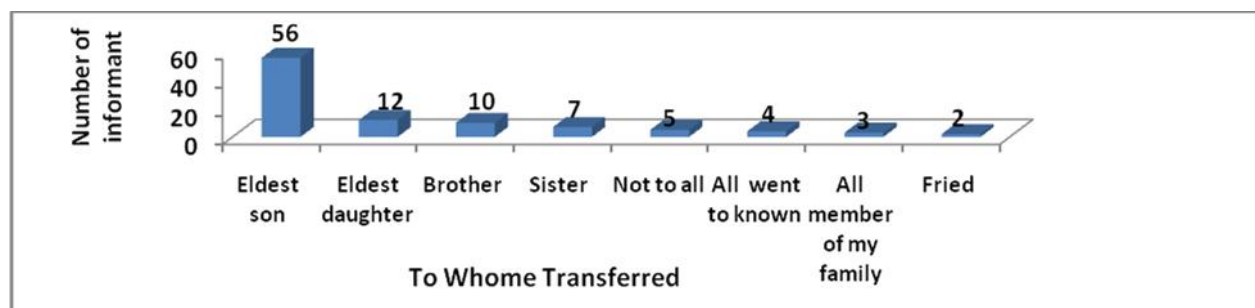


Figure: 10 transferring of knowledge of traditional medicinal plants

## 9. Ranking of most important medicinal plants

### 9.1. Preference ranking

Preference ranking for eleven medicinal plants to treat snake biting (Table 6) made by ten informants showed

that *Bersema abyssinaca* ranked first and hence is the most effective medicinal plant to cure snake biting. *Myrsine melanophloeos*, *Nicotiana tabacum*, *Justicia schimperiana* and *Allium sativum* .Are the 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup> respectively.

Table.6: Preference ranking of eleven Selected Medicinal Plants based on the Degree of their Curative Power of snake bit as Perceived by Informants

Name of plants species	Respondents(R1-R10)										Total	Rank
	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	R <sub>4</sub>	R <sub>5</sub>	R <sub>6</sub>	R <sub>7</sub>	R <sub>8</sub>	R <sub>9</sub>	R <sub>10</sub>		
<i>Allium sativum L.</i>	4	3	5	3	4	5	1	5	5	3	38	5 <sup>th</sup>
<i>Carduus englarium Sch. Bip. Ex A. Rich.</i>	2	3	1	1	2	3	4	3	3	5	27	9 <sup>th</sup>
<i>Carissa spinarum L.</i>	2	5	5	4	5	5	2	5	3	1	37	6 <sup>th</sup>
<i>Justicia schimperiana (Hochst. ex Nees) T. Anders.</i>	4	5	5	2	5	4	5	4	2	3	39	4 <sup>th</sup>
<i>Lagenaria siceraria (Mol.) Standl.</i>	4	4	0	1	4	3	2	2	1	3	24	11 <sup>th</sup>
<i>Nicotiana tabacum L.</i>	3	5	2	4	4	5	5	3	5	5	41	3 <sup>rd</sup>
<i>Paveonia urens cav</i>	5	2	5	3	2	4	5	4	1	5	36	6 <sup>th</sup>
<i>Stereospermum kunthianum</i>	4	2	2	4	5	2	2	5	5	4	30	9 <sup>th</sup>
<i>Bersema abyssinaca</i>	5	5	5	4	5	5	4	4	5	5	47	1 <sup>st</sup>
<i>Dicrocephale latifolia</i>	5	4	2	2	3	2	3	3	3	4	31	8 <sup>th</sup>
<i>Myrsine melanophloeos</i>	5	4	4	5	5	5	4	5	5	4	46	2 <sup>nd</sup>

**9.2. Direct matrix ranking**

Direct matrix ranking was performed to assess the relative importance each of the plant. The result of the direct matrix ranking showed that *Cordia africana* stood first in being the most multipurpose medicinal

plant followed by *Gardenia ternifolia*, *Eucalyptus globulus*, *Myrsine melanophloeos*, *Croton macrostachyus Del.*, *Acacia abyssinica*, *Ximenia caffra.sond*, *Bersema abyssinaca* and *Jatropha curcas* was the least (Table 7).

