The Study on Medicinal Plants and Their Uses to Treat Human Ailments in Damot-Gale District, Wolaita Zone, South Ethiopia

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Abstract

This study was conducted in Damot-gale district between October 2015 and July 2016. It was focused on the investigation of traditional uses of various medicinal plant species of the study area. A total of 80 (60 male and 20 female) informants, aged between 21-96 years old were identified from 13 kebeles. Relevant information was collected by using semi-structured interview, field observation, field guided interviews, group discussion and open ended questions. The collected data was analyzed using preference ranking and paired comparison methods. 77 medicinal plant species were identified and collected from wild (natural habitats) and home gardens. The reported medicinal plant species were distributed in 35 families. The category of reported species includes trees 19 (24.66%) species, shrubs 23 (29.87%) species, herbs 30 (38.96%) species, climbers 2 (2.59%) species and succulent 1 (1.29%) species. The most important parts utilized for preparation of remedies were leaves from 42(54.55%) species, roots from 15(19.48%) species, seeds from 15(19.48%) species, flower from 8(10.39%) species, barks from 7(9.09%) species and fruits from 6(7.79%) species. Knowledge of medicinal plants is wider among elderly women and men while the young are comparatively less knowledgeable. This indigenous knowledge on medicinal plants was gradually disappearing due to the secrecy, unwillingness of the young generation to gain the knowledge, disinterest of the young generation in traditional medicine and the influence of modern education. Local administration, NGOs and other stockholders must involve in awareness creations on traditional healers to transfer their knowledge to the next generation without secrecy and biodiversity conservation.

Keywords: Ethnobotanical knowledge, Home garden, Medicinal plants, traditional healers.

Introduction

Medicinal plants are plants containing inherent active ingredients tending or used to cure diseases or relieve pain. The traditional health care practice is mainly dependent on medicinal plants collected from the natural habitats and home gardens. The role and contributions of medicinal plants to healthcare, local economies, cultural integrity and ultimately the well-being of people, particularly the rural poor, have been increasingly acknowledged over the last decade. It plays an important role in the health care system of most developing countries. Plants represent a huge storehouse of drugs: they produce more than 10,000 different compounds to protect themselves from predators.

Ethnobotany is the study of how people of a particular culture and religion make use of indigenous plants. From the beginning of humanity, indigenous people have developed their own local specific knowledge on plant use, management and conservation (Cotton, 1996). Indigenous knowledge has developed as a result of human interaction with their environment. In this view, ethno botanical studies are useful in documenting, analyzing and communicating knowledge and interaction between biodiversity and human society, how diversity in nature is used and influenced by human activities (Martin, 1995; Cotton, 1996; Balick and Cox, 1996).

The concept of ethnobotanical knowledge has originated from local people, which has the potential to redress some of the shortcomings of contemporary Western knowledge (G. J. Martin, Ethnobotany, 1995). It is passed down from generation to generation and closely interwoven with people's cultural values. Traditional societies throughout the world hold a wealth of such knowledge which they have built up during prolonged interactions with the natural world and which remains fundamental to their physical, spiritual, and social interests (A. Getahun, 1976; C. M. Cotton, 1996).

Historically, herbal medicine treatment is believed to have been started by early humans. plant medicines were discovered by trial and error. When people started to select their food from plants growing nearby, they must have kept some of those, which they found to cure some of their ailments, or which they thought would cure diseases (UNESCO, 1994a).

Thus, the use must have arisen out of need. Throughout the centuries, some of these plants have been used successfully to treat diseases and later on they constituted the basis for many of the modern day drugs like quinine, digitalis, etc (Jansen, 1981).

Traditional medicine has been utilized by the majority of the world population for thousands of years. Until the beginning of the 19th century, all medicines were traditional. Yet, in many developing countries, it is true that for the majority of rural population, traditional medicine is the only primary or any other kind of health care available (Koita, N. 1990). For more than 80% of the population in Africa traditional medicine is the first, if not the only health care system available in the poor and rural areas. In recognition of this fact, WHO underlined

the potential role that traditional medicine may play in reinforcing the health care through the primary health care approach in developing countries (WHO, 1978).

Ethiopia is characterized by a wide range of ecological, edaphic and climate conditions that account for the wide diversity of its biological resources both in terms of flora and fauna wealth and also is a home of many languages, cultures and beliefs that in turn have contributed to the high diversity of traditional knowledge and practices of the people, which among others include the use of medicinal plants (Mirutse Giday and Gobena Amani, 2003). Plants have been used as a source of traditional medicine in Ethiopia from time immemorial to combat different ailments and human sufferings (Zemede Asfaw *et al*., 1999). Due to its long period of practice and existence, traditional medicine has become an integral part of the culture of Ethiopian people (Mirgissa Kaba, 1998). The ways to combat diseases through traditional medicinal plants are also as diverse as the different cultures. There is a large magnitude of use and interest in medicinal plants in Ethiopia due to acceptability, accessibility and biomedical benefits (Dawit Abebe, 2001).

