



ADAMA SCIENCE AND TECHNOLOGY UNIVERSITY
OFFICE OF GRADUATE STUDIES

**Ethinobotanical study of traditional medicinal plants used by local people of
Kondala Woreda, West Wollega zone, Oromia, Ethiopia**

**A Thesis Submitted to the Department of Applied Biology
School of Applied Natural Science
In Partial Fulfillment of the Requirement for the Degree of Master's in
Biology**

**By
Merga Beyene Hundera**

Adama, Ethiopia
September, 2017

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Advisor: Dr. Mesele Admassu

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DECLARATION

I hereby declare that this M.Sc. Thesis is my original work and has not been presented for a degree in any other university, and all sources of material used for this thesis have been duly acknowledged.

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Subject: **Thesis Submission**

This is to certify that the thesis entitled **“Ethinobotanical study of traditional medicinal plants used by local people of Kondala Woreda, West Wollega zone, Oromia, Ethiopia”** submitted in partil fulfillment of the requirements for the degree of Master's of Science in Biology, the Graduate program of program of Applied Biology, and has been carried out by Merga Beyene, **Id.No** GSS/0172/05, under my supervision. Therefore, I recommend that the student has fulfilled the requirements and hence hereby he can submit the thesis to the department.

Name of major Advisor: Dr.Mesele Admassu

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ACKNOWLEDGMENTS

I would like to thank my advisor Dr. Mesele Admassu for his unreserved advice and professional contribution to my thesis and his meticulous comments given throughout the thesis work. I would also like to thank local people of the study area for their hospitality and response to my inquire on information about the medicinal plants and health facilities of the district. It is my pleasure to thank staff members of Kondala preparatory school, my classmates and agricultural office of Kondala district for their contribution in many aspects. Thirdly I would like to put forward my heartily felt thank to Adama Science and Technology University for providing me financial support to conduct this study from the beginning up to the end. Finally, I would like to thank my friends and Biology staff in ASTU for their direct or indirect support.

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Abstract

Ethnobotanical study of traditional medicinal plants used by local people of Kondala woreda was conducted from September 2016 and June 2017. The area lies between latitudes of 9° 30' and 9°40' N and longitudes of 34° 30' and 36° 10' E. A total of 49 informants from seven Kebeles were selected. The main aim of the study were to identify, compile and document medicinal plant species used by the local people for the treatments of human and livestock ailments. The study involved traditional healers, knowledgeable elders and local communities. Various ethno botanical techniques are used to collect and analyze the data: semi- structured interview, guided field walk and observation, was carried out to accomplish this research. A total of 64 plant species were collected out of these, 78% of medicinal plant species were used as cure for human ailments, 12% species for livestock and 10% species for the treatment of both human and livestock. Among different families, *Fabaceae* was represented the most abundant that is followed by *Asteraceae*. The most frequently used plant parts were leaves followed by roots and the most widely used method of preparation was crushing. The most commonly used application of medicinal plant was oral. From the different factors the main threats to medicinal plants in the study area fire wood was ranked first by selected key informant followed by, agricultural expansion. According to the result of ranking, *Vicia faba* is most effective in treating stomach ache while *Cordia africana* the most multipurpose medicinal plants. Majority of the 64 medicinal plants that were cited by informants, (57.8%) were used to treat a specific ailment. Medicinal plants in the market are not a common cultural activity in local markets of the study area. Thus, some medicinal plants sold in the market for their medicinal purpose. Some fresh medicinal plants are also marketed in a local community for their aromatic and spice value. Thus, the local people need to be trained, encouraged and supported on how to conserve and manage the medicinal plant species.

Key words: ailments, ethnobotany, indigenous knowledge, traditional medicine, treatment, specimens

1. INTRODUCTION

1.1. Background of the study

Ethno botany is a broad term referring to the study of direct interrelations between humans and plants (Black & Cox , 1996).The indispensable dependency of human beings up on plants for their livelihoods primarily started by domestication and dates back to 10,000 years (Martin, 1995). Ethnobotanical investigation documents the knowledge on cultural interaction of people with plants. It also tries to find out how local people have traditionally used plants for various purposes and how they incorporated plants into their cultural tradition and religion (Cotton, 1996). In many developing countries, people mostly rely on ethnomedicinal knowledge to treat diseases, because western based health care system is not enough due to poor staffing or because western drugs are expensive. Ethno medicine is a system of maintaining health and curing diseases based on folk beliefs and traditional knowledge, skills, methods and practices. Ethno medicinal knowledge is disappearing because of rapid socio-economic, environmental and technological changes. Thus, ethno medicinal knowledge must be documented and conserved through systematic studies before it is lost forever (Mohammed *et al.*, 2006).

For most countries, there is not even a complete inventory of medicinal plants, much of the knowledge on their use is held by traditional societies, whose very existence is now under threat. Little of this information has been recorded a systematic manner, besides the identification and selection of medicinal plants for use in health services, detailed information is lacking for most of the endangered medicinal plants species no conservation action has been taken. For example, here is very little material of them in gene banks. Also, too much emphasis has been put on the potential for discovering new wonder drugs, and too little on many problems involved in the use of traditional medicines by look populations (WHO, 1979).

In different parts of our country, particularly, in the rural areas mostly dependent on traditional medicinal plants because of low income to buy the modern medication. Therefore, like other parts of our country, Kondala District peoples use traditional

medicinal plants for the treatment of various diseases. Even, there have been some attempts in investigating medicinal plants and indigenous knowledge on the use and management of plant resources. In contrast, there is also lack of conservation actions and an activity is observed in Kondala woreda. The current trend using traditional medicinal plants is facing problems of resource depletion and loss of indigenous knowledge like other areas of the country. Therefore, concerted ethno botanical research plays main role to draw information on the sustainable utilization of medicinal plants (Dawit and Ahadu, 1993).

The main aim of this study is collecting, identifying, describing and listing traditional medicinal plants in Kondala woreda, West Wollega zone. In addition to this helps to study traditional knowledge on the use of plants in health care, to record and document indigenous knowledge of people on the use of medicinal plants and to check the status of medicinal plants in Kondala Woreda.

1.2. Statement of the Problem

Knowledge of traditional medicine is getting lost due to the mistrust of the sound generation and secrecy. In Kondala woreda the young generation refused to know or use traditional medicine and a lot of valuable information could be lost whenever traditional medicinal practitioners die without sharing their knowledge to others. Religions have impact on the knowledge of medicinal plants in the study area. Protestants religious leaders discourage using of traditional medicine by linking with evil work. The main focus of this study is to investigate and document traditional medicinal plants used by local people of Kondala Woreda.

1.3. Research questions

1. What are medically important plant species used by Local people of the Kondala woreda?
2. What are traditional medicinal plants used for treatment of both human and livestock ailments?
3. What are the parts of plants used to treat human and livestock ailments?

1.4. Objectives of the study

1.4.1. General objective

To identify, compile and document medicinal plant species used by the local people for the treatments of human and livestock ailments.

1.4.2. Specific objectives

- document taxonomic groups of medicinal plants that treat human and livestock diseases
- record and document Indigenous knowledge of the people on the use of traditional medicinal plants
- To assess the threat to medicinal plants in the area.
- identify plant parts used to treat health problems, methods of preparation and ways of administration as practiced by the local people of the study area.

1.5. Significance of the Study

In the current situation growing resistance of existing disease causative agents are becoming serious problems. Moreover, ethno botanical research has led to the development of many commercial plants-derived medicines. As a result, there is no doubt for the necessity of indigenous knowledge of traditional medicine for the discovery of new medicines of plant origin, so as, to satisfy the increasing demand of drugs and medicines by human beings. This study has its own contribution to give clue for the discovery of new medicine through recording, compiling and documenting of medicinal plants and their associated indigenous knowledge used by the local people for proper utilization and management of plants. This in turn has a substantial input for the livelihood of local people to solve economic, environmental and health problems as well as provide a basis for further ethno botanical studies that contribute towards protection and conservation of useful plants. From this and many other facts such as habitat destruction and loss of many medicinal plant taxa, it is essential and reasonable to care for and conserve plants and indigenous knowledge. In addition, the main target of this study is to document the traditional medicinal plant and uses for human health care as primary medicine and for pharmacist to produce new drugs based on indigenous knowledge of local people.

