ETHNOBOTANICAL STUDY OF MEDICINAL PLANTS USED BY LOCAL PEOPLE OF SULULTA WOREDA, OROMIA REGION SPECIAL ZONE, ETHIOPIA

M.Sc. THESIS

ESHETU GIRMA

AUGUST 2017

HARAMAYA UNIVERSIY, HARAMAYA

Ethnobotanical Study of Medicinal Plants Used by Local People of Sululta Woreda, Oromia Region Special Zone, Ethiopia

A Thesis Submitted to the School of Biological Sciences and Biotechnology, College of Natural and Computational Sciences, Post Graduate Programs Directorate

HARAMAYA UNIVERSITY

In Partial Fulfillment of the Requirements for the Degree of

MASTER OF SCIENCE IN BIOLOGY

Eshetu Girma

August 2017

Haramaya University, Haramaya

APPROVAL SHEET

HARAMAYA UNIVERSITY

POST GRADUATE PROGRAM DIRECTORATE

As Thesis research advisor, I hereby certify that I have read and evaluated this Thesis, entitled: **Ethnobotanical Study of Medicinal Plants Used by Local People of Sululta Woreda, Oromia Region Special Zone, Ethiopia** prepared under my guidance by **Eshetu Girma Hundie.** I recommended that it be submitted as fulfilling the thesis requirement.

Meseret Chimdessa (PhD)__	_____	_____
Name of Major Advisor	Signature	Date
Yohannes Petros (PhD	_____	_____
Name of Co Advisor	Signature	Date

As a member of the Board of examiners of the M.Sc. Thesis open defense examination, I certify that I have read and evaluated the Thesis prepared by **Eshetu Girma Hundie** and examined the candidate. I recommended that the thesis be accepted as fulfilling the Thesis requirements for the degree of Master of Science in Biology.

_____	_____	_____
Chairperson	Signature	Date
_____	_____	_____
Internal Examiner	Signature	Date
_____	_____	_____
External Examiner	Signature	Date

Final approval and acceptance of the Thesis is contingent upon the submission of its final copy to the council of Post Graduate Program Directorate through the candidate's department.

DEDICATION

I dedicated this manuscript to my beloved mother, Kule Abebe and my Father Girma Hundie, Who sacrificed a lot to this level, nursing me with affection, and for their dedicated Partnership in the success of my life.

STATEMENT OF THE AUTHOR

By my signature below, I declare and affirm that this Thesis is my own work and all sources of materials consulted for this work have been dully acknowledged through citation. I have followed all ethical principles of the research in the data collection, analysis, preparation and compilation of this Thesis. This Thesis has been submitted in partial fulfillment of the requirement for the degree of Master of Science in Biology from the post graduated program directorate at the Haramaya University. The Thesis is deposited in the Haramaya university library to be made available to borrowers under the rules of the library. I solemnly declare that this thesis is not submitted to any other institution anywhere for the award of any academic degree, diploma or certificate.

Brief quotations from this document are allowable without special permission provided that an accurate acknowledgement of the source is made. Request for permission for extended quotation from or reproduction of the manuscript in whole or in part may be granted by the Head of the school of Biology and Biotechnology or the Director of post graduated program directorate when the proposed use of material is in the interest of scholarship. In other instance, however, permission must be obtained from the author of the Thesis.

Name: Eshetu Girma

Signature: _____

Place: Haramaya University

Department: Biology

Data of submission: _____

BIOGRAPHICAL SKETCH

The author, Eshetu Girma, was born from his father Girma Hundie and his mother Kule Abebe on September 05, 1986 in Korea Roba kebele, Sululta Woreda, Oromia Region Special Zone, Ethiopia. He attended his elementary education at Chancho Primary School, Secondary and Preparatory School at Chancho Aba Geda School. After completion of his Preparatory education at Chancho Aba Geda School in 2006, he joined Debre Markos University Department of Biology and graduated in July 2009 with B.Ed degree in Biology. After graduating with first degree, he was employed in Governmental organization as a teacher at Midega Tola Secondary and Preparatory School in East Hararge Zone. In 2013 he joined the Haramaya University PostGraduate Program as a candidate for master's degree in Biology.

ACKNOWLEDGEMENTS

I express my deepest sense of gratitude to Meseret Chimdessa (PhD), my major advisor and Yohannes Petros (PhD), my Co-Advisor, for providing me unreserved effort in the form of guidance, constructive comments and checking the document from the start of the study up to the final work of the manuscript.

My heartfelt appreciation and gratitude also go to the Ministery of Education for giving me the chance and financial support to carry out this research, and Haramaya University and Biology Department for giving the chance to attend the Master Degree program. My appreciation also goes to the people of Sululta Woreda for their positive responses, sharing available information, time, generosity and hospitality. I also thank Woreda Agricultural, Health and Administration Offices for giving their information during the data collection.

My family members, particularly my mama, Kule Abebe, my brothers Addis Girma and my wife Shewaye Mossisa have been continued sources of encouragement in all aspect of my life and deserve heartfelt appreciation. I am very much indebted to all my best friends and Assert Assefa for their endless support during the research period. My appreciation also goes to all people who participated and assisted me on data collection of the study.

ACRONYMS/ ABBREVIATIONS

FL	**Fidelity Level**
HU	**Haramaya University**
ICF	**Informant Consensus Factor**
IK	**Indigenous Knowledge**
MASL	**Meters Above Sea Level**
MP	**Medicinal Plants**
TK	**Traditional Knowledge**
TM	**Traditional Medicine**
WHO	**World Health Organization**

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

LIST OF TABLES

Table **page**

LIST OF FIGURES

Figure **page**

LIST OF TABLES IN THE APPENDIX

LIST OF FIGURES IN THE APPENDIX

Ethnobotanical Study of Medicinal Plants Used by Local People of Sululta Woreda, Oromia Region Special Zone, Ethiopia

ABSTRACT

Ethnobotanical study of traditional medicinal plants were conducted to document indigenous knowledge on the use and management practices of medicinal plants by local people of Sululta Woreda, Oromia Region Special Zone, Ethiopia. A total of 100 respondents (age ≥25) 80 ordinary residents and 20 key informants (traditional healers) participated in this study. Data were collected using semi-structured interview, guided field walk observation and group discussion between August and September 2016. The collected data were summarized using descriptive statistics. Fidelity level (FL) and Informant Consensus Factor (ICF) were also computed. Results show that a total of 34 plant species distributed in 29 genera and 20 families were collected, identified and recorded. Out of the 34 collected medicinal plants of the study area, 25 species (73.52%) against human diseases, 6 species (17.64%) against livestock diseases and the remaining 3 species (8.82 %) were used to treat both human and livestock diseases. Of the total 34 medicinal plants collected from the study area, 15(44.11%) were herb species, followed by 12(35.29 %) tree species, 7(20.5 %) shrub species, and 1(2.9 %) climber species. The most frequently used plant parts were leaves followed by roots. The most widely used method of preparation was crushing followed by powdering the different plant parts. The most dominant route of administration recorded was oral followed by dermal. The major threats to medicinal plants of the study area were human in origin. Diseases categories like digestive system diseases had higher ICF values (0.97)showing high incidence of these diseases in the study area and agreement of people on their remedies. Medicinal plants should be conserved and documented. In order to conserve indigenous knowledge on the use and management practices of medicinal plants by local people of Sululta Woreda, local communities should be aware on *the sustainable use and management of plants resources and their indigenous knowledge.*

***KEY WORDS**: Ethnobotany, Medicinal Plants, Sululta. Traditional medicine*

1. INTRODUCTION

The term Ethnobotany was first coined by John Harshberger in 1896 (Jain, 1986). However, it has different interpretations and definitions depending on the interest of various workers. Cotton (1996) defined ethnobotany as the study of plants by aboriginal people or the relationship between human societies with natural vegetation. It encompasses all studies relating to the mutual relationships between plants and people (Cotton, 1996). On the other hand, Ethnobotany is the study of local people's interaction with the natural environment, how they classify, manage and use plants available around them (Martin, 1995). Ethnobotany has important role in conservation of nature, culture, and particular biological diversity, the diversity of traditional human culture in the world. About 65-80% of the world's population in developing countries depends on plants for their primary health care due to poverty and lack of access to modern medicine (WHO, 2000). Among the relationships of humans with plants, dependence of people on plants for their medicinal value is one. Thus, people depend on plants not only for food, but also for preparation of remedies. Ethnobotanical studies are useful in documenting, analyzing and communicating knowledge and interaction between plant biodiversity and human society, how plant diversity in nature is used and influenced by human activities (Balick and Cox, 1997). From earliest times, human kind has been using plants in attempting to cure diseases and related physical sufferings. Primitive people in all ages have had some knowledge of medicinal plants through trial and error (Hill, 1989).