The country is endowed with a diverse biological resources including about 6, 500 species of higher plants, with approximately 12% endemic, hence making it one of the six plant biodiversity rich regions. This plant biodiversity is distributed all over the country with great concentration in the south and southwestern parts of the country. The woodlands of Ethiopia are the source of most medicinal plants, followed by montane grassland or dry montane forest complex of the plateau; others include the evergreen bush land and rocky (Girma Defar, 1998).

Medicinal plants played a pivotal role in the treatment of various afflictions in Ethiopia (Fekadu Fullas, 2007). These resources are found in locally available plants and they benefit from local knowledge that is simple to use and affordable.

As in any African countries, the use of plants in religious ceremonies as well as for magic and medicinal purposes is common in Ethiopia. The uses of plant species as traditional medicinal plants represent by far the biggest human use in terms of number of species of the natural world (D. Abebe, A. Debella, and K. Urga, 2003). It is estimated that 70–80% of people worldwide (IBC, Government of the FDRE, 2005) and 80% of the people of Ethiopia rely chiefly on traditional herbal medicines to meet their primary healthcare needs. So, plant diversity remains crucial for human well-being and still provides a significant number of remedies required in healthcare.

In many developing countries, medicinal plants have not been well studied, tested or documented. Most of the information is still in the hands of traditional healers and knowledge of healers is either lost or passed to generation by the word of mouth. In spite of this, the medicinal plant biodiversity is being depleted due to man-made and natural calamities. Moreover, the indigenous knowledge associated with the conservation and use of medicinal plants is also disappearing at an alarming rate. Thus, ethnobotanical research attempts to document the knowledge of the healers in the community in order to reserve it for future use. However, as time goes on, the traditional knowledge is gradually worn away for reasons mainly attributed to environmental degradation and deforestation, which in turn brought about the loss of some species including medicinal plants (Desalegn Desissa, 2000).

Inadequate understanding of the potentials of traditional medicinal plants and the associated local knowledge to the present and future generations have led to a decline in sustainable use of these biological resources (M. J. Balick and P. A. Cox, 1996; M. Giday, Z. Asfaw, Z. Woldu, and T. Teklehaymanot, 2009). Natural and anthropogenic causes of wild vegetation loss and transformation of cultures further exacerbate the situation in most parts of Ethiopia including Wolaita. Hence, promoting the cultures and the local knowledge are vital for halting the loss, shaping and conserving the floristic diversity. Notably, attempts to respond to healthcare issues lead to ethnobotanical documentation on traditional medicinal plants (A. C. Hamilton, 2003). However, as the ethnobotanical information is not documented and remains in the memory of elderly practitioners and end users, the knowledge base continues to be threatened (T. Awas and S. Demissew, 2009; N. P. Dhakal, K. C. Nelson, and J. L. D. Smith (2006). Adequate information on the traditional medicinal plant of Ethiopia could only be obtained when studies are undertaken in the various parts of the country where no ethnobotanical explorations have been made (T. Stellmacher and I. Eguavoen; 2011).