2. LITERATURE REVIEW

2.1. Origin and Development of Ethno botany

The study of plants and their uses is one of the most primary human concerns and has been practiced by all cultures for thousands of years, though it was not called 'Ethno botany' (Mac Donald, 2009). Martin (1995) stated ethno botany as the study of people's classification, management and use of plants. Pande (2000), defined ethno botany as it deals with the direct relationships of plants with human kind. Ethno botanical investigation documents the knowledge on cultural interaction of people with plants. It also tries to find out how local people have traditionally used plants for various purposes, and how they incorporated plants into their cultural tradition and religions (Balick and Cox, 1996). Therefore, traditional local communities worldwide have a great deal of knowledge about native plants on which they intimately depend (Langeheim and Thimann, 1982).

2.2. Traditional Medicine

Traditional medicine (TM) is the sum total of the knowledge and practices whether explicable or inexplicable, used in the diagnosis, prevention and elimination of physical, mental and/or social imbalance (WHO, 1979). It has incorporated plant, animal and mineral based medicines, spiritual therapies, include techniques and exercises, applied singularly or in combination (Adewumi, 1991). It depends exclusively on past practical experience and observations handed down from generation to generation, verbally or in writing. It also comprises therapeutic practices that have been in existence often for hundreds of years before the development of modern scientific medicine and are still in use today without documented evidence of adverse effect (Elujoba *et al.*, 2005).

2.3. Indigenous Knowledge

Indigenous knowledge (IK) is defined as the local knowledge that is unique to a given culture or society. It is the bases for the local level decision making in agriculture, health care, food preparation, education, natural resources, management and a lot of other activities in rural communities (Warren, 1991). According to Balick and Cox (1996), indigenous people are defined as “peoples who follow tradition, non-industrial life styles in areas that they have occupied for generations”.

It is a result of many generations', long years' experience, careful observations and trial and error experiments (Martin, 1995). Thus over centuries, indigenous people of different localities have developed their own specific knowledge on plant resources use, management and conservation (Cotton, 1996). IK develops and changes with time and space. Hence, such knowledge includes time-tested practice that developed in the process of interaction of human with their environment. One of the widely used indigenous knowledge system in many countries is the knowledge and application of traditional medicinal plants. Such knowledge known as ethno medicinal knowledge involves traditional diagnosis, collection of raw materials, and preparation of the indigenous knowledge on plant remedies in many countries including Ethiopia, pass from one generation to the other generation verbally with great secrecy. Such secret and verbal transfer makes the indigenous knowledge or ethno medicinal knowledge vulnerable to distortion and in most cases some of the lore is lost at each point of transfer (Amare, 1976). Hence, the need for systematic documentation of such a useful knowledge is obtained through ethno botanical research.

Local knowledge of indigenous people includes information about the ecosystem in general, but also about specific plants used as medicine, food, building material and the like (Leonti *et al.*, 2003). Researches show that the indigenous knowledge of medicinal plants by human beings is decreasing in alarming rate. The main reasons that contribute in the loss of IK are due to rapid land degradation such as accelerated destruction of forests, people's access to modern medicine and exposure to modern culture and acculturation (Kong *et al.*, 2003; Shrestha and Dhillion, 2003). The complex knowledge, beliefs and practices generally known as IK, develops and change with time and space.

Hence such knowledge includes time-tested practice that develops in the process of interaction of humans with their environment (Alcorn, 1984). IK is a body of knowledge built up by a group of people through generation of living in close contact with nature and it is cumulative and dynamic. It builds up on the historic experience of people and adapts to social, economic, environmental, spiritual and political change. The quantity and quality of traditional knowledge differs among community members according to their gender, age, social-standing, profession and intellectual capabilities (Balick and Cox, 1996). Thus, systematic application of IK is important for sustainable use of resources and sustainable development (Thomas, 1995).

2.4. Status of Indigenous Knowledge on Medicinal Plants in Ethiopia

IK of medicinal plants in Ethiopia is unevenly distributed among community members (Zemedu, 2001). The distribution of knowledge and services are hierarchically placed. Services are obtained from the family, the neighborhood, the village or beyond (Hareya, 2005). In Ethiopia, the loss of IK is not far from the developed countries. The vast knowledge on traditional uses of plants is not fully documented and most of the knowledge is conveyed from generation to generation by verbal means. This process together with the increasing acculturation, mobility and displacement of communities due to different factors (Famine, water, etc.), secretive nature of traditional knowledge and skills and the negligence of the contemporary generation to acquire the knowledge on traditional medicine (TM) due to expansion of modern education and to some extent modern medicine, puts to question the future of the cultural heritage of the country which was known and practiced for the centuries (Getachew *et al.*, 2001). Ethiopia's traditional medicine, as elsewhere in Africa, is faced with problems of continuity sustainability primarily due to loss of taxa, habitats of medicinal plants and other category of plants (Ensermu *et al.*, 1992). In the same work it has been pointed out that there is a real genetic danger of genetic erosion, which in turn calls for the need of collection, investigation and conservation of these resources and the indigenous knowledge on them.

2.5. Plants in Ethnoveterinary Medicine

In many developing countries, particularly in sub-Saharan Africa, diseases remains one of the principal causes of poor livestock performance leading to an ever increasing gap between supply demand for livestock and products (Tafese and Mekonen , 2001). Ethnoveterinary medicine provides traditional medicines, which are locally available and usually cheaper than standard treatments. Livestock holders can prepare use homemade remedies with minimum expense. So far many livestock holders in rural areas where there are relatively few veterinaries and shortages of other facilities, traditional medicinal plants are the only choice to treat many ailments (McCorkle, 1995).

Ethnoveterinary medicine can be useful whenever stock raisers have no other animal health care options, whether in rural or peri-urban areas. In spite of its paramount importance as livestock health care system the various traditional veterinary practices remained undocumented in Africa and Ethiopia (Dawit and Ahadu, 1993). Thus ,creation of awareness on ethnoveterinary medicine emphasizing on useful plant used for treatment of livestock has paramount importance to livestock management. In addition, proper documentation and understanding of farmers' knowledge, attitude and practices about the occurrence, cause, treatment, prevention and control of various ailments is important in designing and implementing successful livestock production (Tafesse and Mekonen, 2001).

2.6. The importance of Medicinal Plants for Development of Modern Drugs

Medicinal plants are important element of indigenous medicinal systems worldwide. Ethno pharmacological surveys provide the rational for selection and scientific investigation of medicinal plants, since some of these indigenous remedies have successfully been used by significant number of people. Over extended periods of time (Geerling, 2001) the importance of traditional knowledge system in drug discovery process is exemplified by the isolation of artemisinin from the herb sweet worm wood (*Artemisia annul*) this plant was used in traditional Chinese herbal medicine for over 2000 years for the treatment of fever and malaria, and was rediscovered by Chinese scientists in the 1970's. Historically, botanists have been our most fruitful arena in the

search for new medicine. Searching new drug from traditionally used medicinal plants cant therefore, be the shortest path of success. However, a report has showed that, a success rate in the search of new drugs from randomly synthesized chemicals is only one in 10,000 (Chadwick, 1994).

Historically, plants have provided a source of inspiration for novel drug compounds, as plants derived medicine have made large contribution to human health and well-being. Their role in the development of new drugs could be either by serving as a natural blue print for the development of new drugs, or as phytomedicine to be used for the treatment of diseases (Andrew *et al.*, 1996). Information and photochemical analysis were screened in consultation with local users of the herbal medicines are tested through photochemistry, pharmacy, animal experiments and clinical trials. It is then possible to use them in the formulation of new medicines according to government regulations concerning new medicinal developments (Sheng-Ji, 2001).

2.7 Threats to traditional medicinal plants

Ethiopia's traditional medicine as elsewhere in Africa is faced with problems of continuity and sustainability (Ensermu *et al.*, 1992). Nowadays, herbal practitioners have to walk greater distances for herb collections that once grew in the vicinity of their homes. This is because of availability of plants in general and medicinal plants in particular have been affected by a dramatic decrease in areas of native vegetation (Cunningham, 1993). The primary causes of this problem are loss of taxa of medicinal plants, loss of habitats of medicinal plants and loss of indigenous knowledge (Ensermu *et al.*, 1992). Mirutse (1999), found out that the practice of using plant remedies by Zay people to treat different ailments has been declining from time to time mainly as a result of continued deforestation in the area. In addition, Zemedede (2001) argues that medicinal plants are considered to be at conservation risk due to over use and destructive harvesting. The problem is further compounded by the fact that traditional knowledge on traditional medicine is also being lost at an alarming rate (Tewoldebrhan, 1991).