Ethiopia is a country characterized by a wide range of climate and ecological conditions, possessing enormous diversity of fauna and flora (Pankhurst, 2001). Dawit Abebe (1986) estimated that 95% of traditional medical preparations in Ethiopia are of plant origin. The Ethiopian flora is estimated to contain between 6500 and 7000 species of higher plants of which about 19% are endemic (USID, 2008). The country is well known for its significant geographical diversity which favored the formation of different habitat and vegetation zones. Ethiopia is also home to many languages, cultures and beliefs, which have in turn contributed to the high diversity of traditional knowledge and practices of the people, which among others, includes the use of medicinal plants. Hence, in Ethiopia, plants have been used both in the prevention and cure of various diseases of humans and other animals from time immemorial (Mirutse

and Gobena, 2003). Dawit and Ahadu (1993) reported that 80% of the Ethiopian population still depends on traditional medicine for their health care practice and more than 95% of traditional medicine preparations are of plant origin. Despite their significant contributions to the society, traditional medicines have been given very little attention in modern research and development, and less has been done to upgrade the practice. It is only recently that the Ethiopian health authorities have shown interest to promote and develop it (Dawit, 1986). Ethiopian plants have shown very effective medicinal value for some ailments of humans and domestic animals. Medicinal plants are demanded in Ethiopia due to centrally linked traditional, the trust the communities have in medicinal values of traditional medicine and relatively low cost in using them (Endashaw, 2007).

Medicinal plants are the basis for the development of new drugs and the survival of human kind as well as livestock. Traditional knowledge of medicinal plants and their use by indigenous healers are not only useful for conservation of cultural tradition and biodiversity, but also for community health care and drugs development in the local people. Indigenous knowledge of medicinal plants appeared when humans started and learned how to use the traditional knowledge of medicinal plants. It does vary from place to place and transfer through oral communication from one generation to the next generation (Cunningham, 2001).

Today, the continued deforestation and environmental degradation of habitats in many parts of the country has brought about depletion of medicinal plants and associated knowledge. Nevertheless, little effort has so far been made to properly document the associated knowledge based and conserved medicinal plants in the country (Gidey *et al*. 2009). The indigenous people of Sululta Woreda have diverse and unique traditions of interactions with plants of their surroundings. However; no ethnobotanical investigation and documentation were carried out on medicinal plants of Sululta woreda. This study is, therefore, designed to carry out ethnobotanical study on medicinal plants of Sululta woreda with the following general and specific objectives.

General Objective

- To conduct ethnobotanical study on medicinal plants of Sululta Woreda.

Specific Objectives

- To collect, identify and document medicinal plants of Sululta woreda.
- To document indigenous knowledge on the use and management practices of medicinal plants used by indigenous people of Sululta Woreda.
- To identify diversity, distribution, method of preparation, dosage and rout of administration of medicinal plants.

2. LITERATURE REVIEW

2.1. Ethnobotanical Study:-History, Development and Methods

Ethnobotanical studies of medicinal plants have long been conducted relatively well in countries such as India, China, and Brazil. There has been an ever increasing interest by anthropologists, botanists and explorers of the world to document the potential use or economic potential of plants used by indigenous people (Cotton, 1996).

Around 1858, British explorer, R. Spruce noted for the first time the psychoactive properties of the vine plant (*Banisteriopsis cappi*) (Cotton, 1996). Such works gradually yielded a firm basis for the study of direct interaction between human and other organisms through documentation, analysis and use of indigenous knowledge of biological entity. Eventually, the work on ethno botany promoted this subject to be an independent field of study in biological sciences. Since then different authors used various ways of defining ethno botany. Harshberger in 1895 brought up the term ethno botany for the first time (Cotton, 1996). He defined ethno botany as "the use of plants by aboriginal people". People in different parts of Ethiopia have traditional practices, which they accumulated for generations to treat both human and livestock ailments. They use different parts of plants to prepare remedies (root, bark, leaves, and other plant structures).

The elders, who know more about medicinal plants, may die without sharing their traditional knowledge to the young generation. Since the knowledge of traditional medicine is transferred orally from generation to generation, basic information on the use of medicinal plant may also be lost. Therefore, in order to pass the knowledge that can be used as basis for the invention of modern medicine, documentation of medicinal plants and the knowledge associated with their usage is paramount importance. 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 ancient heritage and indigenous knowledge. According to Cotton (1996), ethnobotany encompasses all the studies that concern with the mutual relationship between plants and traditional people. There are several methods of inquiry tools based on the aims and objectives of the ethno botanical study at hand (Alexiades, 1996). These inquiry methods include participants, observation, and simulation, field interviews, and group discussion, check list, interview and market survey.

Cotton (1996) defined ethnobotany as the study of the use of plants by aboriginal people or the relationship between human societies with natural vegetation. On the other hand, Martin (1995) defined ethnobotany as the study of people's classification, management and use of plants. Although plants have been used as source of medicine to treat both human and livestock ailments in Ethiopia, research and documentation on medicinal plants have been started only very recently (Mesfin and Sebsibe, 1992). Among the research conducted on ethno botanical study of medicinal plants in Ethiopia, Ermias *et al.* (2008) collected the highest number of medicinal plants. Medicinal plants played a vital role in the treatment of various afflictions (distress) in Ethiopia (Fekadu, 2007).

As stated by Martin (1995) to achieve more detailed and reliable information of plants and plant use, ethno botanical study needs involvement of specialists from various disciplines, such as plant taxonomists, plant ecologists, anthropologists, linguists, economic botanists, pharmacologists and others. With such interdisciplinary and multidisciplinary approaches, ethno botany is aimed at gathering and documenting indigenous botanical knowledge, cultural practice, use and management of botanical resources and discovers benefits from plants.

The study of Ethiopian medicinal plants has not been realized as fully as that of India or other traditional communities elsewhere (Iwu, 1993). However, many researchers

(e.g., (Amare Getahun, 1976; Jensen, 1981; Dawit Abeba, 1986; Mesfin Tadesse, 1986; Dawit Abebe and Ahadu Ayehu, 1993; Mirutse, 2001; Debela Hundie *et al.*, 2001; Kebu *et al.*, 2004; Tizazu Gebre, 2005; Haile and Delnasaw, 2007; Endalew, 2007; Tilahun and Mirutse, 2007; Etana Tolasa, 2007; Fisseha Mesfin, 2007; Mirutse *et al*., 2009; Tesfaye *et al.*, 2009; Teferi *et al.*, 2009 and Gidey, 2010) have given attention to medicinal plants, and documented the knowledge of indigenous people on them from different parts of Ethiopia.

The local people employ several methods of preparation of traditional medicine from plants such as rubbing, pounding, powdering, squeezing and infusion. However, pounding and powdering were the most frequently reported method of traditional medicine preparation (Mulugeta, 2014).

2.2. Brief History of Traditional Medicinal plants in Ethiopia

Ethiopia comprises lands of varying altitude and climate. It has varieties of vegetation, including medicinal plants, in close geographical proximity. It is impossible to pinpoint the birth of medicine in Ethiopia, but certainly the evolution of curative practices closely follows the path of the diseases. Numerous medical envoys from abroad, starting with Italians and Russians were influential in building hospitals, providing medicinal training and participating in vaccination campaigns. However, most medical establishments primarily served the urban elites and foreign missionaries and were concentrated in major cities (Pankhurst, 1990).

Ethiopians in their long history discovered the medicinal properties of many plants. Medicinal practitioners of the northern and central provinces had the advantage of recording the information for future generation. Such written data can be supplemented by the observation of foreign travelers who preserved much information about Ethiopians medical practitioners, who were less able to preserve them for posterity. Traditional knowledge, especially on the medicinal uses of plants, has provided many important drugs of modern day (Balick and Cox, 1996).

The study of Traditional Ethiopian cures is the major Importance, Such treatment is culturally preferred by large section of the population thus its development on modern scientific line is desirable to: Understand Ethiopian medical history, seek useful cures, foster national dignity and self-reliance, develop local initiatives and industry generating rural wealth, and provide access to medicine accepted by the rural communities. Research on traditional Ethiopian medicine is a matter of urgency for two reasons. First, indigenous knowledge is losing ground. Second, medical plants are quickly disappearing because of deforestation. Historical account of traditionally used medicinal plants depict that different medicinal plants were in use as early as 5000-4000BC in China and 1600 BC by Syrian, Babylonian's Hebrews (Pankhurst, 1990).

It is not absolutely clear how the knowledge was first started but it is assumed that the early attempts were based on speculations and superstitions. Traditional medicinal plants were well popular as early as 1600B.C among Syrians, Babylonians and ancient Hebrews.