As a plant species is lost from a locality, the information contained in it will also be slowly blurred and finally become lost forever. Urgent ethnobotanical studies and subsequent conservation measures are, therefore, required to salvage these resources from further loss. Thus, the main objective of this study was to document the availability of plants which have been used as remedy to combat ailments and the local knowledge on use of these resources in Wolaita.
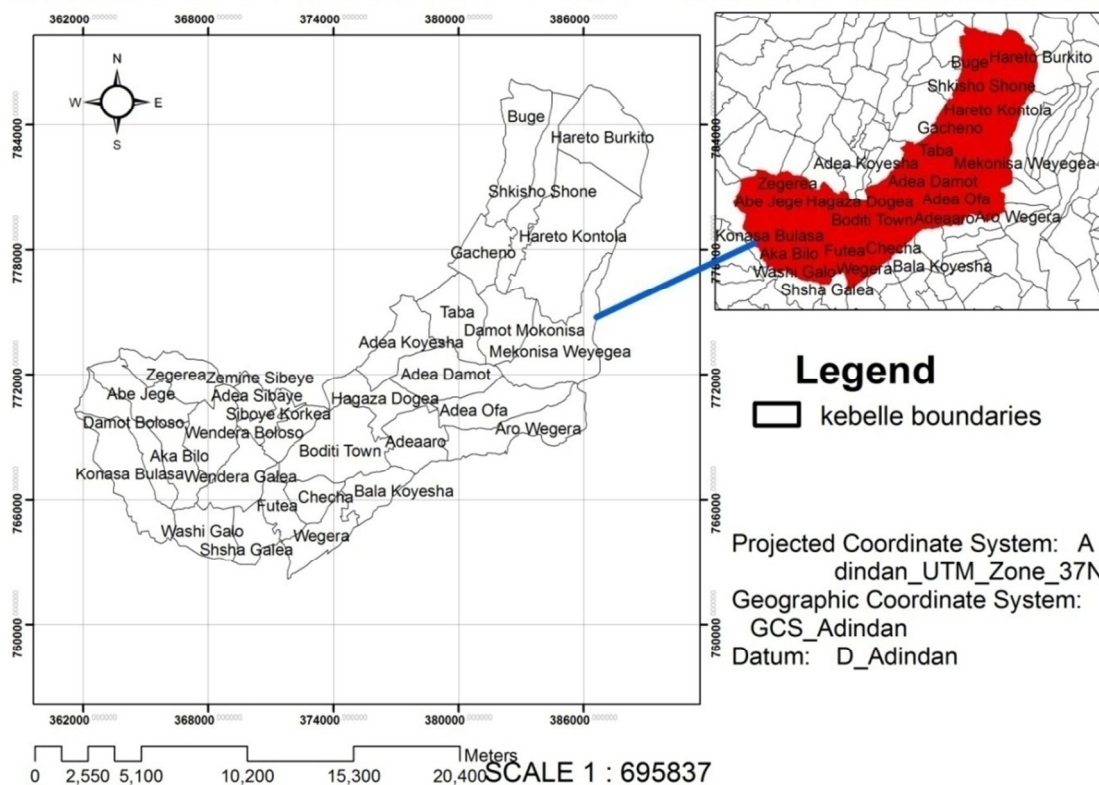
Materials and Methods
Study area
The study on medicinal plants and their uses to treat human ailments was conducted in 13 kebeles of Damot gale district in Wolaita zone, Southern Nations, Nationalities, and Peoples' Regional State (SNNPRS). The area is

found at South Central Ethiopia between 6.4^0-6.9^0N latitude and 37.4^0-37.8^0E longitude and is located at 370 km south of Addis Ababa and 140 km from Hawassa, the capital of the Regional State. Damo-gale district is one of the 12 rural districts of Wolaita zone. The district encloses three agro-climatic zones, high land (Dega), mid land (Woina dega), and low land (kola) .The Dega is above 1800 masl and Woina Dega 1500-1800 masl. These climatic zones are highly degraded because of over cultivated for long periods of time and densely populated with easily erodible landscape. The total population of Damot Gale is estimated to be 158,328 out of which 77,330 male and 80,999 female (2007 census) and average population density is estimated to be 600 in per square km. Population density is very high in the Dega and Woina Dega areas compared to Kola region (below 1500 masl). The Total area of Damot Gale district is 24,285.861 ha. Of which 22% is Dega, 49% is Woina Dega and 29% is Kola zone. Maximum and Minimum temperature of the district is 24 and 12 degree Celsius respectively. The average annual rainfall ranges from 900mm to 1400mm. From the total area of the district 3,232.234 ha, is covered by perennial crops, 15,979.37 ha, is also covered with annual crops. 1,596.5ha, of land is occupied by vegetation and 2,399.25 ha, of land is used for grazing. The rest 1,078.5 ha, is for other uses like settlement, construction and some of it is highly degraded, rugged, and deforested. For administration purposes the district is divided into 31 rural kebeles.

Methodology
Ethnobotanical data collection
Preliminary survey of the study area was conducted in October 2015 and July 2016. These months were selected purposively because, October is the begging of the dry season and July is the rainy season (wet season) and in these two seasons the medicinal plant species are not in the same situation. During this survey, information about the physical features of the study area was collected. 13 kebeles were identified by the help of district administrative office and agricultural department of Damot-gale district. They were selected purposefully for ethnobotanical data collection, based on availability of traditional healers and different agro-climatic zone (Dega, Woina Dega and Kola) of the region. The type of medicinal plants and their distribution is depends on the agro-climatic conditions. The identification was assisted by the district and local authorities, elders and knowledgeable persons to gather diversified information on the management, use and conservation of medicinal plants.

The data were collected using purposive sampling method. This technique was preferred because the study focuses on specific issues that it was gathered from the most knowledgeable representatives of the society.

The methods employed in the data collection were group discussion, semi-structured interviews, open ended questions, field observation, market survey, preference ranking and paired comparison methods. All the relevant data including the vernacular name of the plants, human diseases treated, system of management (wild/cultivated), status, parts of plants used for medicine preparation, methods of preparation, routes of administration, noticeable adverse effects of remedies, indigenous knowledge transfer, other uses of the ethnomedicinal plant species, existing threats to these species and traditional conservation practices were gathered during the interviews.