There are two sources of threats to medicinal plants, that is human-made and natural causes. Rapid increase in population, the need for fuel, urbanization, timber production,

over harvesting, destructive harvesting, invasive species, commercialization, honey harvesting, degradation, agricultural expansion and habitat destruction are human caused threats to medicinal plants. Likewise, natural causes include recurrent drought, bush fire, disease and pest out breaks (Ensermu *et al.*, 1992). In addition to this, most of the medicinal plants utilized by Ethiopian people are harvested from wild habitats (Mirutse, 1999). Hence, this aggravates the rate of loss of taxa with related indigenous knowledge and loss of widely occurring medicinal plant species. The consequence is also bad in such a way that, when the plants that have been serving as the raw material for the preparation of different remedies are being destroyed, the traditional practices associated with them would also diminish.

2.8. Conservation of traditional medicinal plants

Some conservation actions have been undertaken around the world designed to protect threatened medicinal plants from further damage (Cunningham, 1993). This includes in-situ and ex-situ conservation measures. Both in-situ and ex-situ conservation efforts are implemented to capture medicinal plant genetic resources. In-situ conservation is conservation of species in their natural habitat. Some traditional medicinal plants have to be conserved in-situ due to difficulty for domestication and management. Medicinal plants can also be conserved by ensuring and encouraging their growth in special places, as they have been traditionally this can be possible in places of worship (churches, mosques, grave yards, etc), scared grooves, farm margins, river banks, road sides, live fences of gardens and fields (Zemedu, 1997).

3. MATERIALS AND METHODS

3.1 Study Area

The study was conducted in Kondala Woreda in the local parts of West Wollega Zone. Kondala Woreda is found at about 653 km from Addis Ababa to west direction and 253 km from Gimbi town. The area located between 9° 30' and 9°40'N latitude, and 34° 30' and 36° 10' E longitude . A total of seven Kebeles were selected for ethno botanical data collection based on availability of traditional healers identified with the assistance of local authorities, elders and knowledgeable persons.

These kebeles are Shoro Soreyi, Koli Sede, Boji Gara Arba, Wanja Chiri, Karma Babine, Keshmando and Burka Misoma (Fig 1).

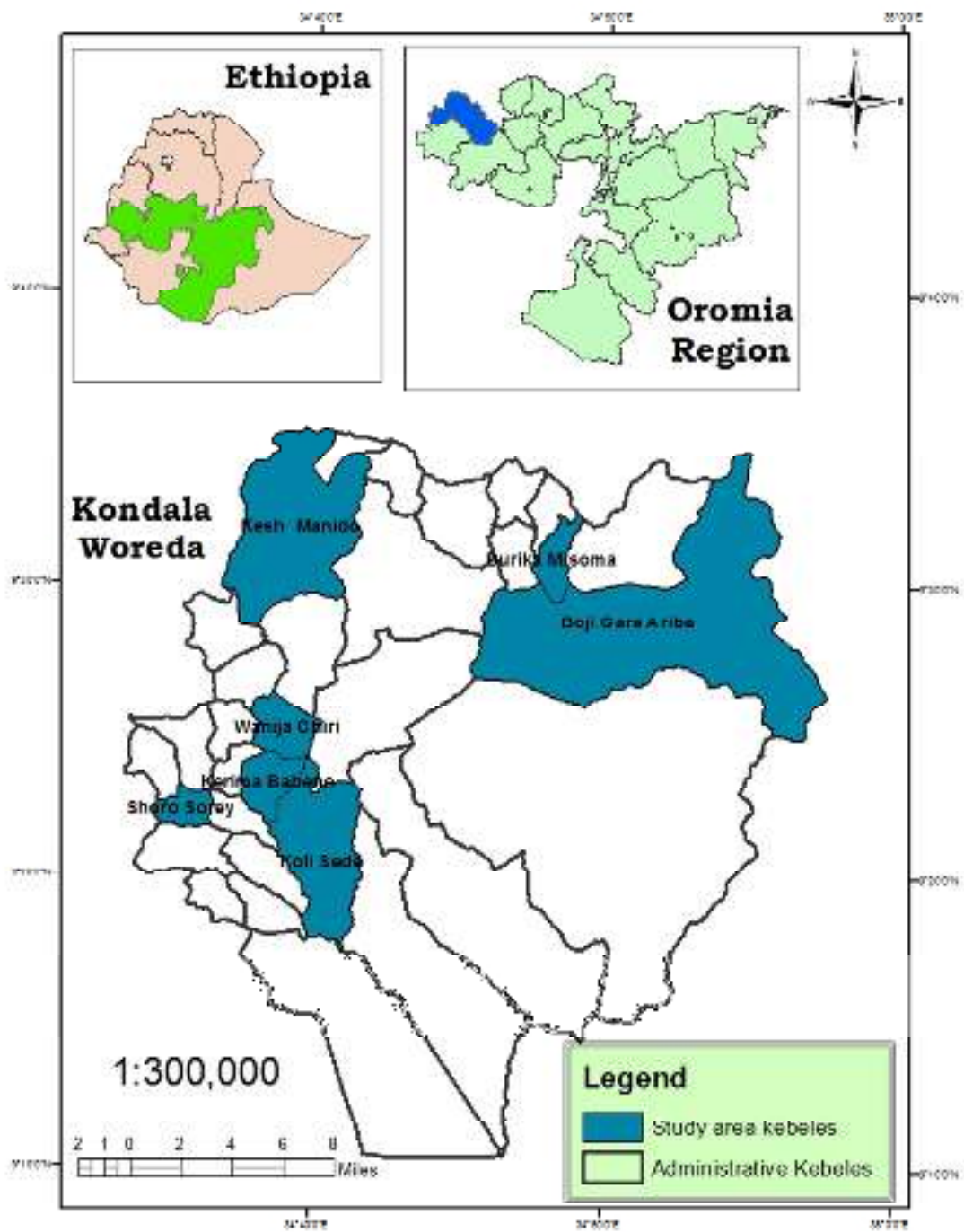


Figure 1: Map of study area

Source: (Data from Kondala Agricultural office, 2015)

3.2. Climate

Temperature and rainfall are major climatic elements that affect the growth and distribution of plants. The topography of the study area is generally characterized mainly by ragged mountain, escarpment and hill. The climatic condition of this woreda is generally Weina-Dega. However; the rainfall season is from May to September that is at least five months of a year is a rainy season. Moreover, the climatic data that shows temperature and rainfall of the study area of the last five years (2012- 2016) is given in Fig. 2 and 3 respectively. The annual mean minimum and maximum temperatures were 14C° and 26.5C°, respectively. The highest mean minimum and maximum temperature were recorded in December and April respectively for the last five years (Fig.2).

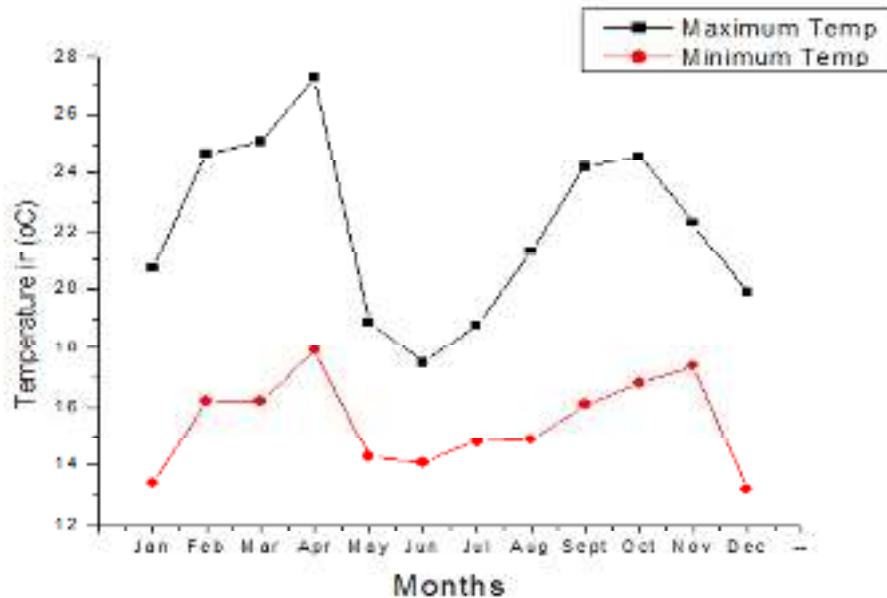


Figure 2: Average Temperature of the study area

Source: Data obtained from Gimbi metrological service Agency [2014].