Table 7: Direct matrix ranking for seven specie and main use in study area

Name Plant species	Use categories								Rank
	Charcoal	Construction	Medicine	Food	Firewood	Fencing	Furniture	Total	
<i>Jatropha curcas</i>	0	0	4	0	3	5	1	13	9 <sup>th</sup>
<i>Ximenia caffra.sond</i>	0	2	5	5	5	3	2	22	7 <sup>th</sup>
<i>Cordia africana Lam.</i>	5	5	5	4	5	3	5	32	1 <sup>st</sup>
<i>Croton macrostachyus Del.</i>	5	5	5	0	4	4	2	24	5 <sup>th</sup>
<i>Acacia abyssinica</i>	5	5	3	0	4	3	3	23	6 <sup>th</sup>
<i>Eucalyptus globulus</i>	5	5	3	0	5	5	5	28	3 <sup>rd</sup>
<i>Myrsine melanophloeos</i>	5	5	5	0	5	2	3	25	4 <sup>th</sup>
<i>Bersema abyssinaca</i>	1	2	5	0	3	3	1	15	8 <sup>th</sup>
<i>Gardenia ternifolia</i>	2	3	5	3	4	3	5	30	2 <sup>nd</sup>
Total	33	30	40	12	47	31	23		
Rank	3 <sup>rd</sup>	5 <sup>th</sup>	2 <sup>nd</sup>	7 <sup>th</sup>	1 <sup>st</sup>	4 <sup>th</sup>	6 <sup>th</sup>		

**9.3. Paired comparison**

A paired comparison made to determine the most preferred medicinal plants among the 9 species that were used to treat eye vile in the study area, the responses of ten key informants, showed that Ranked

*Withania somnifera* first followed by *Gardenia ternifolia*. (Table8). Therefore, this result indicated that *Withania somnifera* .is the most preferred while. *Clausena anisata* is the least favored over the other plant species cited in treating eye vile.

Table 8: Paired comparisons of five medicinal plant species used to treat fibril illness.

Name of plants species	Respondents (R1-R10)										Total	Rank
	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	R <sub>4</sub>	R <sub>5</sub>	R <sub>6</sub>	R <sub>7</sub>	R <sub>8</sub>	R <sub>9</sub>	R <sub>10</sub>		
<i>Gardenia ternifolia</i>	1	4	3	0	1	1	2	4	5	4	35	2 <sup>nd</sup>
<i>Acacia abyssinica</i>	4	1	2	2	4	5	5	4	2	1	30	4 <sup>th</sup>
<i>Allium sativum L.</i>	2	2	1	4	3	2	4	3	2	5	28	5 <sup>th</sup>
<i>Croton macrostachyus Del</i>	5	5	1	4	2	2	1	0	1	4	25	8 <sup>th</sup>
<i>Vernonia amygdalina Del.</i>	1	0	2	4	3	1	4	1	5	1	27	6 <sup>th</sup>
<i>Secuidaca longepedunculta</i>	4	1	0	4	1	2	1	4	5	4	26	7 <sup>th</sup>
<i>Clausena anisata</i>	4	4	1	0	4	1	4	3	1	0	22	9 <sup>th</sup>
<i>Capparis tomentosa</i>	1	2	4	2	4	2	4	4	3	5	31	3 <sup>rd</sup>
<i>Withania somnifera</i>	4	2	4	4	5	1	5	4	4	5	38	1 <sup>st</sup>

#### 4.10. Threatened and factor threatening medicinal plants in Dibati Woreda

##### 4.10.1 Threatened medicinal plant in the study area

The ranking of 9 medicinal plants based on the degree of threats was conducted using 10 key informants. (Table 9) The results (Table 9) indicated that *Asparagus africanus* and *Myrsine melanophloeos* the most threatened followed by *Withania somnifera* (L.) and *Bersema abyssinaca* and the least threatened one is *Glinus lotoides* L.