Reviews of Medicinal text books that have been written in Geez or Arabic between 17 ^{the} and 18^{the}centuries. Since medicinal plants are the main, often only source of traditional medicine for the rural population and have high demand in health care systems of this population when compared to modern medicine, Indicated that majorities of the Ethiopians with the exception of few privileged groups, starting from the time Italian occupation, have been depending almost entirely on the traditional medicine (Pankhurst, 1990).

The practice of traditional medicine in Ethiopia consists of the use of herbs, cupping, bleeding, steam bath, spiritual healing, holy water, bone setting and minor surgical procedures. Most knowledge on traditional medicinal plants is transmitted orally, although few are available in written records (Wilson and Wolde, 1979, Cited in Pankhurst, 1990).

Traditional medicine is the sum total of all the knowledge, beliefs and practices that are used in diagnosis, prevention and elimination of physical, mental or social disorder that rely exclusively on practical experiences and observation handed down from generation to generation (WHO, 1998). As elsewhere in Africa, indigenous people in Ethiopia, by large have been employing plant based traditional medicine to get cured from diseases arising from worms, fungi, viruses and protozoa (Dawit, 2001). Ethiopia has rich flora of which some are of therapeutic value that may be used in the treatment of many diseases (Urga, 2004) before development of modern medicine, treatment of ailments through plant based medicine was the principal means in Ethiopia and these days most indigenous people prefer traditional medicine to modern medicine mainly due to their affordability and easy access (Dawit, 2001).

Traditional Ethiopian medicinal texts tended to be secret and therefore, (unlike modern medicine) were not subject to independent testing. Traditional medical practitioners, mostly important herbs, spiritual healing, bone setting and minor surgical procedures in treating diseases. Ethiopian Traditional medicine is vastly complex and diverse varying greatly among different ethnic groups (Bishaw, 1991).

For thousands of years, the word plants and medicines were used synonymously. In the fifth century A.D, for example, doctors of the Byzantine Empire used the autumn crocus to effectively treat rheumatism and arthritis (Mirutse, 2007).

Hundreds of years ago, certain groups of native North Americans used the rhizomes of the May apples as a laxative, a remedy for intestinal worms, and as a treatment for warts and other skin growths. The oils from pepper mint leaves have long be used to settle an upset stomach, lotions containing the thick, syrupy liquid from the succulent plant *Aloe Vera* are often used to relieve the pain associated with minor burns including sunburn.

Drugs produced from the needles and bark of the pacific Yew has been used successfully to treat, ovarian, lung and other cancers. Although interest in medicinal plants by consumers, medical experts, and pharmaceutical companies is growing, it is estimated that less than 10 % of the 250,000 different flowering plant species have been studied for their potential use in the field of medicine (Yineger *et al*., 2008).

People have always used substances obtained from plants to treat a variety of ailments. By studying the plants traditionally used to treat human aliments, researchers have developed many modern medicines. For example, solution made by soaking the bark of willow trees was traditional cure for aches and pains. The pain of relieving chemical found in willow is called salicine. Acetylsalicylic acid a derivative of salicine was first sold in 1899 under the name aspirin. Today aspirin is the most widely used pain revealing drug in the world. The extremely poisonous leaves of the fox glove, Digitalis purpurea, yields digitalis, a drug that is used to stabilize irregular heart beat and to treat cardiac disorder. The rosy periwinkle, catharanthus, roseus, is the sources of two cancer treatment drugs, vinblastine and vincristine.Vinblastine is often used to treat Hodgkin's diseases, a type of cancer that affects lymph nodes. Vincristine is used to treat childhood leukemia and other types of cancer. The use of plant based traditional medicine is almost as old as the history of human kind. Among the 422000 plant species documented worldwide, 12.5% are reported to have medicinal value. Because of the escalation of the price of synthetic drugs in the last couple of decades; medical plants still play a vital role in many part of the world, especially in developing countries. This is true in Ethiopia where nearly 80% of the population still relies on plants to prevent and cure various health problems (Dawit and Ahadu, 1993).

Table. 1. Some Important medicines currently made from plants or originally derived from plants (George B, and peter H, 2006).

Name of drug	Source	Action
Caffeine	tea and coffee leaves	Stimulant
Codeine	Pappy fruits	relieves pain
Cortisone	yam tubers	Relieves symptoms of allergies
Ephedrina	Ephedrine stems	reduces cancerous tumors size
Cathinone	khat leaves	Stimulant
Nicotine	tobacco leaves	Addictive

Most medicinal plant species used to treat human aliments were wild. This implies that the majority of the plants of medicinal importance were not yet identified and cultivated by traditional healers (Haile, 2005).The expanding trade on medicinal plants has serious implications on survival of several plant species, with many under serious threat to be extinct. In Ethiopia, as well as around the world, traditional medicine mostly uses plant. Moreover, national products research is often based on ethno botanical information and many of the drugs used today were developed from medicinal plants used by indigenous societies. Despite this fact, many medicinal plants are threatened with extinction and indigenous culture, are being disrupted and destroyed (Zemede, 2001). The indigenous people of different localities in the countries have developed their own special knowledge of plant resources in some parts of Ethiopia, livestock diseases such as black leg, anthrax, ascaries, leeches, trpanosomiasis and stomatitis have been treated using various combinations of natural plant products. Humans may have tried plant remedies in animals before they used them for their own medical problems. Ethnoveterinary medicine comprises of traditional surgical techniques, traditional immunization, magico religious practice and

the use of herbal medicine to treat livestock diseases (Yibrah, 2014). Medicinal plants played a vital role in the treatment of various afflictions (distress) in Ethiopia (Fekadu, 2007).

2.3. Indigenous Knowledge on Medicinal Plants in Ethiopia

Indigenous knowledge is the accumulation of knowledge, rules, standards, skills and mental sets that are possessed by local people in particular area (Quanash, 1998).The immediate and intimate dependency of local people on natural resources in the accumulation of indigenous knowledge that helped people to adapt to and survive in the environment in which the live. It is local knowledge that is unique to a given culture or society and the base for agriculture, healthcare, food preparation, education, environmental conservation and host of other activities(Thomas, 1995).

The status of phytomedicine preparation of crude extracts and isolation of the active ingredients is very minimal. Moreover, the indigenous knowledge associated with the conservation of and use of medicinal plants is also disappearing at an alarming rate (Endashaw, 2007).

Indigenous knowledge on plant remedies in many countries including Ethiopia passes from one generation to the other verbally with great secrecy. Such secrete makes indigenous knowledge or ethno medicinal knowledge vulnerable to distortion and in most cases, some of the lore is lost at each point of transfer. Hence, there is a need for systematic documentation of such useful knowledge through ethno botanical researches. The distribution of knowledge and services of medicinal plant are hierarchically placed. Services are obtained from the family, neighborhood, and village or beyond. Furthermore, there is very little ethno botanical documentation on most medicinal species in Ethiopia (Gidey, 2010).

Similar to other forms of traditional knowledge, the ethno veterinary medicinal plant knowledge, is not well documented, in Ethiopia is passed verbally from generation to

generation and valuable information can be lost whenever a traditional medical practitioners passes without conveying this traditional medicinal plant knowledge, and the younger generation is not interested in living the traditional way of life (Yibrah, 2014).

2.4. Threats to Traditional Medicinal plants and Conservation in Ethiopia

Ethiopia's traditional medicine, as elsewhere in Africa, is facing a problem of sustainability (Ensermu et *al*., 1992). The primary causes of this problem are loss of medicinal plants species, loss of habitats of medicinal plants and loss of indigenous knowledge. Some studies have shown that most of the medicinal plants utilized by Ethiopian people are harvested from wild habitats (Mirutse, 1999). According to Zemede (2001), apart from their medicinal use, people use many wild species of plants for food, clothing, shelter, fuel, fiber, etc.

Threats to medicinal plants can be categorized into anthropogenic and natural causes. Human-induced extinction of species and habitat degradation are the order of the day. With rapid increase in population size anthropogenic threats through increased fuel consumption, urbanization, timber production, over harvesting, agricultural expansion etc will take place. Likewise, natural causes such as recurrent drought, bush fire, disease and pest outbreaks are threats to medicinal plants (Ensermu *et al.,* 1992). Intensive and unrestricted grazing, the presence of large number of livestock could also lead to serious decline of medicinal plants in particular and the entire vegetation as a whole in Ethiopia. Pressures from agricultural expansion, wide spread cutting for fuel wood combined with seasonal drought have been reported by Balemie *et al*. (2004), Lulekal *et al*. (2008) and Mesfin *et al*. (2009) as main factors for environmental degradation as well as the depletion of medicinal plants.