Descriptive statistical methods such as percentages and frequency were employed to analyze and summarize the data on medicinal plants use. The most useful information gathered on medicinal plants reported by local people; medicinal value, application, methods of preparation, routes of administration, diseases treated, and parts used and habit was analyzed through descriptive statistics. Paired Comparison and preference ranking methods were also used in data analysis.

Selection of informants

Village meetings were held in each target village of the 13 rural kebeles and the aims and objectives of the survey were discussed. Both volunteer and recommended traditional medicine practitioners were identified as potential informants and subsequently participated in personal interviews. A total of 80 (60 male and 20 female) informants, aged between 21-96 years old were identified from the entire study sites (13 kebeles) of Damot-gale district. Out of this, 30 (21 male and 9 female) were healers systematically selected based on recommendations from elders, local authorities, Development Agent workers and kebele administration leaders, and 20 (15 male and 5 female) were knowledgeable elders, selected by systematic sampling method. 10 patient's, (all male) were selected systematically, and 20 (14 male and 6 female) informants were selected randomly from the community. Totally 80 participants (60 male and 20 female) were involved in this research work as data resources. Individuals, who were selected, know and practice at least four/five medicinal plant species were considered as traditional healers in this study. The choice of key informants is following the suggestion made by Martin (1995). Accordingly, in this study the systematic choice of 2-4 key informants from each site was done. The other 20 informants were selected randomly from the local people of the study area.

Informant consensus

In order to analyze the cultural importance of an individual species, the information obtained during the interview were categorized into relatively well-defined ethnomedical categories. Informant consensus factor (ICF) is calculated for each category to identify the agreements of the informants on the reported cures for the group of ailments.

The effectiveness of the medicine's use-reports were evaluated numerically using the Informant Consensus Factor, (IFC) which gives the relationship between the Number of Use Reports in each category (NUR) minus number of taxa used (Nt) divided by number of use reports (NUR) in each category minus one(Heinerich et al., 1998).

Thus, ICF is determined as follows:

$$ICF = Nur\text{-}Nt / Nur\text{-}1$$

Where: ICF: Informant consensus Factor

Nur: number of use citation

Nt: number of species used

The factor provides a range of 0 to 1, where a high value acts as a good indicator for a high rate of informant consensus. A value close to 1 indicates a high intercultural consensus i.e., more healers use the same species for similar diseases. A value close to zero indicates a high variation in the use of species.

The reliability of the information collected during interview was evaluated at least two times the same ideas to check the validity of the information recorded. If the ideas of the informants contradict with the original information, it was rejected since it is considered as unreliable.

Plant sampling method

As it might be expected traditional medicinal practitioners (healers) carry out the identification of plants before collection. The practitioners have an outstanding approaches and methods in identification of the plants. They use color of flowers, smell of leaves, height and thickness of stem, number of roots, presence or absence of latex and type and size of fruits during identification. All of the traditional healers know the geographical location of medicinal plants based on their past experience.

Almost all traditional medicinal practitioners collect medicinal plants at specified time of the day and none of the healers collect medicinal plants at midday. According to the healers this is done in order to keep themselves from evil spirits that may be hiding the plant during this time of the day. All traditional medicinal practitioners prefer to collect medicinal plants in the morning.

Traditional medicinal practitioners claim traditional medicines to be effective only if the plants are collected in certain time of the day or moon cycle, and the most preferred days for collection in the study area are Friday, Wednesday and Sunday, regarding days of the week, except for a few, all healers mention their day of preference to collect medicinal plants. Specially, for some specific diseases like epilepsy, evil spirit, evil eye and pneumonia the healers prefer to collect medicinal plants in Saturday, Tuesday and Thursday at evening of the sun set. They believe that, at evening the power of the sun is getting decrease, so as that the power of the disease is easily defeated, if the medicine is collected and prepared in the evening of the day, which will be given to the patients in the next day early in the morning. Some traditional healers highly depend on these days for efficacy of the herbs and others choose as the best day for healing practice. Some traditional medicinal practitioners collect medicinal plants on the same day whereas; some others have specific days for specific medicinal plants.

Though practitioners correlate collection season only with availability of plants, the season at which each drug is collected is usually a matter of considerable importance, as the amount, and sometimes the nature of the active ingredients is not constant throughout the year.

In order to assess the distribution of the reported medicinal plants in the area, both natural vegetation and home gardens surveys were carried out. A total of 59 sites, 52 (4 from each kebele) home gardens and 7 vegetation sites (4 sites with natural vegetation and 3 sites with plantation) were purposively selected for medicinal plant sample collection. Four of vegetation sites were with high human interference. The other 3 vegetation sites were in plantations that have little or no human influence.