Table 9: Ranking of threatened plants

Name of plants species	Respondents(R1-R10)										Total	Rank
	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	R <sub>4</sub>	R <sub>5</sub>	R <sub>6</sub>	R <sub>7</sub>	R <sub>8</sub>	R <sub>9</sub>	R <sub>10</sub>		
<i>Myrsine melanophloeos</i>	1	4	3	0	1	1	2	4	5	4	35	2 <sup>nd</sup>
<i>Bersema abyssinaca</i>	4	1	2	2	4	5	5	4	2	1	30	4 <sup>th</sup>
<i>Paveonia urens</i>	2	2	1	4	3	2	4	3	2	5	28	5 <sup>th</sup>
<i>Oncoba spinosa</i> Forssk.	5	5	1	4	2	2	1	0	1	4	25	8 <sup>th</sup>
<i>Momoridica foetida</i> .schum	1	0	2	4	3	1	4	1	5	1	27	6 <sup>th</sup>
<i>Kalancheo petitiana</i> A.Rich,	4	1	0	4	1	2	1	4	5	4	26	7 <sup>th</sup>
<i>Glinus lotoides</i> L.	4	4	1	0	4	1	4	3	1	0	22	9 <sup>th</sup>
<i>Withania somnifera</i> (L.)	1	2	4	2	4	2	4	4	3	5	31	3 <sup>rd</sup>
<i>Asparagus africanus</i>	4	2	4	4	5	1	5	4	4	5	38	1 <sup>st</sup>

##### Factors threatening medicinal plants in the study area

The cause of threats to medicinal plants can be generally grouped into natural and human induced factors. However, as reported in this study most of the causes for the threats to medicinal plants and the associated indigenous knowledge are the anthropogenic factors such as deforestation due to over exploitation of plants for different uses including charcoal making, population pressure, fire wood collection, house hold construction, overgrazing, cutting and burning of plants to create new agricultural expansion lands and urbanization. Informants ranked agricultural expansion, fire wood and population pressure as the most serious threat to the medicinal plants followed by medicinal purpose and charcoal collection is lower levels of threats by the other factors (Table 10). Similar study by (Ensermu kelebessa, 1992; Zerihun and Mesfine, 1999; Kebu Balemie *et al.*, 2004; Fisseha Mesfin, 2007; in Wonago District, Assegid Assefa and Tesfaye Abebe, 2014; Tadess

Birhanu *et al.*, 2015; Yihenew Simegiew Birhan *et al.*, 2018). This showed that, there are different threats in medicinal plants such as agricultural expansion fire wood collection and others. Furthermore, the negative impact of deforestation on medicinal plants was also reported in (Mirutse Giday, 1999).

In this study, the information gathered from the key informants was indicated that the treats of medicinal plants increase from time to time in study area. The agricultural expansion and deforestation was the major medicinal plant treats. The finding was in line with other findings (Giday *et al.*, 2001; Mesfin Taddes *et al.*, 2009). This might be due to continuous agricultural expansions, deforestation and draught in addition to lack attention towards the medicinal plants. The plants are disappeared because of rapid socioeconomic, environmental and technological changes and as a result of the loss of cultural heritage under the guise of civilization ( Erimias Lulekal *et al.*, 2008; Khan *et al.*, 2012).



Table 10: Ranking of threats to medicinal plants

Name of plants species	Respondents(R1-R10)										Total	Rank
	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	R <sub>4</sub>	R <sub>5</sub>	R <sub>6</sub>	R <sub>7</sub>	R <sub>8</sub>	R <sub>9</sub>	R <sub>10</sub>		
Fire wood	4	5	5	4	3	4	3	5	2	5	40	2 <sup>nd</sup>
Medicinal purpose	2	1	2	1	2	2	1	2	2	1	16	8 <sup>th</sup>
Charcoal Making	4	2	3	2	3	1	3	4	1	3	23	7 <sup>th</sup>
Household tool construction	4	5	5	3	1	2	4	4	2	3	33	6 <sup>th</sup>
Over grazing	3	4	4	2	5	5	4	3	2	3	35	4 <sup>th</sup>
Agriculture expansion	5	4	5	5	5	4	4	5	5	5	47	1 <sup>st</sup>
Urbanization	3	2	4	5	4	3	2	2	5	4	34	5 <sup>th</sup>
population pressure	5	2	3	4	5	5	3	3	4	5	39	3 <sup>rd</sup>