Among many medicinal plants in Ethiopia, about 26 species are endemic and they are becoming increasingly rare at the verge of extinction (Tesfaye and Sebsebe, 2009). However, the continued deforestation and environmental degradation of habitats in

many parts of the country has brought about depletion of medicinal plants and associated knowledge. Medicinal plants form the basis of traditional or indigenous health system used, in the estimate of world health organization, by the majority of the population of most developing countries. Training of practitioners and preservation of traditional ecological and medicinal knowledge lies at the core of futures prospects for ancient but challenge traditions (Bodeker, 2002).

The issue of conservation of medicinal plants in Ethiopia calls for aggressive studies and documentations before accelerated ecological and cultural transformation distort the physical entities and the associated knowledge base **(**Endashaw**,** 2007)

3. MATERIALS AND METHODS

3.1. Description of the Study Area

3.1.1. Location

The study was conducted in Sululta woreda, Oromia region special zone, Ethiopia. It is located between 9^{o} 10’ 60" N and 38^{o} 45’ E latitude and longitude, respectively. The altitude of the study area ranges between 1600 and 3340 meters above sea level. Its land mass coverage is about 465952 hectares and subdivided into 26 kebeles of which 3 are urban kebeles and the rest 23 are rural kebeles. Sululta woreda town, Chancho, is found at a distance of 40 km away from Addis Ababa to the North. The main occupation of the people is trading and farming. Ethnically, the majority of the residents are Oromo people and the major language spoken in the area is Afan Oromo(Figure 1).

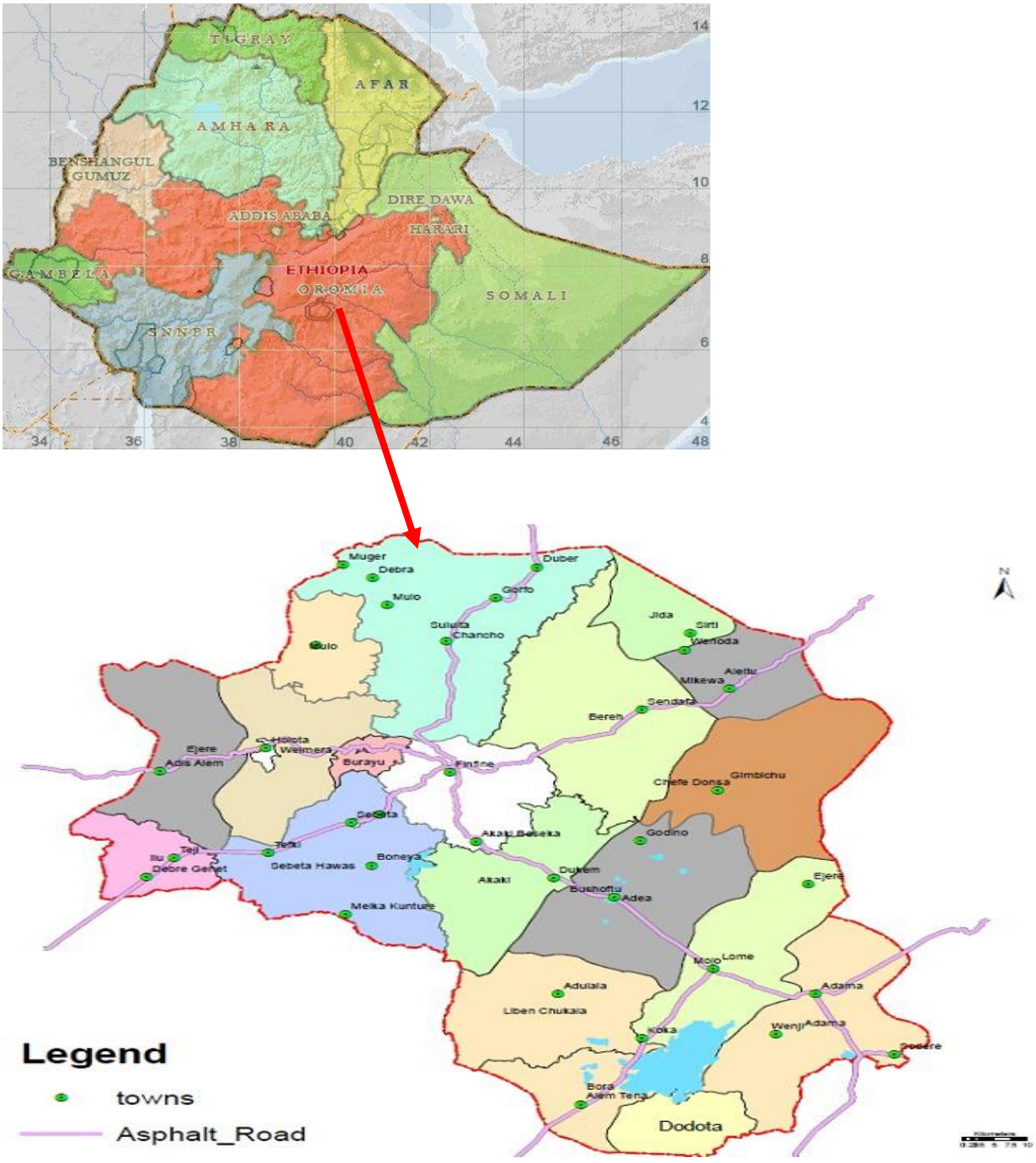

Figure 1. Map of the study area, Sululta Woreda.

3.1.2. Climatic Condition

According to its climatic condition Sululta woreda is subdivided into three agro ecological zones known as highland (Badda, in local language) covering 71% of the area, mid-altitude (Badda Daree, in local language) that covers 23.4% of the area and lowland (Gammojjii, in local language) that covers about 5.6% of the area. The Environmental temperature of the area varies from lower temperature of 4.4^0c to higher temperature of 22.5^0c. The area receives higher rainfall between July and August with annual average of 1440.5 mm/annum as well as moderate amount of rain fall from March to June. The maximum and minimum rainfalls are 1447 and 834 mm/annum, respectively. The dry season extends from October to February and to some extent to March. (Sululta woreda Agricultural Office, 2016).

3.1.3. Soil Type and Structure

The areas are characterized by the presence of various soil types including Vertisoil (0.5%), nitsoil (24%, luvi soil (49%) and others (26.5%). There are also different soil structures found in the area including silt soil (35%) clay soil (12) and sand soil (53%) (Sululta woreda Agricultural Office, 2016).

3.1.4. Vegetation and Major Crop Cultivation

The Vegetation types in the study area consist of different grasses, herbs, shrubs and trees. Some common plant species in these areas include *Acacia* species , *Eucalyptus* species, *Podocarpus falcatus*, *Juniperus procera*, *Cordia africana* and etc. Most of the plants are found in and around protected areas, church compounds, for example. The other areas are highly degraded due to urbanization and high demand of wood for construction, fire wood and charcoal. Especially, *Eucalyptus* species are cut and highly used for construction and other purposes. Some commonly cultivated crop plants in the study area include *Teff (Eragrotis teff)* 13%, Bean (*Vicia faba)* 6.5%, pea (*Pisum sativum)* 4%, Sorghum *bicolor* (6%), wheat (*Triticum Species)* 25%, Barley

(*Hordeum vulgare)* (33%), and others (12.5%) (Sululta woreda Agricultural Office, 2016).

3.1.5. Livestock

According to Sululta woreda natural resources and livestock health care Agency (2016) the woreda possesses a total livestock population of 210211 cattle, 16491goats, 80900 sheep, 75936 hens, 11409 horses, 20302 donkeys and 1151 mules.

3.1.6. Land use and Land cover

In the study area, land, which is about 465952 hectares, is used for different purposes

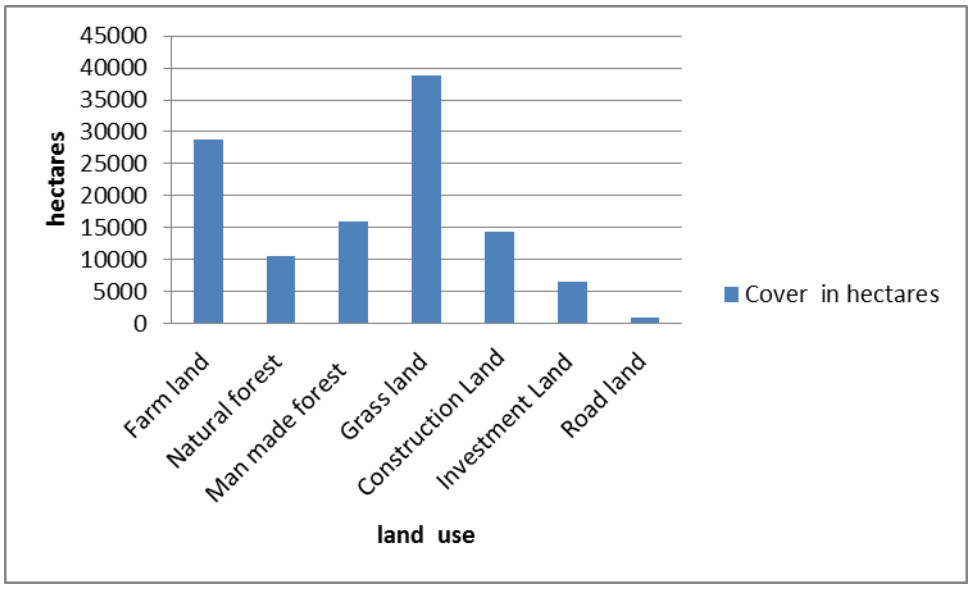

Figure 2. Land use and land cover (Sululta Woreda Agricultural Office, 2016

3.1.7. Population and Health problems

According to the 2013 national census, the population size of Sululta woreda is estimated to be129322 of which 64597 are males and 64725 are females. The major Health problems of the area are infectious diseases, headache and toothache (Sululta Woreda Health office, 2016).