The total mean annual rain fall was about 600 mm to 1200 mm and the highest rain fall was recorded in June 2010. The longer rainy season extends from late May to early September which supports the major crop production and the shorter rainy season comes in March and April that allow certain crop production.



Figure 3: Average monthly Rainfall of the study area

Source: (Gimbi metrological agency, 2015)

3.3. Population and medical services

Majority of the Kondala Woreda people is Oromo Nationality and the total population of the Woreda is about 64,000 of which 31,000 are males and 33,000 are females. The woreda has two urban centers that are 01 and 02 Kebele and thirty two rural Kebeles. Crop production and livestock rearing are the main activities of the population in the woreda. Kondala Health office (2015), reported the first ten major diseases are malaria, lung disease, hypertension, gastritis, tonsillitis, diabetes, diarrhea, rheumatism, skin diseases, snake bite and fever of unknown source. These diseases mostly affect people living in shortage and do not cater their needs; as well they are unable to afford the high cost of modern drugs. Hence, the severity of common diseases forces people to be served by traditional health practitioners and traditional means of treatment.

3.4. Livestock

According to Kondala Woreda Agricultural office (2016), the Woreda possesses 156,724 livestock population consisting of 84,889 Cattle; 35,948, goats; 547, mule, 5,896, donkey; 32,948, sheep and 32,444 poultry there are problems like shortage of grazing and browsing, land adequate health services and facilities. As the Woreda health facilities do not match and unable to support this vast population of livestock, people try to treat livestock by ethno veterinary medicine. The livestock diseases in the study area are anthrax, blackleg pasteurellosis and trypanosomiasis (Information from Kondala Woreda Agricultural Office, 2016).

3.5. Sampling of Informants

A total of 49 (14 female and 35 male) individuals in the ages of 18 and above were selected from seven kebeles. Out of these, 20 key informants were purposively selected from, traditional healers by getting assistance from elders and local authorities. The selection of key informants is following the suggestion made by Martin (1995). The other 29 informants were selected randomly by lottery method from the local people of the study area to see the general knowledge of medicinal plants in the people.

3.6. Data Collection

Ethno botanical data were collected from September 1, 2016 December 25, 2016 based on methods given by (Martin (1995) and Cotton (1996). Accordingly, semi- structured interviewees, observation, group discussion, and guided field walks with informants was employed to obtain indigenous knowledge of the local community on medicinal plants based on a checklist of topics, or questions prepared in English, and translated to Afan Oromo. Most of the interviews and discussion was held in Afan Oromo directly by the investigator and information were gathered technically by speaking to the villagers and accessible information regarding local names of medicinal plants, part(s) used, methods of preparation, diseases treated, dosage used, route of application, adverse effect, uses other than medicinal uses and management methods was recorded at the spot. Local

names of plants were studied by repeated in quires at different times with the same informants to check the accuracy of information obtained and information were recorded.

3.7. Plant identification

Specimens were collected for each plant species and identification of some common and well known species were made in the field. The specimens were pressed, dried and identified in the National Herbarium, Addis Ababa University. The identification work was performed by using the published volumes of the Flora of Ethiopia and Eritrea and by comparing with authentic specimens deposited in the National Herbarium (ETH), Addis Ababa University and by getting assistance from taxonomic personnel and taxonomists. Finally, the identified specimens were deposited at the national Herbarium (AAU).

3.8. Data analysis

A descriptive statistical method such as percentage, tables and frequency was employed to analyze and summarize the data on medicinal plants, associated knowledge, use and conservation.

3.8.1 Preference ranking

Preference ranking was conducted following Martin (1995), for five most important medicinal plants used in treating stomach ache, as traditional healers treat it usually. Ten informants were selected to identify the best preferred medicinal plant species for treatment of stomach ache.

3.8.2 Direct matrix ranking

The ranking was done following Martin (1995), in order to compare multipurpose use of a given species and to relate this to the extent of its utilization versus its dominance. Ten key informants were chosen to conduct this activity and each key informant was asked to assign use values.

Accordingly, each key informants use values for the five multipurpose medicinal plant species, average value of each use and diversity for a species was taken and the values of each species were summed up and ranked

3.8.3. Informant consensus

The informant consensus was helpful to see the similarity of information given by the informants to confirm the authenticity of information by comparing it with other information given by other informants on the same topic. Accordingly, numbers of citation and percentages were recorded.

3.8.4. Informant consensus factor (ICF)

The informant consensus factor was calculated for each category to identify the agreements of the informants on the reported cures for the group of ailments. The ICF was calculated as follows: number of use citations in each category (nur) minus the number of species used (nt), divided by the numbers of use citations in each category minus one (Alexiades, 1996).

$$\text{ICF} = \frac{\text{nur} - \text{nt}}{\text{nur} - 1}$$

3.8.5. Ranking of factors threat to medicinal plants

Ranking of threats to medicinal plants that were reported by most of the informants in the study area was conducted using 10 selected key informants as described by Martin (1995) and Alexiades (1996). As mentioned by most of the informant seven threats were selected and the informants were asked to give most threatening factor and least threatening factor in the study area. This information is used to determine the highest threats to traditional medicinal plants in the study area and helps to suggest the necessary appropriate conservation action.

4. RESULTS

4.1 General Information of Informants

4.1.1 Age of informants

The distribution of informants with respect to age class indicated that, most of knowledgeable elders are in the age class of 71 to 80 and followed by age class of 61 to 70 (Table 1).

Table 1. Ages of informants

Informants age	No. of informants	Percentage (%)
18- 25	1	2.04
26-30	3	6.12
31-40	4	8.16
41-50	6	12.24
51-60	7	14.28
61-70	12	24.48
71-80	16	32.65
Total	49	100%

4.1.2. Educational Status of Informants

As data documented from the study area, most of the informants that used medicinal plants as remedies for different health problems. The educational status of informants were categorized as illiterate (40.81%), write & read (18.36%), high school (16.32%) and college (14.28%). Thus, modern education blocks the acceptance of traditional medicinal plants in the study area (Table 2).

Table 2 . Educational status of informants in the study area

Educational status	No. of informants	Percent (%)
Illiterate	20	40.81
Write & read	9	18.36
Elementary school	5	10.2
High school	8	16.32
College	7	14.28
Total	49	100 %

4.1.3. Sources of traditional knowledge in the study area

Most number of traditional medicinal plant knowledge gained 30 (58.8%) from father/mother followed by 5 (9.8%) each from wife/husband and the neighborhood (Table 3).

Table 3 . Sources of knowledge on the practice of traditional medicine

Source of knowledge for traditional practitioner	No. of respondents	Percent (%)
Father/ Mother	30	58.9
Wife/Husband	5	9.8
Neighborhood	5	9.8
Friends	4	7.8
Sister/brother	3	5.9
Uncle/aunt	2	3.9
Others	2	3.9
Total	51	100 %

4.1.4. Transferring Knowledge of Traditional Medicinal Plants

As the data indicated from the study area, the highest number for the ways of transferring knowledge on traditional medicinal plants is to eldest son who received 25 (29.6%) votes followed by all children of the family 20 (23.80%) and 15 (17.86%) for eldest daughter (Table 4).