### 10.3. Management and Conservation of Medicinal Plants

At this moment natural habitats of medicinal plants in the study area are highly affected by factors mentioned above. The local people in the study area have brought only about 48 and 17 species of the total collected medicinal plants under wild and home garden. As a result many medicinal plants are under serious threats. So the local people should be conserve medicinal plant in-suit and ex-suit management style.

Those manes that forty eight medicinal plants that are collected in the wild by conserve in-suit conservation method and the reaming seventeen medicinal plants that conserve by ex-suit conservation method. According to the informant information generally, there are some conservation measures that have been under taken around the world aimed at protecting threatened medicinal plant species from further destruction by create awareness for the user local people for the use and management of medicinal plant in study area .

Some authors clarify that home gardens can be refuge for wild species that are threatened in the wild by deforestation and environmental changes. Concerning this (Zemedede Asfaw, 2001) reported that home gardens are being used as informal experimentation plots for new varieties and exotic species.

Medicinal plants are also left as remnants of trees, shrubs and herbs in and around agricultural fields due

to their uses as forage, fuel wood, timber, and construction, spiritual and ritual needs. Protecting such multi-purpose plant species by agro-pastoralists in their localities is evidence for the existence of traditional conservation practices in the area. But this has to be strengthened to safeguard these natural resources. Of the species purposely maintained in home gardens in the country, about 6% are primarily cultivated for their medicinal values (Zemedede Asfaw, 2001).

Informants also reported that the healers know time and processes of gathering, and storing medicinal plants. It is once a year that some medicinal plants are collected and preserved. *Lepidium sativum*, *Cucurbita pepo*, *Jatropha curcas* and *Ocimum basilicum* seed, leaf, fruit or root are harvested, dried and preserved in roof corners or outside house, and dried parts are powdered and stored in different containers like pots, bottles or tied with clothes and used when needed.

The study indicated that many of the informants who have knowledge on traditional medicine usage give priority to the immediate use of the medicinal plants than to its sustainable future uses, as a result their harvesting style is destructive. However, some plants has 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 medicinal plants through cultivation. Taddes Birhanu, *et al.*, (2015)

#### 10.4. Informant consensus factor (ICF)

All cited human and livestock diseases were categorized into 7 categories: namely, Sense organs related diseases, Animal and insect biting related disease, digestive system related disease, Reproductive system related diseases, Cultural related disease, Respiratory disease related diseases, intestinal and parasitic infection related diseases, and derma related disease. These diseases are categorized based on nature of disease, conditions that cause, place of attack, symptoms and sign of disease (Table 11). Disease categories with relatively higher ICF values were: intestinal and parasitic infection related

diseases(0.89), derma related diseases (0.87) Sense organs related diseases (0.83), Cultural related diseases (0.73). This may indicate the common occurrence of these diseases so that more number of people exchanging information and agree on plant species that can be used to treat these diseases than the rest. The medicinal plants that are presumed to be effective in treating a certain disease have higher ICF values. On the other hand, the rest of disease categories had ICF value of lower suggesting that these diseases are either rare in the study area or are treated only by the healers with little information passed to other general public (Tilahun Teklehaymanot and Mirutse Giday, 2010).