3.2. Reconnaissance Survey and Ethnobotanical Data Collection

Reconnaissance survey was made to three purposively select kebeles of the woreda that have clear altitudinal variation and traditional medicine use history. For ethno botanical data collection, a totally of 100 respondents (aged ≥25) were selected from the Woreda and participated in the study. Of which 80 were ordinary residents (non-traditional medicine practitioners) that were randomly selected but all available 20 (14 male and 6 females) traditional medicine practitioners (key informants) were purposively selected based on the information obtained from the local people. Data were collected between August and September 2016. Data Collection methods were through semi-structured interviews, group discussions and guided field walks with key informants for field observations. Respondents were first interviewed individually to mention about the local names of the plants they use to treat diseases, diseases treated, part(s) of plants used, and growth habits, methods of preparation and route of application of the remedies as well as dosage. Further group discussions were made with key informants on the entire mentioned medicinal plants and field visit was made with them for onsite observation of the plants. Voucher specimens were collected, pressed and dried for identification. For some species, preliminary identification was done in the field using Taxonomic keys and illustrations (picture). In addition, further identification of all specimens were done by comparison with authentic specimens, illustrations and Taxonomic keys from flora of Ethiopia and Eritrea and with the help of experts for confirmations. The identified specimens were deposited in Haramaya University Herbarium.

3. 3. Data Analysis

A descriptive statistical method (e.g., percentage and/or frequency) was employed to summarize ethnobotanical data on the reported medicinal plants and associated indigenous knowledge.

3. 3. 1. Informant Consensus Factor (ICF)

Informant Consensus Factor (ICF) was calculated for categories of diseases to identify the agreements of the informants on the reported cures using the formula used by Tilahun and Giday (2007).

$$ICF = \frac{Nuc - Ns}{Nuc - 1}$$

Where, Nuc is the number of use citations in each illness category and Ns is the total number of species used by all informants for this illness category. The ICF values range from 0 to 1, with high values (i.e. close to 1) indicating that relatively few plants were used by a large proportion of informants, while low values (< 0.5) indicate that informants do not agree on the plant species to be used to treat a category of diseases.

3. 3. 2. Fidelity level index (FL)

Fidelity Level index (FL) was calculated using the following formula indicated in Alexiades (1996) as follows.

$$\mathbf{FL\ (\%) = \frac{IP}{IU} \times 100}$$

Where, IP is the number of informants independently suggested the use of a species to treat a particular disease category and IU is the total number of informants mentioned the plant for any major disease. FL was used to quantify the importance of a given species for a particular purpose in a given cultural group.

4. RESULTS AND DISCUSSION

4.1. Diversity and Distribution of Medicinal Plants in the Study Area

In this study, a total of 34 different medicinal plant species distributed in 29 genera and 20 families were recorded and reported to treat 32 different health problems in the study area (Appendix 3). Out of the 34 collected medicinal plants of the study area, 25 species (73.52%) were used to treat human diseases, 6 species (17.64%) for livestock diseases and the remaining 3 species (8.82%) were used to treat both human and livestock diseases. This indicated that high numbers of medicinal plants were used to treat human diseases as compared to live stock diseases. Family Euphorbiaceae with 4 species was the dominant family followed by Asteraceae, Rutaceae, Poaceae, Cucurbitaceae, Rosaceae, Myrtaceae, Solanaceae and Lamiaceae each with two species, whereas, Boraginaceae, Alliaceae and the rest of the families contained one species each. This study suggested that family Euphorbiaceae is the most dominant family in terms of the number of genera and species in the study area. This dominance of Euphorbiaceae family is comparable with studies conducted on ethnomedicinal plant knowledge and practice of the Oromo ethnic group in southwestern Ethiopia by Yineger *et al*. (2008). Moreover, the diversity of this medicinal plant species in the study area is also comparable to Gedeo people, an ethnic group in Southern Ethiopia (Mesfin *et al*., 2009).

The use of indigenous knowledge and practice on medicinal plants by people of Sululta Woreda indicates that the indigenous people of the area still depend on plant originated traditional medicines in spite of its proximity to the capital city of the country. According to Fassil (2001) about 75-90% of the rural populations in the world except the western countries were depended on traditional medicine as their only health care system.

4. 2. Habit, Part used and Preparation Methods of Medicinal Plants

4.2.1.Habit of Medicinal Plants

Of the total 34 medicinal plants collected from the study area, 15 (44.11%) were herbaceous species followed by trees 12 (35.29%), shrubs 7(20.5%) and climbers 1(2.9%) species . This study showed that herbaceous species were the most distributed and used medicinal plants. Most previous studies also reported that herbaceous species were the most distributed and used medicinal plants (e.g., Debela, Zemede and Ensermu, 2004).

4.2.2. Preparation Methods of Medicinal Plants

The result of this study indicated that people of the study area use various plant parts for the preparation of traditional medicine. Leaves were the most used plant parts in remedy preparation followed by root, seed and fruit respectively . This agrees with some previous studies conducted at different parts of Ethiopia (e.g., Dawit 1991, Mirutse, 1999, Bayafers 2000; Endelew, 2007). Though the use of leaf appears to be less damaging, herbal preparation that involves roots, rhizomes, bulbs, stem, or whole plant parts have negative effect on the survival of mother plants (Dawita and Ahadu, 1993).

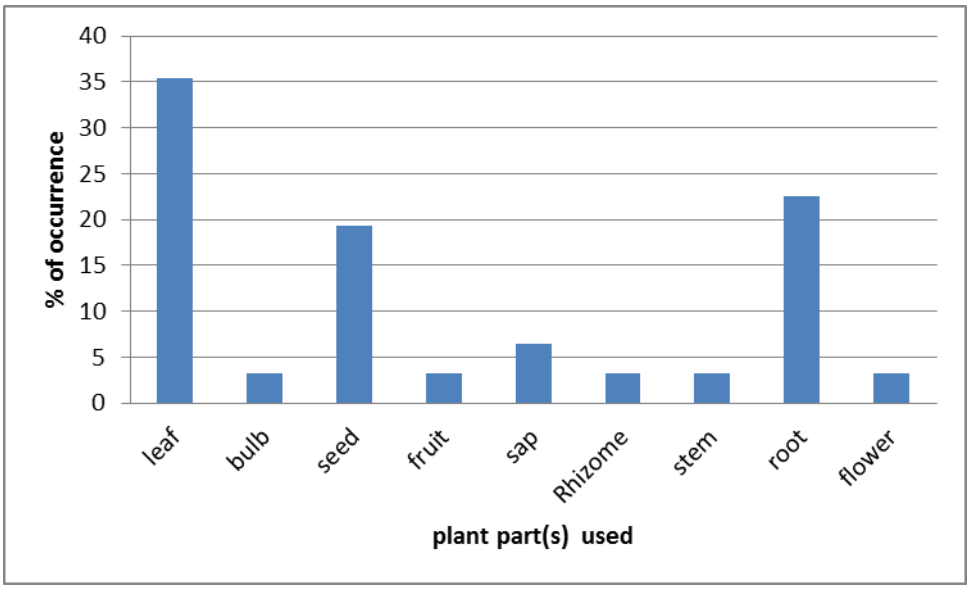

Figure 3. Plants part(s) used in the preparation of traditional herbal medicine in the study area.

4.2.3. Methods of remedies preparation in the study area

Crushing (24.13%) was the dominant mode of preparation of remedies followed by powdering (20.68%). In the majority of preparations (64.5%) ingredients such as coffee, lemon juice, tea, honey, butter or *Tella* are included to facilitate the curing potential. Such additives were also reported by some previous researchers (e.g. Dawit, 1986; Mirutse, 1999 and Bayafers, 2000).

4.3. Dosage and Route of Administration

In this study, there was no agreement in measurement or unit used by informants. Most informants reported that cup, spoon, drops, and hands are used as measuring units to determine dosage. According to respondents, the dosage of medicine to be administered is provided through estimation of age and physical condition of the patient with less precision. The lack of precision in dosage is the major drawback of practicing traditional remedy (Dawit and Ahadu, 1993).