Table 4 . Transferring of knowledge of traditional medicinal plants

To whom transferred	No. of respondents	Percent (%)
Eldest son	25	29.76
All children	20	23.80
Eldest daughter	15	17.86
Husband/Wife	12	14.28
All members of the family	7	8.33
Brother/sister	3	3.5
To all freely	2	2.38
Total	84	100%

4.2. Types of medicinal plants used in KondalaWoreda

Sixty four major plant species with their medicinal use were identified (Appendix 1). The species were represented by 32 families (Appendix 1). Among the identified medicinal plants, in terms of species composition the family *Fabaceae* consists of 7 species followed by *Asteraceae* 5 species, *Euphorbiaceae* 4 species, *Boraginaceae* 3 species, *Lamiaceae* and *Cucurbitaceae* each consists of 2 species (Table 5). The plants were found to treat many health problems affecting the health of both humans and livestock 78% in human and 12% in livestock, and 10% in both (Appendix 3). In terms of plant families, the family indicated with highest number of species in treating health problem in human was *Fabaceae* and *Asteraceae*. Each contributes 7 and 5 species respectively and *Euphorbiaceae* 4 species in livestock (Table 5).

Table 5.Types of medicinal plant species in the study area

Family	Species number	Percentage (%)
<i>Fabaceae</i>	7	10.93
<i>Asteraceae</i>	5	7.86
<i>Euphorbiaceae</i>	4	6.25
<i>Boraginaceae</i>	3	4.68
<i>Lamiaceae</i>	2	3.12
<i>Cucurbitaceae</i>	2	3.12
<i>Other families</i>	41	64.04
Total	64	100 (%)

4.3. Source of Medicinal Plants in the study area

Out of 64 plant species, 40 (62.5%) were originated from wild, 9 (14.06%) home garden and 15 (23.43%) from both home garden and wild (Table 6).

Table 6 . Source of medicinal plants

Source	no. of respondents	Percent (%)
Wild	40	62.5
Wild Home garden	15	23.43
Home garden	9	14.06
Total	64	100(%)

4.4. Habits of Medicinal Plants

From 64 medicinal plants collected in the study area, 39 (60.9 %) species were herbs, 17 (26.56%) species were shrubs and 8 (12.5%) species were trees (Table 7). There might be owing to the easily occurrence of these species in the study area and high level of abundance.

Table 7.Types of medicinal plants

Types	no. respondents	Percent (%)
Herbs	39	60.9
Shrubs	17	26.56
Tree	8	12.5
Total	64	100%)

4.5. Medicinal Plants and their main uses by the local People

Out of the collected 64 medicinal plants of the study area, 78% were used against human ailments. Those used for the treatment of livestock ailments were 12%, the remaining 10% are used to treat both human and livestock ailments (Appendix 3).

4.6. Parts of plant Used for Medicine

From the interview result leaves are the most commonly used plant parts accounting for (39.6%) of the total, followed by roots (24.75%), and fruit (14.85%). Use of other plant parts is as indicated in (Table 8).

Table 8 .Parts of plants used for medicine

Plant parts	No. of respondents	Percent (%)
Leaf	40	39.60
Root	25	24.75
Fruit	15	14.85
Seed	7	6.38
Latex	4	3.96
Flower	3	2.97
Other parts	7	8.92
Total	101	100(%)

Regarding to the dosage, it was reported that, local healers use local units such as finger length, Pinch and numbers were used to estimate and fix the amount of medicine. The dose given depends on age, physical strength and health conditions. The healers never administer treatments that are taken internally to pregnant women and infants.

4.7. Preparation of Herbal Remedies

The Herbal remedies are prepared using fresh material from 40 of the species (62.5%), while 15 (23.43%) species is used in the case of dried plant material. There were also 9 (14.06%) species in which the local people use either dried or fresh materials for the treatment of ailments (Table 9).

Table 9 . Preparation of herbal remedies

Preparation	No. of respondents	Percent (%)
Fresh	40	62.5
Dry	15	23.43
Dry/Fresh	9	14.06
Total	64	100(%)

4.8. Methods of preparation of Medicinal Plants

According to the informants crushing (26.2%), pounding (22.8%) and fumigation (13.4%) are the three main methods of preparation of medicine (Table 10).

Table 10 . Methods of preparation of Medicinal Plants

Forms of preparation	No. of respondents	Percent (%)
Crushing	30	26.20
Pounding	20	22.80
Fumigant	10	13.40
Juice	8	9.40
Chewing	8	9.40
Decoction	5	3.40
Others	9	15.40
Total	89	100 (%)

4.9. Mode of Application of Medicinal Plants

The greater proportion of application of medicinal plant preparation is internal with 57.88% and external application was with 42.12% (Table 11). There are various ways of application of traditional medicinal plants in the study area by the local community. The major mode of administration by the peoples under the study area was oral, dermal, fumigant, nasal, oracular and local.

Table 11 . Mode of application of traditional medicines

Route of application		No. of respondent	Percent (%)
Internal	Oral	48	50.52
	Nasal	5	5.26
	Local and oracular	2	2.1
External	Dermal	20	21.05
	Fumigant	7	7.36
	Tie	3	3.15
	and Others	10	10.56
Total		95	100 (%)

4.10. Informants consensus

Out of 64 reported medicinal plants in the study area, not all were equally important. Some medicinal plants were well known than others. Informants were frequently cited those medicinal plants for treatment of certain diseases. For instance, *Allium sativum* and *Vicia faba* were cited by 67 informants followed by *Ricinus communis* 63, *Crassula schimperi* by 61 and *Zingiber officinale* 51 (Table 12).

Table 12. Informants consensus

Plant species	Frequency of citation	% of informants
<i>Allium sativum</i>	33	67.35
<i>Citrus limon</i>	20	40.81
<i>Zingiber officinale</i>	25	51.02
<i>Crassula schimperi</i>	30	61.22
<i>Vicia faba</i>	33	67.35
<i>Ricinus communis</i>	31	63.26

4.11. Informants consensus factor

Diseases that are frequent in the study area had higher informant consensus factor. Hypertension, common cold and cough had the highest ICF value 0.66 due to the high incident of the disease in the study area (Table 13).

Table 13 . Informants consensus factor

Category	No. of spp.	No. of use citation	ICF
Head ache	10	26	0.64
snake bite& Spider poison	10	11	0.1
Malaria	15	22	0.33
Skin diseases and wound	16	18	0.11
cattle ailments like Anthrax & Trypanosomiasis	18	22	0.19
Diarrhea& Amoeba	17	23	0.27
Hypertension, common cold cough and Stomach ache	3	7	0.66
Ear, Eye and Tooth ache	15	35	0.58
Gonorrhea	2	4	0.5
kidney and Liver Diseases	3	5	0.5

4.12. Factors Threatening Medicinal Plants

According to the respondents fire wood is the most serious threat to the medicinal plants followed by agricultural expansion and charcoal (Table 14).

Table 14 . Ranking of threats to medicinal plants

Threats	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	Total	Rank
Drought	1	2	1	1	2	3	3	2	1	4	18	6th
Agricultural Expansion	5	4	5	2	3	2	6	7	5	7	46	2nd
Fire wood	5	5	5	5	5	5	6	6	5	3	50	1 st
Charcoal	5	5	6	5	2	4	3	5	3	2	40	3rd
Construction	3	2	3	1	3	3	3	3	3	4	28	4 th
Urbanization	3	3	4	2	3	2	4	2	1	3	27	5 th
Fodder	1	1	2	1	2	1	1	1	1	1	12	7 th

Key: R= represented respondents

4.13. Ranking of Most Important Medicinal Plants

4.13.1. Preference ranking

The ranking of five medicinal plants that were reported as effective to threat stomach ache which is the most common problem in the study area by selecting 10 key informants. *Vicia faba* is the most effective in treating Stomach ache followed by *Millettia ferruginea* and the least effective was *Helinus mystacinus* (Table 15).

Table 15 . Preference ranking of medicinal plants used for treating stomach

Medicinal plants	Respondents										Total	Rank
	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10		
<i>Helinus mystacinus</i>	1	2	1	2	1	1	1	1	1	1	12	5 th
<i>Cymbopogon citrates</i>	2	2	1	3	1	1	2	3	2	2	19	3 rd
<i>Vicia faba</i>	5	3	3	2	4	3	5	4	1	2	32	1 st
<i>Clutia abyssinica</i>	2	1	1	2	4	1	1	1	1	1	15	4 th
<i>Millettia ferruginea</i>	1	3	3	3	2	3	4	5	2	2	28	2 nd

4.13.2. Direct matrix ranking

Direct matrix ranking was also conducted to evaluate the relative importance and to check the major impacts on each of the plant. The result of the ranking showed that stood *Cordia africana* first in being the most multipurpose medicinal plant followed by *Ekeberiga capensis* while *Dodonaea angustifolia* was the least (Table 16).