Table 11: Informant consensus factor (ICF)

Categories	Ailments/diseases	Number of Species used (nt)	Use citation (nur)	ICF Value
Sense organs	Eye problem, ear problem, trachoma,	5	25	0.83
Animal and insect biting	snake bite , rabies, malaria, spider poison, scorpion poisons	23	69	0.64
digestive system	Stomach ache, , bloat, diarrhea, toothache, gastritis abdominal pain	25	81	0.70
Reproductive system	gonorrhea, sexual weakens diseases, retained placenta , infertility RHfactor	11	33	0.68
Respiratory diseases	Nasal bleeding, , tonsillitis, cough and asthma, common cold ,leech	16	28	0.44
intestinal and parasitic infection	Tap worm, ascarisis	6	49	0.89
dermal	Dandruff, wound, skin rash, body swell ,bone broken Leprosy goiter ,ring worm mouth rash Athletes foot	8	58	0.87
Cultural related	Eye vile, feberal ilnes, headache, preventing snake	18	64	0.73

#### 10.5. Fidelity level Index (FLI)

Fidelity level (FL) quantifies the importance of a species for a given purpose. Hence, fidelity level values were calculated for commonly used individual medicinal plants against the following ailments: *Justicia schimperiana*(against snake biting and Rabbits) *Nicotiana tabacum* L.( against leech) *Asparagus africanaus*(against retained of placenta) *Croton macrostachyus* (against eye vile),

*Stereospermum kunthianum*(Tonsil ,scorpion biting) , *Momordica foetida.schum* (against Bleeding during delivery ) *Myrsine melanophloeos* (against blackleg) *Euphorbia abyssinica* (against Hemorrhoid, gonorrhea) *Paveonia urens cav*(against Rheumatic ,tooth ache ) and *Protulaca sp.*( against Gastritis). The fact that these medicinal plants had the highest FL values which could be an indication of their good healing potential (Table 12).

Table 12: The relative healing potential of individual medicinal plants used against human or livestock ailments

No	Medicinal plants species	Aliments treated	IP	IU	FLI (%)	Rank
1	<i>Croton macrostachyus</i>	Evile eye	52	58	89.6	4 <sup>th</sup>
2	<i>Justicia schimperiana</i> (Hochst. ex Nees) T. Anders.	Snake biting, rabbis	47	47	100	1 <sup>st</sup>
3	<i>Nicotiana tabacum</i> L.	Leech,	45	48	93.75	2 <sup>nd</sup>
4	<i>Asparagus africanus</i> (kunth) Baker	Retained placenta	38	41	92.6	3 <sup>rd</sup>
5	<i>Myrsine melanophloeos</i>	Black leg	37	45	82.22	7 <sup>th</sup>
6	<i>Stereospermum kunthianum</i> Cham.	Tonsil ,scorpion biting	31	35	88.57	5 <sup>th</sup>
7	<i>Euphorbia abyssinica</i> J.F Gmel	Hemorrhoid, gonorrhea	29	37	78.38	8 <sup>th</sup>
8	<i>Momordica foetida</i> .schum	Bleeding during delivery	26	31	83.8	6 <sup>th</sup>
9	<i>Protulaca</i> sp.	Gastritis	21	29	72.4	10 <sup>th</sup>
10	<i>Paveonia urens</i> cav	Rheumatic ,tooth ache	19	25	76.0	9 <sup>th</sup>

### 10.6. Medicinal Use Value

While some plant species are known to treat a single ailment, some others may be used for multiple of health problems. Medicinal use value is a quantitative method that demonstrates the relative importance of species known locally (Luiz *et al.*, 2005).

Some species that were cited for more than one ailment were selected and their use value was calculated. Results of use value computation for these species showed that *Croton macrostachyus* and had the *Carissa spinarum* highest use value (Table 13). The informant consensus values also indicated that the people share the knowledge of the most important medicinal plant species to treat the most frequently encountered diseases in the community. Moreover, most medicinal plant species have least use values in

the study area, which could not mean that they are less effective to treat ailments. This is because the few effective medicinal plant species are reported by one or two healers. In this case, the knowledge is very secret. This suggests that these species are used to treat many ailments. For example, *Croton macrostachyus* was reported to treat ailments such amoeba, evil eye, febrile illness, wound, prevent snake, skin infection and malaria. On the other hand was *Carissa spinarum* L. reported to treat snake biting, ascariasis, malaria, gonorrhoea, Amoeba, febrile illness and diarrhoea. *Justicia schimperiana* was reported to treat ailments such as snake biting, anti-toxic stabbing malaria, rabbis and typhoid's. *Stereospermum kunthianum* was reported to treat ailments such as scorpion biting, retained placenta, gasterite, tosil, snake biting and stomachache