52 home gardens were selected by purposive sampling method (4 home gardens from each kebele) and use categories of all the plants were described. To the vegetation sites, the data that helps to show the pattern of distribution of the plants (presence or absence of plant species in each plot) was collected following Martin (1995) Peter (1996) and Jha (1997). Sites identified from natural vegetation cover area were very rich in biodiversity concentration and important source of medicinal plant species. At the end of the interview, the reported medicinal plants were collected from natural vegetation (wild resources), plantation resources and the home gardens. Sample specimens of the plants cited for their medicinal value were collected, numbered, pressed and dried for further identification using through the flora Volumes of Ethiopia and Eritrea in Wolaita Soddo University Herbarium.

Analysis data

Descriptive statistical methods such as percentages and frequency were employed to analyze and summarize the data on medicinal plants use. The most useful information gathered on medicinal plants reported by local people; medicinal value, application, methods of preparation, routes of administration, disease treated, and parts used and habit was analyzed through descriptive statistics.

Paired Comparison and preference ranking methods were also used in data analysis. By selecting the five most effective plants based on their use value as suggested by most informants, paired comparisons were done following Martin (1995). The paired comparisons of the five most effective plants in treating stomach disorder were made using random number table. Random selection of ten healers was made to give their responses independently for pair of medicinal plants in treating stomach ache. An overall rank for the species was given by adding up these values for all respondents.

In addition, preference ranking was made following Martin (1995) for five medicinal plants in treating snake bite. Accordingly, eight informants were identified to rank the six selected medicinal plants according to their efficacy in treating snakebite. Each rank is stated by integer values 1, 2, 3, 4, and 5. The most effective plant is stated by highest value 5 while the least important is stated by a value of 1. An overall rank for the species was given by adding up these valves for all respondents.

Results and Discussion

The study revealed a total of 77 medicinal plant species belonging to 35 families of *Asteraceae* 10 species, followed by *Fabaceae* 8 species, *Lamiaceae* 6 species *Solanaceae* 5 species, *Rubiaceae* 4 species, *Euphorbiaceae, Myrtaceae*, and *Apiaceae* each 3 species, *Alliaceae, Brassicaceae, Rutaceae, Cucurbitaceae, Poaceae, Boraginaceae, Cypraceae* and *Zingiberaceae* each 2 species and *Apocynaceae, Amaranthaceae, Simaraubaceae, Caricaceae, Celastraceae, Commelinaceae, Conuvolvulaceae, Musaceae, Tiliaceae, Myrrecenaceae, Moringaceae, Pytolacaceae, Rhaminaceae, Malraceae, Ranunculaceae, Lauraceae, Rosaceae, Aloeceae* and *Verbenaceae* each with 1 species were used to prepare medicines and help to treat various human ailments. Out of these 44 (57.14%) species were collected from wild (natural habitats and plantations) and the rest 33 (44.86%) species were reported from home gardens.

Table1. Medicinal plants distribution in Family of the study area.

S.No	Family name	Number of species	%	Rank
1	*Asteraceae*	10	12.99	1st
2	*Fabaceae*	8	10.39	2nd
3	*Lamiaceae*	6	7.79	3rd
4	*Solanaceae*	5	6.49	4th
5	*Rubiaceae*	4	5.19	5th
6	*Euphorbiaceae*	3	3.89	6th
7	*Myrtaceae*	3	3.89	6th
8	*Apiaceae*	3	3.89	6th
9	*Alliaceae*	2	2.59	7th
10	*Brassicaceae*	2	2.59	7th
11	*Rutaceae*	2	2.59	7th
12	*Cucurbitaceae*	2	2.59	7th
13	*Poaceae*	2	2.59	7th
14	*Boraginaceae*	2	2.59	7th
15	*Cypraceae*	2	2.59	7th
16	*Zingiberaceae*	2	2.59	7th
17	*Apocynaceae*	1	1.29	8th
18	*Amaranthaceae*	1	1.29	8th
19	*Simaraubaceae*	1	1.29	8th
20	*Caricaceae*	1	1.29	8th
21	*Celastraceae*	1	1.29	8th
22	*Commelinaceae*	1	1.29	8th
23	*Conuvolvulaceae*	1	1.29	8th
24	*Musaceae*	1	1.29	8th
25	*Tiliaceae*	1	1.29	8th
26	*Myrrecenaceae*	1	1.29	8th
27	*Moringaceae*	1	1.29	8th
28	*Pytolacaceae*	1	1.29	8th
29	*Rhaminaceae*	1	1.29	8th
30	*Malraceae*	1	1.29	8th
31	*Ranunculaceae*	1	1.29	8th
32	*lauraceae*	1	1.29	8th
33	*Verbenaceae*	1	1.29	8th
34	*Rosaceae*	1	1.29	8th
35	*Aloeceae*	1	1.29	8th

Analysis of the data showed that, herbs constituted the largest number, 30 (38.96%) species of identified plant species followed by shrubs 23 (29.87%) species. Trees accounted 19 (24.66%) species and the rest two groups, climbers and succulent species, each contributed 1.29% of species in the collection.