Table 16 . Direct matrix ranking for multiple uses of medicinal plants

Use	<i>Ekeberiga capensis</i>	<i>Acacia Abyssinica</i>	<i>Cordia africana</i>	<i>Maytenus arbutifolia</i>	<i>Dodonaea angustifolia</i>
Medicinal	5	2	3	4	5
Charcoal	1	6	5	2	4
Fire wood	1	6	2	4	3
Construction	4	1	5	2	1
Furniture	5	1	7	1	1
Edible fruit	1	1	1	1	1
Fence	7	6	3	4	2
Total	24	23	26	18	17
Rank	2 nd	3 rd	1 st	4 th	5 th

4.14. Medicinal Plants Used to treat one or more Ailments

Out the 64 medicinal plants that were cited by informants, 37 (57.53%) were used to treat a specific ailment, 15 (23.43) were used treat two ailment, 10 (15.62) were used to treat three ailment and 2 (3.12) more than three ailments (Table 17).

Table 17 . Medicinal Plants Used to treat one or more Ailments

Ailment	No. of respondents	Percent (%)
One	37	57.8
Two	15	23.43
Three	10	15.62
More than three	2	3.15
Total	64	100 (%)

4. .15. Marketed medicinal plants

The medicinal plant materials found being marketed in the open markets for medicinal purpose. In addition to this, some medicinal plants are sold in the market for other purposes and most of them are sold as food (Table 18). Medicinal plants in the market are not a common cultural activity in local markets of the study area.

Table 18 . Some medicinal plants which are found in market

Types of species	Uses
<i>Allium sativum</i>	Medicinal
<i>Capsicum annum</i>	Food
<i>Catha edulis</i>	Stimulant
<i>Citrus limon</i>	Food
<i>Citrus Medica</i>	Food
<i>Coffea Arabica</i>	Stimulant
<i>Cucurbita pepo</i>	Food

4.16. Use of Medicinal Plants Associating with Belief

The local knowledge of people of the Kondala Woreda has shown variation in some aspects to use medicinal plants to treat human and animal health problems due to the following factors. These are variation on the basis of the geographical location, climatic conditions, perception to gender difference and their distance to the nearest town and religious beliefs. Some members of the local community in using traditional medicinal plants for different remedies are reflected its magical activities rather than reflecting the ethno botanical knowledge. In other members of the local community, utilization and willingness to share ethno botanical knowledge is affected by the assumption that as if they considered themselves as civilized and relies on modern medicine

5. DISCUSSION

Sixty four medicinal plants have been documented in this study. The number of reported medicinal plants and their uses by the local people of the Kondala Woreda indicated the depth of the local knowledge on medicinal plants and their applications. Out of the collected medicinal plants, 78% species were reported as used to treat human diseases, whereas, 12% of species were used to treat livestock ailments and 10% species were used to treat both human and livestock ailments. The use of medicinal plants to treat human diseases than livestock ailments by local people indicated that local people of the study area seek traditional medicine for ailments first and then try to search for his livestock ailments. As a result, they could acquire low knowledge of medicinal plants to treat livestock ailments than knowledge of medicinal plants treating human ailments. Similar finding was reported by Seyoum (2009). Among the families, *Fabaceae* was represented by 7 species (10.93%) followed by *Asteaceae* 5 (7.81%) in the study area. The finding of the family *Fabaceae* as the contributor of higher number of plant species used for medicinal purposes than other families in line with similar studies elsewhere in Ethiopia (Kebu *et al.*, 2004; Haile and Dilnessaw, 2007).

The most widely used plant remedies by people of Kondala Wereda were obtained 60.9% from herbs. This finding is in line with the results of Mirutse (2000), Tilahun and Mirutse (2007) and Seyoum (2009). It is true that herbs can grow everywhere (roadside, home garden, farmland and wild) and common in the study area compared with other species such as tree, shrub and climber. In addition, herbs are not exposed to various threats as compared with trees and shrubs as a result; they can be harvested and cultivated easily by local people.

As the result indicated, majority of medicinal plants have been originated (62.5%) from wild vegetation except few herbs, trees and some cultivated crops, the local people rely on medicinal plants from wild habitats. Similar finding was also reported by Haile and Delensaw (2007), in Sekoru Woreda, Jimma Zone which showed that among the listed medicinal plant species of the study area, the majority were collected from the wild. The local people cultivate some popular medicinal plants in their home garden for the

purpose of medicine such as *Zingiber officinale*, *Allium sativum* and *Ricinus communis* . The work by Zemede (1997), showed that the plants maintained in home gardens in Ethiopia are primarily cultivated for their medicinal value. It was found from the present study area 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 plants .There might be owing to the easily occurrence of these species in the study area and high level of abundance. In the same way high number of herbs and shrubs for medicinal purpose were also previously reported by (Debela *et al.*, 2004). Mirutse *et al.* (2003) noted that, more than half of the KondalaWoreda plant remedies were obtained from herbs because; it takes much time and effort to harvest medicinal trees. However, it is a fact in the country that woody plants are declining and most of the easily available plants become the herbs.

According to the result of this study, among the different parts of plants, leaves were mostly used by the local people in the study area .In agreement with this study conducted in different parts of Ethiopia indicated that leaves being used more than the other parts of the plant (Haile and Delensaw, 2007). This practice helps to reduce the rate of threat on plant species or helps for sustainable harvesting of plants. Therefore, the existence of the plant will be ensuring (Mirutse *et al.*, 2003). According to Dawit and Ahadu (1993), medicinal plant harvest that involves root, rhizomes, bulbs, barks and stems have serious effect on the survival of mother plant.

Regarding the age of informants a rich knowledge of traditional medicine is mainly found among the elderly members 70-80 years. Young people do not have much knowledge compared with elders that is an indication of decline of the knowledge of traditional medicine in addition to secrecy. This might be related to the disinterest of young generation on traditional medicine. Various studies in different parts of Ethiopia have reported that transfer of medicinal plants knowledge have been affected by modernization like access to modern education and health services (Debela *et al.*, 2004 ; Kebu *et al.*, 2004; Fisseha,2009 and Tesfaye *et al.*,2009). As the result indicated, non-educated informants handled much knowledge of traditional medicine; whereas educated informants had low knowledge of traditional medicine, this indicated the

impact of modern education on traditional medicine. This finding agrees with the findings of Debela *et al.* (2004).

According to informants, the most popular method of preparation of remedy in the study area was crushing. This finding is in line with the results of Haile and Dilnessaw (2007). Majority of traditional medicines were prepared from fresh (62.5%) plant materials in the study area. Different studies in different parts of Ethiopia reported similar result (Tilahun and Mirutse, 2007,). Informants claimed that they use fresh plant parts mostly are because 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. However, it has contribution on threat of medicinal plants since local people have no habit of preserving dry form of traditional medicine.

Regarding methods of application, the well-known one is oral that accounted for 50.52% followed by dermal 21.05% in the study area. This result agrees with the findings of Kebu *et al.* (2004) in their study on Fentalle area (Eastern Shewa) reported that about 54.7% of remedies are taken orally. In the same manner, Debela *et al.*, (2004) indicated that, most of the remedies given by orally (52%) and the external application accounting for 35% of the total medicinal preparations

Informants reported that there were medicinal plants, which are very effective in treating certain diseases. Even patients prefer to visit local healers than modern medicine or use traditional medicine after failure of modern drug. Local people of the study area prefer traditional medicines than modern drugs to get relief from rabies and health problems associated with tooth ache. Concerning dosage, it was reported that, lack of precise dosage is one limitation of traditional medicinal plants (Amare, 1976; Dawit, 1986) the result of this study is in line with it, since lack of consistency was observed among the informants. In the study area, various ways of measuring dosage were reported by local people like finger index, cup of coffee, hand palm and taken by bottle or locally made materials were common in the study area.

Ranking of medicinal plants showed that there are medicinal plants that are preferred by local people than the other. This indicated that local people acquire the knowledge

through experience and could differentiate medicinal plants that are effective for treatment of their own or their livestock ailments. In the study area, *Cordia africana* stood first by having the highest multipurpose use. Although, it has low medicinal value, the plant is used mostly for construction (timber) production. This is the evidence for the depletion. Although, it has low medicinal value, the plant is used mostly for construction (timber) production.