There were two major routes of administration in which medicines are applied. These were internal and external application. Internal application involves through oral, whereas external application involves dermal. This result showed that oral administration was the most dominant route of administration than dermal administration. This agrees with some previous studies reported by different researchers in which oral administration was the most dominant route of administration than dermal administration (e.g., Dawit, 1986; Bayafers, 2000; Kebu *et al*., 2004).

4.4. Fidelity level and Informant Consensus Factor (ICF)

Fidelity Level (FL) values were calculated for some commonly used medicinal plants against some commonly reported diseases: *Ocimum lamiifolium* (against headache and Mich), *Hagenia abyssinica* (against tape worm), *Croton macrostachyus* (against ring worm and wound) and *Cordia africana* (against spider poison) (Table 2). The medicinal plants that are widely used by the local people to treat one or very few diseases will have higher FL values than those that are less popular (Tilahun and Mirutse, 2007). For example, *Hagenia abyssinica* was reported by five informants to treat Tape worm and hence had 100% Fidelity Level. This 100% of Fidelity Level of the plant is an indication of high efficiency of the reported plant to cure specific diseases.

Table 2. Fidelity level of commonly reported medicinal plants

Scientific Name of Medicinal plants	Major diseases treated	**IP**	**IU**	**FL**	**FL%**
Hagenia abyssinica	Tape worm	**5**	**5**	**1**	**100**
Ocimum lamiifolium	Headache and "*Mich"*	**20**	**22**	**0.90**	**90**
Croton macrostachyus	Ringworm and Wound	**26**	**30**	**0.86**	**86**
Cardia africana	Spider poison	**15**	**20**	**0.75**	**75**

In this study, based on information obtained from the local informants, all the human diseases reported were grouped in to 7 categories (Table 3). Digestive system problem (such as Vomiting, Hemorrhoids, Stomachache, Ascaries, Abdominal pain and Tape worm) had high ICF value followed by Respiratory system problem (such as Asthma, TB, Tonsillitis, Cough and Common cold), Urino-gential problem (Gonorrhea, Placental retention and Urine retention), Sensorial problem (such as Ring worm, Scabies, Dandruff) Pain problem (such as Headache), Poison problem (such as Snake bite and Spider bite) and Hormonal problem (Goitre) respectively (Appendix Table 3). This study shows that ICF value range from 0.57 for Hormonal problems to 0.97 for Digestive system problem. Thus, all categories had ICF value greater than 0.5 indicated that all informants agree on the plant species used in treating categories of diseases (Appendix 2). Some previous studies show that effective medicinal plants have high ICF value (value closest to 1) in treating a certain disease while a low value (value closest to 0) shows that informants disagree on the plants used in the treatment of a given diseases (e.g., Tilahun and Mirutse, 2007).

Table 3. Informant Consensus Factor (ICF)

Disease/Problem categories	N_s	N_{uc}	ICF
Digestive system problem	3	68	0.97
Respiratory system problem	4	56	0.94
Sensorial problem	14	70	0.81
Pain problem	9	14	0.64
Urino-gential problem	3	6	0.6
Poison problem	6	13	0.58
Hormonal problem	4	8	0.57

4.5. Demographic Characteristics of the Respondents

Several factors such as sex, educational status, religious, family size, and age groups were tested in relation to the use of knowledge in traditional medicinal plants(Appendix 1). The percentage of males within the Respondent population was 54% while the female percentage was 46%. A total of 100 informants/ participants were grouped in to three groups based on gender and age as young 25≤39 age (males 37 % and females 26%), Adults 40≤65 age (males 14% and females 20%) and elders ≤ 66 age (males 3% and females 0%). Among those age and gender categories of the respondents, the highest use of Traditional medicinal plants was between the age of 25 and 39 years of old, 63% (Appendix 1). This is probable due to low income in this categories of population or low cost of medicinal plants that were well known by local people near to them but far from modern medicinal services. Moreover, study area was also influenced the number of medicinal plants known and used. In these study informants with family size 1-5 were 78 (0.78%), 6≤ were 15 (0.15%) and no family sizes were 7% (0.07). This is again may be due to they had the knowledge of family planning. The

religious of most of the participants were Christian (0.95 %) and Muslims (0.05 %). This is due to the majority of the inhabitant populations were Christian.

The highest use of Traditional medicinal plants was uneducated (illiterate) male and female groups of the population 58%, (Appendix 1). This indicated that there is no relationship between the use of traditional medicinal plants and education. Between those who use Traditional medicinal plants, the percentage of male and female who achieved the educational levels at primary school was 12% and those who educated up to secondary school was 16%. The use of indigenous medicinal plant knowledge is independent of age means no relationship between age and use of traditional medicinal plants (Yineger *et al*., 2008)

4.6. Threats to Medicinal Plants and Conservation

The major threats to medicinal plants as reported were human in origin including fire wood collection, urbanization, agricultural expansion and construction. As reported by most informants the most threatened species was Eucalyptus species followed by *Acacia abyssinica* mainly for fire wood collection. Construction is the most threats to medicinal plants followed by urbanization. The resident local people of the study area give a little attention for conservation (management and sustainable use) of medicinal plants when compared to few knowledgeable people. This is due to lack of knowledge and awareness about conservation. Those knowledgeable people that access to modern health system were also ignored by many people as reported in the study. This due to the people prefer their update choice or lack of dosage in their medicine. The effort of conservation is also very low in the area as a whole. Therefore; more attention should be given to conservation in the area

5. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1. Summary

Ethiopia has varieties of plant species for various uses including medicine. Literature review showed that various types of ethnobotanical studies and documentations were conducted in different parts of Ethiopia on medicinal plants. The local people of sululta woreda had their own indigenous knowledge on the use of medicinal plants. However, no ethnobotanical investigation and documentation were carried out on medicinal plants of Sululta woreda in particular. In this study a total of 34 different medicinal plant species that were distributed in 29 genera and 20 families were collected, identified and recorded. These plants were reported to treat 32 different health problems in the study area. Ethnobotanical data were collected through semi-structured interview, guided field walk observation and group discussion between August and September 2016. A total of 100 respondents (age $\geq$25) were purposively and randomly selected. The collected quantitative data were analyzed using Descriptive statistics (e.g., percentage and/or frequency). The results of the studies were presented in the form of tables and figures. Humans were the major threats to medicinal plants. The result of this sudy showed that oral administration was the most dominant route of administration than dermal administration.

People of the study area used various plant parts and methods for the preparation of traditional medicine. Leaves were the most used plant parts in remedy preparation followed by root, seed and fruit respectively. Disease categories like digestive system disease had higher ICF values showing high incidence of these disease in the study area and agreement of people on their remedies (Table 3). The knowledge of medicinal plants was largely transmitted orally. This causes the use of indigenous knowledge on medicinal plants to decline from generation to generation.

5.2. Conclusions

Although, no ethnobotanical studies and documentations of medicinal plants were conducted in Sululta Woreda in particular.The local people of Sululta woreda had their own indigenous knowledge on the use of medicinal plants. Medicinal plants had also different threats, therefore, the issues of conservation should be introduced in to the area through giving awareness for Local people about sustainable use, management of plant resources and modern electric power usage. Special attention should be given to the most important and threatened medicinal plants. E.g., *Hagenia abyssinica* (against tape worm) were the most threatened and also the most preferred and popular with highest fidelity level (FL) values, an indication of their high healing potential in the area.

The Indigenous knowledge of people on medicinal plants should be changed in to formal education before it is completely lost from the area. It should be also consolidated through education and training. Further studies should also be conducted on the reported medicinal plant species of the Sululta Woreda to consolidate their documentation, usage and management of indigenous knowledge of people for future generation. In conclusion, Medicinal plants should be conserved, preserved and documented in the study area.

5.3. Recommendations

From the result of the study, the following recommendations were forwarded:

- The local people need to be trained, on sustainable use and management of the medicinal plants in their area;
- Attention and education should be provided to both the traditional healers and other members of the local community by training on the quality of medicinal plants.

6. REFERENCES

Abebe D, Urga K. 2004. A survey of traditional medicine in Shirka District, Arsi Zone, Ethiopia. *Ethiopia pharmacy journal*, 19:0–47.

Addis G, Abebe D, Genebo T, and Urge K. 2002. Perceptions and practices Modern of and traditional Health practitioners about traditional medicine in Shirka district Arisi Zone.*Ethiopia Journal Health Development,*16:19-29, Google Scholar.

Alexiades, M. 1996. In Selected Guideline for ethnobotanical research: A Field Manual Alexiades M, editor. U.S.A. Sheldon JW: The New York Botanical Garden.