Table 2. Growth forms of medicinal plants in the study site.

S.No	Growth forms	Number of species	%	Rank
1	Herb	30	38.96	1st
2	Shrub	23	29.87	2nd
3	Tree	19	24.68	3rd
4	Climber	2	2.59	4th
5	Other	1	1.29	5th

The plant parts used for medicine preparation revealed that in terms of number, leaves are the most widely used part followed by seeds, roots, flowers and barks in this study. Leaves of 39 species, seeds of 14 species, roots of 12 species, flowers of 10 species, barks of 8 species and fruits of 5 species were used to prepare remedies that used to treat different human ailments. Bulbs, rhizome, corm and shoot are used for medicine preparation. Other plant products such as gum, resin and sap are also used for medicine preparation.

Table 3.Parts of medicinal plants used for medicine preparation

S.No	Parts used	Number of species	%	Rank
1	Leaves	39	50.65	1st
2	Seeds	14	18.18	2nd
3	Roots	12	15.58	3rd
4	Flowers	10	12.99	4th
5	Barks	8	10.39	5th
6	Fruits	5	6.49	6th

The traditional healers in the study area were predominantly use herbs followed by shrubs. People who are using shrubs focus on root parts while those who use herbs do focus on leaves of that plant. The use of roots, barks, stems, and a whole plant than leaves maximize the threat to destructions of medicinal plants.

The total plant species identified in the study area were used to treat 58 different types of diseases of human ailments. As shown in table 4 below, the major ten top diseases in the study area were treated using four or more than four plant species. The rest disease types are treated using 1-3 different plant species.

Table 4. Major diseases and number of plant species used to treat each disease.

No	Common diseases in the study area	Number of species used	%
1	Stomach problems/ache/disorder/	30	38.96
2	Common cold/ pneumonia/ chill	15	19.48
3	Snake bite	8	10.39
4	Tonsillitis	7	9.09
5	Hepatitis/liver problems	6	7.79
6	Malaria	6	7.79
7	Intestinal worms	6	7.79
8	Evil eye	5	6.49
9	Evil spirit	5	6.49
10	diabetics	4	5.19

The most common diseases identified in the study area were stomach disorder, common cold, intestinal worms, malaria, evil spirit, tonsillitis, evil eye, snake bite, pneumonia and hepatitis/liver diseases. 30 plant species were used to prepare remedy to treat stomach disorder.

Most medicinal plants prescription (87%) was orally administered and followed by dermal, nasal and anal. Assessment of the remedies preparation showed that, crushing, pounding, powdering, grinding, boiling, extracting juice and chewing are the modes of preparation for the majorities of remedies.

Most traditional healers practice the same plant species for treating different diseases. *Artemisia afra* used to treat evil spirit, stomach disorder, blood clotting after delivery and to remove fluid from uterus after birth; *Aloe vera* used to treat malaria, diabetics, stomach disorder; *Allium sativum* used to treat pneumonia, evil spirit, common cold, stomach disorder; *Brassica nigra* used to treat stomach ache, constipation, bloating, amoebic dysentery abortifacient, wound dressing and *Echinops kebericho* used to treat evil spirit, headache, fever and cold.

In other round traditional healers were also used to treat the same disease using different plants, for the snake bite they are using *Acocanthera schimperi, Cynoglossum spps, Dichondra repens, Solanum incanum;* to treat the stomach disorder healers are using *Verinonia amygralina, Solanum capsicoides, Ruta chalopensis, Plectranthus caninus, Nigella sativa, Mytrus communis, Leucas abyssinica, Aframomum corrorima, Grewia bicolour, Foeniculum vulgare, Citrus aurantifolia, Carica papaya, Brassica nigra, Artemisia abyssinica, Aloe vera, Allium sativum* and to treat tonsillitis the healers are also using *Zingiber officinale, Rhamnus prinoides, Cinnamomum spp., Acmella caulirhiza, Aframomum corrorima* and *Nigella sativa.*

Eucalyptus spp., Chinops kebericho, Aframomum corrorima, Allium sativum, Artemisia abyssinica, Artemisia afra, Brassica nigra, Carica papaya, Croton macrostachyus, Leucas abyssinica, Moringa stenopetala, Nigella sativa, Presea americana, Pycnostachys abyssinica, Ruta chalopensis and *Solanum capsicoides* are popular medicinal plants each used to treat three or more diseases of human being.