According to the informants, being a wildness of the cited medicinal plants expose to various anthropogenic factors. From these factors the main threats to medicinal plants in the study area, fire wood was ranked first by selected key informants followed by agricultural expansion while the least one is fodder.. Most informants reported that, they preserve the plant material that they could not find in the dry or rainy season by various ways like pounding and saving the powder. Plants are managed and conserved because of their spiritual, ritual and material values, which open the way for the possibilities in conservation of vegetation of the locality in general and medicinal plants in particular. Here, the intermixing of multi- purpose tree species by farmers on their farmland is evidence to management practices in the area. This finding agrees with the result of (Zemedede, 1999).

6. CONCLUSION AND RECOMMENDATIONS

6.1. Conclusion

In this study 64 species of medicinal plants were recorded out of this 78% were noted to treat human ailments while, 12% are used to treat livestock ailments and 10% are used to treat both livestock and human ailments. Majority of the listed medicinal plant species were from the wild habitat 40 (62.5%). However, Plant habitats are subjected to the loss of a number of plant species due to different anthropogenic factors such as fire wood, agricultural expansion, drought and others.

Most of the knowledge on herbal remedies in this study area concentrated on elders, who were between 71-80 years. This shows that there is a problem in the transfer of knowledge from the elders to the younger generation. The problem is may be faced due to the introduction of modern education, religious factors, spiritual and cultural related problems. However, these factors played a significant role in conservation of medicinal plants in the study area.

Herbal remedies are prepared as using fresh materials 40 (62.5%) species than dried plant materials. Thus, the consequence of this result may expose the area to reduce many plant species. Leaves 39.9% are harvested for medicinal purpose than other plant parts in the study area, which is important to ensure the existence of medicinal plants. Herbs are highly utilized 60.9 % for medicinal purpose than trees and shrubs. This might help to ensure the survival of trees and shrubs. Most of medicinal plants are administered orally (29.47%). Regarding the dosage of traditional medicinal plants, there is no standardized measurement. This will have negative consequences on the health of the individuals. Thus, attention should be given to standardization of measurement and hygiene of the medicines made from plants by training both the healers and other members of the local people.

6.2. Recommendations

Depending on the result of this investigation, the following recommendations were suggested:

- The local people need to be trained, encouraged and supported on how to conserve and manage the medicinal plant species.
- Increasing awareness of the younger generation to avoid negative impacts on the medicinal plants and associated knowledge in the area and documentation of local knowledge concerning medicinal plants
- Education must be given to the members of the local community by the Woreda agricultural experts so that they can engage home gardening practices.
- Attention should be given to standardization of measurement and hygiene of the medicines made from plants by training both the healers and other members of the local people.

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Appendices

Appendix1. Type of medicinal plant species in the Home garden of study area

Plantspecies	Family	Local name	H	Ailments	Processing	Dosage
<i>Catha edulis</i>	<i>Celastraceae</i>	Caatii	S	Influenza	Juvenile leaves	One cup with hot tea or coffee
<i>Caylusea Abyssinica</i>	<i>Resedaceae</i>	Reencii	H	Male Impotenxy, diabetes	Root powdered, leaves crushed	Half cup with coffee
<i>Citrus limon</i>	<i>Rutaceae</i>	Loomii	S	Nasal	Fruit jammed	One fruit of
<i>Coccinia abyssinica</i>	<i>Cucurbitaceae</i>	Ancootee	H	Frutctures	Drier powdered, mixed with soup.	One glass
<i>Cordia africana</i>	<i>Boraginaceae</i>	Waddessa	T	Spider poison	Leaf crushed & mixed with fresh	Three finger length
<i>Cucrbita pepo</i>	<i>Cucurbitaceae</i>	Buqqee nyaataa	H	Tape worm	Dried seed roasted powdered	Quarter

Appendix1Contineud

<i>Persea americana</i>	<i>Lauraceae</i>	Abokao	T	Dandruff	Ripened fruit with bark Grewia ferruginea concoction	One glass for 3-5 days washing
<i>Prunis persica</i>	<i>Rosaceae</i>	Kookii	T	Tinea corporis	Juvenile leaves grinded & mixed with fresh butter	Four spoons for 2 days
<i>Plectra thusedul</i>	<i>Lamiaceae</i>	Dinnicha Oromoo	H	Loos of appetite	Root boiled and Eaten with bulb	Eating 3 times/week one spoon during on set
<i>Rhamnus sprinoides</i>	<i>Rhamnaceae</i>	Geeshoo		Tonsillitis	Allium sativum Juvenile leaves crushed with rhizome of zingiber	Half spoon with tea
<i>Ricinus communis</i>	<i>Euphorbiaceae</i>	Qobboo	H	Anthrax, Actinomy cosis	Dried fruit, root powdered & mixed with water	One cup
<i>Cymbopogon citratus</i>	<i>Poaceae</i>	Marga	H	Stomach ache	Root crushed & mixed with salt	Half spoon
<i>Vernonia amygdalina</i>	<i>Asteraceae</i>	Eebicha	T	Flariasis	Leaves grinded & massaged on	Three Spoons
<i>Vicia faba</i>	<i>Fabaceae</i>	Baaqela	H	Stomach problem	Seed roasted, Pounded & mixed with soup	One glass per day
<i>Vigna unguiculata</i>	<i>Fabaceae</i>	Eephoo	H	Rheumatis	Drier seed cooked & bulb of Allium sativum mixed	One glass of the concoction
<i>Zingiber officinale</i>	<i>Zingiberaceae</i>	Jijinbila	H	Asthma	Rhizome infusion	One/two Spoon in on set of illness

Appendix 2 Type of medicinal plant species in the wild of study area

Plants Species	Family	Local Name	H	Ailments	Processing	Dosage
<i>Acacia abyssinica</i>	<i>Fabaceae</i>	Laaftoo	T	Bat	Crushed & mixed with fresh butter	One spoon
<i>Acanthus pubescens</i>	<i>Acanthaceae</i>	Kasorruu	S	Tinea	Juvenile leaves crushed & mixed with fresh butter	2 spoons
<i>Achyranthes Spera</i>		Darguu	H	Bat	Leaves crushed & mixed with oil	2 spoons
<i>Acmella caulirhiza</i>	<i>Asteraceae</i>	Qabarii	H	Tonsillitis	Seed and leaf crushed & chewed	1 spoon
<i>Albizia himperianaol</i>	<i>Fabaceae</i>	Muka arba	T	Liver Cirrhosis	Leaves pounded	One Spoon
<i>Aloemacro Carpa</i>	<i>Aloaceae</i>	Arkisa	H	Wound Burn	Latex creamed on	One spoon
<i>Amorphophalus abyssinicus</i>	<i>Araceae</i>	Qicuu	H	Black leg	Root crushed & mixed with salt	One glass
<i>Bersama Abyssini</i>	<i>Melanthaceae</i>	Lolchiisaa	S	Ascariasis	Stem tip chopped and cooked with bean	Taken in empty stomach
<i>Brachystel Malin</i>	<i>lepiadaceae</i>	Karkarro	H	Black	Leaves crushed with leaf of croton	One glass
<i>Brucea antidysentera</i>	<i>Simaroubaceae</i>	Qomonyo	S	Tooth ache	Leaf put before the fire & massaged on	Half spoon
<i>Buddlea polystachen</i>	<i>Loganiaceae</i>	Anfarree	T	Eye infection	Leaves crushed drops added	2-3 drops
<i>Caesalpinia capetala</i>	<i>Fabaceae</i>	Harangama	H	Tooth infection	Root pounded, & mixed with salt	One Spoon
<i>Carissa spinarum</i>	<i>Apocynaceae</i>		H	Ascariasis	Seed cooked & eaten with Garlic	Half spoon
<i>Carduslepta Canthus</i>	<i>Asteraceae</i>	Arraba dubartii	H	Blackleg	Root pounded & mixed with water	One glass
<i>Capparis mentosa</i>	<i>Capparidaceae</i>	Hadaa Gurraacha	S	Dandruff	Leaf crushed with leaf of Daturastramonim	One glass
<i>Calpurnia</i>	<i>Fabaceae</i>	Ceekaa	S	Snake bite	Leaves crushed	One