Amare Getahun. 1976. *Some common medicinal plants and poisonous plants used in Folk medicine*. Addis Ababa University, pp.3-63.

Balick, M. J. and Cox, P. A. 1997. Ethnobotanical research and Traditional Health Care in Developing Countires.In: Bodeker, G. and Vantomme, (P. eds.), *Medicinal Plant For forest Conservation and Health Care*. FAO, Rome. Non-Wood Forest Products no.11.

Bayafers Tamene. 2000. A Floristic Analysis and Ethnobotanical Study of the Semi- Wet Land of Cheffa Area, South Welo, Ethiopia, M.SC.Thesis, AAU.PP.139.

Bishaw M. 1991. Promoting Traditional Medicine in Ethiopia. A brief Historical Review of Government policy .Social Science and Medicine.33(3):193-200.

Bodeker, G. 2002. *Medicinal plants towards sustainability and security*.Green College, Oxford, UK.

Cotton, C. M. 1996. *Ethnobotany: principles and Applications*. John Willey and Sons LTD. Hechester, UK, 424.

Cox, A. P, Balick, J. M. 1996. Ethnobotanical Research and traditional Health Care in Countries, plants, people and culture. W.H. Freeman and Co;

Cunningham, A. 2001. Applied Ethnobotany: People, Wild Plant Use and Conservation. *UK. Devevlopmental Science: Earth scan, London.*

Dawit Abebe. 1986. Traditional medicine in Ethiopia: The Attempts being made to promote it for Effective and better Utilization. *SINET: Ethiopian Journal of Science,*9: 62- 69.

Dawit Abebe and Ahadu Ayehu 1993. Medicinal plants and Enigmatic Health practice of North Ethiopia Berhanina selam printing enterprise, Addis Ababa, 341.

Dawit Abebe (2001*). Plants as primary sources of drugs in the traditional health care Practices of Ethiopia,* plant genetic resources Ethiopia 6, 101-113.

Dawit Abebe. 2001. The role of medicinal plants in Health care coverage of Ethiopia, Benefits of Integration, Institute of Biodiversity Conservation and Research, Addis Ababa, 6-21.

Debela Hundie. 2001. Use and Management of traditional medicinal plants by The possible Indigenous people in Boosat, welenchiti Area. M.Sc. Thesis, AAU.

Debela Hunde, Zemede Asfaw and Ensermu Kelbessa. 2004. Use and Management of ethno Veterinary Medicinal plants of indigenous people in boosat, welenchiti Area, *Ethiopia .Journal of Biological science, 3:113-132.*

Endashaw Bekele. 2007. Study on actual situation of medicinal plants in Ethiopia. Prepare for International collaboration of agriculture and forestry, 'http://www.endashaw . Com.pdf accessed on 4/05/2009.

Endalew. 2007. Use and Management of Medicinal Plants by indigenous People ofEjaji Area (Chelya Wereda) West Shewa, Ethiopia: An Ethnobotanical Approach M.Sc. Thesis. Addis Ababa, Ethiopia.

Ensermu Kelbessa, Sebsebe Demissew, Zerihun Woldu and Edwards, S. 199 Threatened Endemic Plants of Ethiopia.In**:** Edwards, S. and Zemede Asfaw (eds.)*Plants used in African traditional medicine as practiced in Ethiopia and Uganda* 35-55 Botany 2000: NAPREC, Monograph Series No**.**2. Addis Ababa University,Ethiopia.

Ermias Lulekal. 2005. Ethno botanical Study of Medicinal Plants and Floristic Composition of Manna Angatu Moist Montane Forest, Bale. M.Sc. Thesis. Addis Ababa, Ethiopia.

Ermias Lulekal, Ensermu Kelbessa, and Haile Yineger. 2008. A ethnobotanical Study of medicinal plants in Mana Angetu Wereda, south eastern Ethiopia. *Journal of Ethnobiology and Ethnomedicine,* 4: 10.

Etana Tolasa. 2007. Use and Conservation of Traditional Medicinal Plants by Indigenous People in Gimbi Wereda, Western Wellega. M.Sc. Thesis. Addis Ababa, Ethiopia.

Fekadu Fullas. 2007. The Role of indigenous Medicinal plants in Ethiopia Health care, African Renaissance. London, UK.

Fassils Kibebew. 2001. The status and availability of data of oral and written knowledge on Traditional health care in Ethiopia. A base study. In conservation and Sustainable use of medicinal plants in Ethiopia, IBCR.

Fisseha Mesfin .2007. An Ethnobotanical Study of medicinal Plants in Wonago Woreda,

SNNPR, Ethiopia. M.Sc.Thesis. Addis Ababa University, Ethiopia.

Friedman, J., Yaniu, Z., Dafni, A., and Palewitch, D. (1986). A Preliminary Classification of the Haling Potential of Medicinal Plants, Based on the Rational Analysis of an Ethnopharmacolgical Survey among Bedouins in Negue Desert,Israel.*Journal of Ethnophamacology*, 16:275-287.

Giday, M. 2001. An ethnobotanical study of medicinal plants used by the Zay people in Ethiopia. CBM, 3: 81-99 Google Scholar.Govaerts R.

Gidey Yirga. 2009 .Use of traditional medicinal plants by indigenous people .Thesis, Mekele University, 17, 1799-1804.

Gidey Yirga. 2010. Assessment of Indigenous Knowledge of Medicinal plants in Central Zone of Tigray, Northern Ethiopia.*African Journal of Plant Science.*4:6-11
.

Haile Yineger. 2005. A study of Ethnobotany of medicinal plants and Floristic Composition of the Dry Afromantane Forest at Bale Mountains National park MSc. Thesis Addis Ababa Ethiopia.

Haile Yineger, Ensermu Kelbessa, Tamrat Bekele and Ermias Lulekal. 2008. Plants Used inTraditional Management of Human Ailments at Bale Mountain National Park Southeastern Ethiopia. *Journal of Medicinal Plant Research*, 2**:**132-153.

Hill, A. F. 1989. *Economic Botany*. TATA McGraw- Hill Publishing Company Ltd, New Delhi. Pp. 560.

Iwu, M.M. 1993. *Hand book of African Traditional Medicinal Plants*. Roca Raton Ann Arbor.CRC Press, London 43pp.

Jain, S. K. 1986. *Ethnobotany. Natrona Botanical research Institute*, Lucknow, India. *Interdisciplinary Science Reviews* 11:285-292.

Jansen, P.C.M. 1981. *Species, Condiments and Medicinal Plants in Ethiopia, their Taxonomy and Agricultural Significance.* Centeral for Agricultural Publishing and Documentation, Wageningen, Netherlands, pp. 327.

Kebu Balemie, Ensermu Kelbesa and Zemede Asfaw. 2004. Indigenous medicinal plant Utilization, management and threats in Fentale area, Eastern Shewa,Ethiopia. *Ethiopian Journal of Biological Sciences,* 3: 37 – 58.

Lulekal, E., E. Kelbessa, T. Bekele & H. Yineger. 2008. An ethnobotanical study of Medicinal plants in Mana Angetu District, southeastern Ethiopia. *Journal of Ethnobiology and Ethno medicine,* 4:10. 10.1186/1746-4269- 4-10.

Martin, G.J. 1995. *Ethno botany: A method manual. Chapman and Hall, London, 347 pp.*

Mesfin Tadesse. 1986. Some Medicinal plants of central shewa and South Western *Ethiopia. SINET: Ethiopia Journal of Science,* 9: 19-86.

Mesfin, F. 2009. An Ethno botanical study of medicinal plants inWanago Woreda, SNNPR, Ethiopia.M.Sc Thesis, Addis Ababa University, Addis Ababa, Ethiopia.

Mirutse and Gobena. 2003. An Ethno botanical survey on plants of veterinary importance in two Districts of Southern Tigray, Northern Ethiopia. *SINET: Ethiopia Journal of Science,* 26: 123-136.

Pankhurst, R. 1990. An Introduction to the Medical History of Ethiopia. The Red Sea Press

Inc.New Jersey,USA.

Pankhurst, R. (2001) The Status and Availability of Oral and Written Knowledge on Tradi tional Health Care. In: Medhin, Z. and Abebe, D., Eds., Conservation and Sustainable Use of Medicinal Plants in Ethiopia. Proceedings of the National Workshop on Biodiversity Conservation and Sustainable Use of Medicinal Plant Ethiopia, IBCR, Addis Ababa, 92-106.

Sebsebe Demissew and Ermias Dagne. 2000. Basic and applied research on medicinal Plants of Ethiopia. In *Conservation and Sustainable Use of Medicinal Plants in Ethiopia, Proceeding of the National Work Shop on Biodiversity and Sustainable use of Medicinal Plants In Ethiopia, 28 April-01 May 1998. pp. 29-33.*

Quanash. 1998. Bicultural diversity an integrated healthcare in Madascar. *Nature an Resources,* 30:18-22.