Table 13: Use Value of Certain Medicinal Plants in Study Area

Plant species	Use citation(U)	Number of informants(n)	Use value (Uv)
<i>Croton macrostachyus</i>	7	23	0.35
<i>Carissa spinarum</i> L.	7	19	0.37
<i>Stereospermum kunthianum</i> Cham.	6	12	0.50
<i>Justicia schimperiana</i> (Hochst. ex Nees) T. Anders	6	14	0.43
<i>Vernonia amygdalina</i> Del.	5	12	0.42
<i>Combretum collinum</i>	5	13	0.38
<i>Paveonia urens</i> cav	5	15	0.33
<i>Cordia africana</i> Lam.	5	23	0.22
<i>Solanu nigrum</i>	4	11	0.36
<i>Kalancheo petitiana</i> A.Rich	4	9	0.44
<i>Gardenia lutea</i> Fresen.	4	12	0.33
<i>Allium sativum</i> L.	3	7	0.43

<i>Clusia abyssinica</i> Jaub. and Spach	3	5	0.60
<i>Coffea arabica</i> L.	3	25	0.12
<i>Ximenia caffra</i> .sond	3	8	0.38
<i>Nicotiana tabacum</i> L.	3	7	0.43
<i>Ruta chalepensis</i> L.	3	19	0.16
<i>Eucalyptus globulus</i> .Labil.	3	20	0.15
<i>Zingiber officinale</i> Roscoe,	3	15	0.20
<i>Clematis hirsuta</i> perr and Guill	3	12	0.25
<i>Euphorbia abyssinica</i> J.F Gmel	3	4	0.75
<i>Linum usitatissimum</i> L.	3	11	0.27
<i>Oncoba spinosa</i> Forssk.	3	9	0.33

## Conclusion

Dibati woreda is one the most rich medicinal plant species and the associated indigenous knowledge. In this study area 39family, 62genera and 65 medicinal plant species were recorded. Of these, 48(47.6%) and 17 (21.9%) of the species were reported as seeing used to treat human ailments and livestock respectively, while 30.5% of them were reported to treat both livestock and human ailments. The majorities of these medicinal plant species were obtained and collected 48 from wild, 17 from home garden. Analysis of growth forms of these medicinal plants that herbs constitute the largest category 24 (36.9%) followed by tree 18 (27.69%) shrub 16(24.61) and climber 7 (10.76%) plant species. Herbal remedies are prepared from fresh materials 45 (62.23 %) and dried plant materials 8 (12.30 %) and in both condition 18 (18.46%). In the study area, 72 ailments were reported (57 for human and 15 for livestock) which are being treated by traditional medicinal plants of the area.

Leaves were the most frequently used plant parts followed by roots for preparation of human and livestock remedies. Most of the medicinal plants are administered orally (54.4%) and followed dermal (7.69). The most widely used method of preparation was crushed (23.07%), Pounding (20%), squeezed (15.4%), chewing (10.7%) crushed pounded, cooking, smoking eating of the different medicinal plant parts.

The shinasha people of Dibati Woreda are rich with indigenous knowledge in using, conserving and managing plant resources in general and medicinal plants in particular. They have a wide knowledge in using plants for various purposes such as for medicine, food, household utensils, fodder, fuel, construction, etc. This knowledge is transferred from elders to

youngsters entirely through oral traditions and personal experiences. But this way of knowledge transmission will lead to distortion of the original knowledge or total disappearance of the practice. The major threats to medicinal plants and the associated knowledge in the study area are mainly agricultural expansion, firewood collection, population pressure, over grazing, urbanization, household tool construction, charcoal production and medicinal purpose. Therefore, use and management system awareness rising should be made among the healers so as to avoid erosion of the indigenous knowledge and to ensure its sustainable use.

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