The use of plants in religious ceremonies as well as for magic and medicinal purposes is common in the study area. Species such as *Allium sativum* (Goromoote Xaliya, to prevent vandalism of evil spirit), *Artemisia afra* (Mariam Naatiraa, used to make Mary pleasant at the time of woman delivery), *Echinops kebericho* (smoke, used to frightened devil), *Ruta chalopensis* (Goromoote Xaliya, indicate the effect of evil eye), *Sida schimperiana (put in the pocket of children to protect the reaching of devil), Solanum incanum, Verbena officinalis, Acmella caulirhiza* (used to make pleasant the spirit that cause small pox), *Chata edulis* (to call and order the evil spirit to do something), *Coffea arabica* (to avoid the feeling of tiredness due to the influence of evil spirit), *Datura stramonium* (used to stimulate someone to do something over than expected by the power of evil spirit), *Galiniria coffeoides* (used to wash the patient's body with the juice extracted from the plant) *and*

Verinonia theophrastifolia are used for religious ceremonies as well as for magic and medicinal purposes. In addition to this, these species are also used to treat other diseases similar to that of other medicinal plant species.

Most medicinal plants are prepared alone and some are used to prepare in combination with others. *Artemisia afra, Artemisia* abyssinica, *Coriandrum sativum*, *Allium sativum, Mytrus communis* and *Aframomum corrorima* are chopped together and mixed with water, boiled to treat chill, common cold and stomach problem.

Nigella sativa, Aframomum corrorima, Allium sativum, and *Zingiber officinale* are crushed, mixed and combined with cheese and butter eaten to treat pneumonia, tonsillitis, cold, and fever, and chest pain.

CONCLUSION

Seventy seven medicinal plant species were collected and recorded from thirteen kebeles of Damot Gale district. The selected kebeles were relatively rich in medicinal plant diversity. The identified medicinal plants were distributed in 35 families and 77 species. Out of these 44 (57.14%) species were collected from wild (natural habitats and plantations) and the rest 33 (44.86%) species were reported from home gardens. Herbs constituted the largest number, 30 (38.96%) species from the total identified plant species followed by shrubs 23 (29.87%) species. Trees accounted 19 (24.66%) species and the rest two groups, climbers 2 (2.58%) species and succulent 1 (1.29%) species in the collection. These all species were noted to treat human ailments. In the study area, 58 different human ailments were reported by informants as human health problems.

The most common diseases identified in the study area were stomach disorder, common cold, intestinal worms, malaria, evil spirit, tonsillitis, evil eye, snake bite, pneumonia and hepatitis/liver diseases. 30 plant species were used to prepare remedy to treat stomach disorder.

Analysis of the plant parts used for medicine preparation revealed that in terms of number, leaves are the most widely used part followed by seeds, roots, flowers and barks. In this study, leaves of 39 species, seeds of 14 species, roots of 12 species, flowers of 10 species, barks of 8 species and fruits of 5 species were used to prepare remedies that used to treat different human ailments. Bulbs, rhizome, corm and shoot are used for medicine preparation. Other plant products such as gum, resin and sap are also used for medicine preparation.

Most medicinal plants are prepared alone and some are used to prepare in combination with others. *Artemisia afra, Artemisia* abyssinica, *Coriandrum sativum*, *Allium sativum, Mytrus communis* and *Aframomum corrorima* are chopped together and mixed with water, boiled to treat chill, common cold and stomach problem.

Nigella sativa, Aframomum corrorima, Allium sativum, and *Zingiber officinale* are crushed, mixed and combined with cheese and butter eaten to treat pneumonia, cold, and fever and chest pain. The routes of administration are mainly internal in which oral administration (87%) is the common that followed by dermal, nasal and anal. Assessment of the remedies preparation showed that, crushing, pounding, powdering, grinding and chewing are the modes of preparation for the majorities of remedies. Most traditional healers practice the same plant species for treating different diseases and in other round traditional healers were also used to treat the same disease using different plants species.

Like in other parts of Ethiopia, in 13 kebeles of Damot Gale district, medicinal plants were threatened by different factors. Human driving factors were recorded as the main threats to plant species in general, and the way of harvesting medicinal plants in particular. The main factors to loss of plant species in the study area are agricultural expansion in relation to population growth, fire, deforestation, firewood, charcoal, construction materials. Other problems threatening medicinal plants are lack of awareness, secrecy, and oral based knowledge transfer, unwillingness of young generation and influence of modern educations.

References

Abebe D, Debella A, Urge K (2003). Medicinal plants and other useful plants of Ethiopia. EHNRI, camerapix publishers international, Nairobi. pp. 25-43.

A.C. Hamilton, Medicinal Plants and Conservation: Issues and Approaches, International Plant Conservation Unit, WWF-UK, Panda House, Godalming, UK, 2003.