<i>aurea</i>				(livestock)	& smashed	Bottle
<i>Clematissi mensis</i>	<i>Ranunculaceae</i>	Fiitii	C	Spider Poison	Leaves crushed & the exudates dropped	1 cup
<i>Clerodendrum myricoides</i>	<i>Lamiaceae</i>	Marariisaa	S	Headache	Dried root pounded & added on fire & fumigated	One glass
<i>Clutia abyssinica</i>	<i>Euphorbiaceae</i>	Uleefoonii	S	Toothache	Juvenile leaves hold in teeth	Half spoon
<i>Crassula schimperi</i>	<i>Crassulaceae</i>	Qamxallaa	H	Delayed Placenta	Leaves crushed & mixed with salt	One spoon
<i>Crepisru Eppellii</i>	<i>Asteraceae</i>	Aannanee	S	Acute watery diarrhea	Root grinded & mixed with salt	Half cup
<i>Combretum collinum</i>	<i>Combretaceae</i>	Ununuu	T	Breast swelling	Bark grinded & mixed in water	1cup for Cattle
<i>Combretum Molle</i>	<i>Combretaceae</i>	Dabaqqaa	T	Infection (cattle)	Stem chopped & burned on fire	Half of spoon
<i>Combretum paniculatum</i>	<i>Combretaceae</i>	Baggii	S	Eye infection		1-2 drops
<i>Croton macrastachys</i>	<i>Euphorbiaceae</i>	Bakkan niisa	T	Fibril	Sap is extracted	1 cup
<i>Cucumis ficifollius</i>	<i>Cucurbitaceae</i>	Hiddii Hoolaa	H	Stomach ache	Leaf is added on fire & fumigated	One spoon
<i>Cynodon dactylon</i>	<i>Poaceae</i>	Coqorsa	H	Snake poison, wound	Root crushed & chewed with salt	Half Cup
<i>Cynoglossum amplifolium</i>	<i>Boraginaceae</i>	QorichaBo wwuu	H	Headache	Above ground part crushed & mixed with Nicotiana tabacum	½ spoon
<i>Datura stramonium</i>	<i>Solanaceae</i>	Asangira	H	Dandruff	Leaves grinded & Sniffed	1-5 days Wash
<i>Dracaena steudneri</i>	<i>Dracaenaceae</i>	Afarfattu	T	Tryponomia	Leaves crushed B water	One glass
<i>Dodonaea angustifolia</i>	<i>Sapindaceae</i>	Ittacha	S	External Parasite	Leaves crushed & mixed with water	1-2 days wash for Calves
<i>Echinop skebericho</i>	<i>Asteraceae</i>	Qabarichoo	H	Evil eye	Root heated before fire and fumigated	Half spoon
<i>Ehretia</i>	<i>Boraginacea</i>	Ulagaa	T	Tooth ache	Bark chewed in	

<i>Cymosa</i>					Teeth	
<i>Ekeberiga capensis</i>	<i>Meliaceae</i>	Somboo	S	Trypanomiasis	Bark crushed & mixed with water	One glass for cattles
<i>Embelia schimperi</i>	<i>Myrsinaceae</i>	Hanquu	E	Tape worm	Leaf concoction	2 spoons
<i>Englerina woodordioide</i>	<i>Loranthaceae</i>	Dheertuu	T	Stomach ache	Whole plant is grinded & mixed with water	Quarter Spoon
<i>Entada abyssinica</i>	<i>Fabaceae</i>		T	Anthrax, wound	Root/bark grinded & applied on	Half of spoon
<i>Eucalyptus globules</i>	<i>Myrtaceae</i>	Akakiltii Adii	T	Common cold	Leaf infusion	1-2 Spoon
<i>Eucalyptu stereticornis</i>	<i>Myrtaceae</i>	Akakiltii	T	Bloating	Bark decoction	One cup For cattle
<i>Euphorbia candela</i>	<i>Euphorbiaceae</i>	Adaamii	T	Wart	Latex creamed	1-2 drops
<i>Ficus vasta</i>	<i>Moraceae</i>	Qilxuu	T	Snake bite	Root crushed & mixed with water	One spoon for 2-3 days
<i>Ficussy comorus</i>	<i>Moraceae</i>	Odaa	S	Hemorrhoid	Bark grinded & mixed with fresh butter	1-2 Spoon
<i>Helinus mystacinus</i>	<i>Rhamnaceae</i>	Oomachoo	T	Stomach ache	Leaf boiled & drops is taken	1-2 drops For baby
<i>Maytenus arbutifoli</i>	<i>Celastraceae</i>	Kambolcha	T	Diarrhea	Leaves crushed & mixed with salt	1 glass for cattle
<i>Millettia ferruginea</i>	<i>Fabaceae</i>	Sootaloo	S	Stomach ache, swelling	Leaves crushed & mixed with water	2 spoons

Appendix 3 Medicinal plants used to treat human, Livestock and both in the study area

Plant species	Treatment for:		
	Human	live stock	Human and live stock
<i>Catha edulis</i>	✓		
<i>Caylusea abyssinica</i>	✓		
<i>Citrus limon</i>			
<i>Coccinia abyssinica</i>	✓		
<i>Cordia africana</i>	✓		
<i>Nicotiana tabacum</i>	✓		
<i>Ocimumlamiifolium</i>			✓
<i>Persea Americana</i>		✓	
<i>Prunis persica</i>		✓	
<i>Plectrathus edulis</i>	✓		
<i>Ricinus communis</i>		✓	
<i>Cymbopogon citrates</i>	✓		
<i>Vernonia amygdalina</i>	✓		
<i>Vicia faba</i>	✓		

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<i>Acacia abyssinica</i>	✓		
<i>Acanthus pubescens</i>	✓		
<i>Achyranthes aspera</i>		✓	
<i>Acmella callirhiza</i>	✓		
<i>Albizia himperianaoliv</i>			✓
<i>Aloe macrocarpa</i>			✓
<i>Amorphophallus</i>	✓		
<i>Bersama abyssinica</i>	✓		
<i>Brachystylis malincare</i>	✓		
<i>Bucea antidysenterica</i>	✓	✓	
<i>Buddleia polystachya</i>			✓
<i>Caesalpinia decapetala</i>	✓		
<i>Carissa spinarum</i>		✓	
<i>Cardus leptacanthus</i>	✓		
<i>Capparis tomentosa</i>	✓		
<i>Calpurnia aurea</i>	✓		
<i>Clematis simensis</i>	✓		
<i>Clusia abyssinica</i>		✓	
<i>Crassula schimperi</i>			✓

Appendix3continueud

<i>Crepis rueppellii</i>			✓
<i>Combretum molle</i>	✓		
<i>Croton macrastachyus</i>	✓		
<i>Cucumis Ficifollius</i>	✓		
<i>Cynodon dactylon</i>		✓	
<i>Datura stramonium</i>			✓
<i>Dracaena steudneri</i>		✓	
<i>Dodonaea angustifolia</i>			✓
<i>Echinops kebericho</i>			✓
<i>Millettia ferruginea</i>		✓	
<i>Ehretia cymosa</i>	✓		
<i>Ekeberiga capensis</i>	✓		
<i>Embelia schimperi</i>	✓		
<i>Entada abyssinica</i>	✓		
<i>Eucalyptus globules</i>	✓		

Appendix4 Checklist of semi-structured interviews for collecting ethno botanical data.

1. General information of respondent.

Name of the respondent.....Sex.....Age..... Educational status.....

2. Mention medicinal plant used to treat human disease (give local names)

a. _____ b. _____ c. _____

3. List medicinal Plants used to treat animal disease (give local names)

a. _____ b. _____ c. _____

4. Mention medicinal plants used to treat both human and animal disease

a. _____ b. _____ c. _____

5. Where do you find medicinal plants?

In the wild _____ in the home gardens _____ in the wild and home gardens _____

6. Which part of the medicinal plant is used?

Flower _____ Latex _____

Fruit _____ Leaf _____

Seed _____ Root _____

7. What are the methods of preparation of the medicinal plant?

8. Dosage: Does it vary among age groups, sex?

9. What are modes of application of the medicinal plants for the victim human or

Animal?

10. How is/are the medicinal plant preserved?

11. Is the medicinal plant marketable?

12. How is the knowledge of medicinal plant transferred from elders to younger Generation?

13. What are the major problems associated with medicinal plants in the area?