Amare Getahun, (1976). Some common medicinal and poisonous plants used in Ethiopian folk medicine. Addis Ababa University, Addis Ababa. Pp. 3-69.

Cotton, C.M. (1996). Ethnobotany: Principles and Applications. John Wiley and Sons Ltd., Chichester, England, pp: 347-374.

Dawit Abebe (2001). The role of medicinal plants in healthcare coverage of Ethiopia, the Possible Integration. In: Conservation and Sustainable Use of Medicinal Plants in Ethiopia. Pp: 6-21, (Medhin Zewdu and Dawit Abebe (eds). Proceeding of the National Workshop on Biodiversity Conservation and Sustainable Use of Medicinal Plants in Ethiopia, 28 April-01 May 1998, IBCR, Addis Ababa, Ethiopia.

D. Abebe, A. Debella, and K. Urga, Medicinal Plants and Other Useful Plants of Ethiopia, Ethiopian Health and Nutrition Research Institute, Addis Ababa, Ethiopia, 2003.

Desalegn Desissa (2000). Uses and conservation status of medicinal plants used by the Shinasha people. EWNHS, Addis Ababa.

F. Berkes, Sacred Ecology: Traditional Ecological Knowledge and Resource Management, Taylor & Francis, New York, NY, USA, 1999.

Fekadu Fullas (2007). The role of indigenous medicinal plants in Ethiopia healthcare. African Renaissance. London, UK

Giday M, Asfaw Z, Woldu Z, Elmquist T. An ethnobotanical study of medicinal plants by the Zay people in Ethiopia. J. Ethnopharmacol. 2003;85:43–52.

Girma Defar (1998). Non- wood forests products of Ethiopia. FAO corporate documentary repository.

Heinrich M, Ankl A, Frei B, Weimann C, Sticher O. Medicinal plants in Mexico: Healer's consensus and cultural importance. Soc. Sci. Med. 1998;47:1863–1875.

IBC, Government of the FDRE: National Biodiversity Strategy and Action Plan, Institute of Biodiversity Conservation, Addis Ababa, Ethiopia, 2005.

Jansen, P.C.M. (1981). Spices, condiments and medicinal plants in Ethiopia. Their Taxonomy and Agricultural Significance. College of Agriculture. Addis Ababa University, Ethiopia and the Agricultural University, Wageningen, the Netherlands, Centre for Agricultura Publishing and Documentation, Wageningen.

L. Hoareau and E. J. DaSilva, "Medicinal plants: a re-emerging health aid," Electronic Journal of Biotechnology, vol. 2, no. 2, pp. 56–70, 1999.

Koita, N. (1990), comparative studies of the traditional remedy "Suma-Kala" and chloroquine treatment for malaria in the rural areas. In: Proceedings of International Conference on Traditional Medicinal Plants, Arusha, pp. 68- 82.

M. Giday, Z. Asfaw, Z. Woldu, and T. Teklehaymanot, "Medicinal plant knowledge of the Bench ethnic group of Ethiopia: an ethnobotanical investigation," Journal of Ethnobiology and Ethnomedicine, vol. 5, pp. 24–34, 2009.

M. J. Balick and P. A. Cox, Plants, People, and Culture: The Science of Ethnobotany, Scientific American, New York, NY, USA, 1996.

Martin, G.J. (1995). *Ethnobotany*: A Method Manual. Chapman and Hall, London, pp: 267- 347

Mirgissa Kaba (1998). Utilization of plant medicine for the treatment of health problems. The case of Oromo of Chora District, Illubabor Zone, Western Ethiopia. Ethio. J. Health Dev., 10: 161-166.

Mirutse Giday and Gobana Amani (2003). An ethnobotanical survey on plants of veterinary importanc in two Woredas of Southern Tigray, Northern Ethiopia. SINET: Ethiop. J. Sci. 26 (2): 123-136.

Tesfaye Awas and Sebsebe Demissew (2009). Ethnobotanical study of medicinal plants in Kafficho people, southwestern Ethiopia. **In**: Proceedings of the 16th International Conference of Ethiopian Studies. Pp. 714-18, (Svein E. Harald A., Birhanu Teferra and Shiferaw Bekele (eds). Trondheim.

T. Stellmacher and I. Eguavoen, "The rules of hosts and newcomers: local forest management after resettlement in Ethiopia," in Proceedings of the European Conference of African Studies (ECAS '11), Panel 103: Pathways to Social-Economic Integration. Inclusion and Exclusion of Migrants in Africa, Uppsala, Sweden, June 2011.

WHO (1998). Regulatory situation of herbal medicines. A world wide review. Geneva.

UNESCO (1994a). Traditional knowledge in Tropical Environment. Nature and Resource, 39(1) UNESCO, Paris