Teferi Flatie, Teferi Gedif, Kaleab Asres and Tsige Gebre-mariam. 2009. Ethnomedicinal Survey of Bertha ethnic group Asossa Zone, Benishangul-Gumuz regional state, Mid-West Ethiopia. *Journal of Ethnobiology and Ethnomedicine,* **5:**14.

Tesfaye Awas and Zemede Asfaw. 1999. Report on Ethnobotanical study of traditional medicine of Nations of Nationalities and People in Gambella and Benishangul Gumuz Regional States. Progressive Report to Research and Publication office, Addis Ababa University,Addis Ababa.

Tesfaye Awas and Sebsebe Demissew. 2009. Ethno botanical study of medicinal plants in Kafficho People, South Western Ethiopia, in preceding of the 16 the International Conference of Ethiopian studies, Herald Aspen,Birhanu Teferra and Shiferaw Bekele, Trondheim, 711-726.

Tesfaye Hailemariam, Sebsibe Demissew and Zemede Asfaw. 2009. An ethno botanical Study of medicinal plants used by local people in the lowlands of Konta special Wereda, Southern Nations, Nationalities and People Regional State, Ethiopia. *Journal of Ethnobiology and Ethnomedicine,* 6**:**25.

Temene. 2002. Floristic analysis and Ethno banical study of the semi wetland of Cheffa area South Welo., Ethiopia.M.Sc .Thesis: Addis Ababa University, Biology Department Google scholar.

Thomas, H. 1995. Indigenous Knowledge, Emancipation and Alienation. *Journal of Knowledge Transfer and Utilization, 8:63*-73.

Tilahun Teklehaymanot and Mirutse Giday. 2007. Ethnobotanical study of medicinal plants Used by people in Zegie Peninsula, North western Ethiopia. *Journal of Ethnobiology and Ethnomedicine,* 3**:**1-12.

Tizazu Gebre. 2005. An Ethnobotanical Study of Medicinal Plants in Konso Special District, Southern Nations, and Nationalities and Peoples Regional State, Ethiopia. M.sc. Thesis. Addis Ababa University.

Iwu, M. M. 1993. Hand book of African medicinal plants. Boca Raton: CRC Press.

WHO. 1998. *Regulatory situation of herbal medicines:* A World Wide Review, pp.1-9.WHO/TRM/98.1.Geneva.

WHO. 2000. Development of National Policy on Traditional Medicinal Report of the Workshop on Development of National policy on Traditional Medicine, 11-15, October 1999, Beijing China.

WHO. 2001. Legal status of traditional medicine and complementary /Alternative Medicine: widereview.World Health Organization,Geneva,189 -*329, 1156-1159, 10.1136/bmj.329, 7475, 1156,* View Article Google Scholar.

Yibrah Tekle. 2014. An Ethno veterinary Botanical Survey of Medicinal Plants in Koncho District of Gedo Zone, Southern Nation, Nationalities and People Regional State of Ethiopia: Vol.13.

Yineger, H. 2008. Ethnomedicinal plant knowledge and practice of the Oromo ethnic group in southwestern Ethiopia. *Journal of Ethnobiology and Ethnomedicine,* 4:11.

Zemede Asfaw. 2001. The Role of Home Garden in Production and Conservation of Medicinal Plants. In (Medhin Zewdu and Abebe Demissie eds). *Conservation and Sustainable use of Medicinal Plants in Ethiopia.* Proceeding of the National Workshop on Biodiversity Conservation and Sustainable use of Medicinal Plant in Ethiopia, April 28-01May, 1998, pp. 76-91.

7. APPENDICES

Appendix 1. Growth habit of *Aloe Vera* plants

Figure 2. Collection of Endod plants sample picture by key informant .

Appendix 1. Demographic characteristics of the respondents

o	Name	Sex	Age	Religious	Educational status	Family size	No of medicinal plants reported
1	Fekedu Bulbula	M	39	Orthodox	Elementary	3	2
2	Tike Hordofa	F	54	Orthodox	Uneducated	6	13
3	Bekela Hailu	M	37	Orthodox	Elementary	2	3
4	Girma Hundie	M	58	Orthodox	Elementary	9	5
5	Kule Ababa	F	47	Orthodox	Uneducated	6	6
6	Lelise Mitiku	F	49	Orthodox	Uneducated	7	5
7	Getse Dagaf	F	36	Orthodox	Uneducated	1	2
8	Denke Kumsa	F	54	Orthodox	Uneducated	5	9
9	Nugusu Alemu	M	56	Orthodox	Uneducated	6	11
10	Tefare Bayene	M	38	Orthodox	High school	3	2
11	Dereje Teseme	M	35	Orthodox	Uneducated	3	7
12	Addis Girma	M	35	Orthodox	Uneducated	2	1
13	Obese Gutama	F	63	Orthodox	Uneducated	5	6
14	Asefa Chengere	M	74	Orthodox	Uneducated	4	
15	Birhenu Adugne	M	54	Orthodox	Religious	8	6
17	Fekedu Tesame	M	38	Orthodox	Uneducated	2	1
18	Menigistu Girma	M	29	Orthodox	Elementary	0	2
19	Ayenalem Hailu	F	38	Orthodox	Elementary	3	0
20	Asseret Assefew	M	38	Orthodox	Degree	2	1
21	Temesgu Assefew	M	30	Orthodox	Uneducated	0	0
22	Suyume Guluma	M	38	Orthodox	Uneducated	3	1
23	Ahmed Shukure	M	38	Muslim	High school	2	0
24	AbduMohammed	M	38	Muslim	Uneducated	3	1

Appendix 1. Continued

25	Birhenu Mesfin	M	38	Orthodox	Diploma	3	1
26	Emabet Girma	F	26	Orthodox	Elementary	1	0
27	Dereje Gutema	M	38	Orthodox	Religious	2	0
28	Emabet Bekele	F	38	Orthodox	Uneducated	1	1
29	Asserat Birhenu	M	29	Orthodox	Diploma	1	1
30	Chala Metiku	M	27	Orthodox	High school	0	1
31	Tefere Bayen	M	38	Orthodox	High school	3	2
32	Gedisssa Girma	M	37	Orthodox	Elementary	0	1
33	Feyisse Birhenu	F	36	Orthodox	High school	2	0
34	Suyoume Guluma	M	38	Orthodox	Uneducated	2	1
35	Bekela Assefew	M	33	Orthodox	Degree	1	1
36	Ayelew Hundie	F	45	Orthodox	Uneducated	3	4
37	Metiku Belachew	M	36	Orthodox	Diploma	1	3
38	Ayantu Ali	F	29	Muslim	Diploma	2	0
39	Chule Fekadu	F	29	Orthodox	High school	2	0
40	Nugusu kebeda	M	51	Orthodox	Uneducated	6	8
41	Gutema Gurumesa	M	78	Orthodox	Uneducated	5	5
42	Shitu lome	F	47	Orthodox	Uneducated	6	4
43	Nigatu Changare	M	86	Orthodox	Uneducated	4	5
44	Shewaye Mosisa	F	29	Protestant	Diploma	3	0
45	Meseret Girma	F	26	Orthodox	High school	1	0
46	Ababa Tola	M	48	Orthodox	Uneducated	6	2
47	Fekedu Tola	M	47	Orthodox	Uneducated	5	4
48	Derbe Ababa	F	27	Orthodox	High school	2	0
49	Birhenu Demito	M	35	Orthodox	Uneducated	1	4
50	Askala Megersa	F	64	Orthodox	Uneducated	5	6
51	Fanoshe Abera	F	37	Protestant	Elementary	3	1

Appendix 1. Continued

52	Gulume Worku	F	36	Orthodox	Diploma	1	0
53	Emabet Bekela	F	32	Orthodox	Uneducated	4	1
54	Mulu Assefa	F	31	Orthodox	High school	3	1
55	Mune Assefa	F	33	Orthodox	Uneducated	1	0
56	Deraje Tesema	M	35	Orthodox	Uneducated	2	0
57	Eshetu Negatu	M	39	Orthodox	Uneducated	0	3
58	Tagnu Bekela	M	38	Orthodox	Uneducated	3	3
59	Bureketu Feyyissa	F	48	Orthodox	Uneducated	9	1
60	Buzune Tola	F	38	Orthodox	Uneducated	3	1
61	Dajane Simee	M	41	Orthodox	High school	4	1
61	Beshadu Fayyissa	F	52	Orthodox	Uneducated	5	2
62	Teddassa Tesema	M	25	Orthodox	Uneducated	1	0
63	Zenu Assafa	F	35	Orthodox	Uneducated	1	2
64	Birhane Gaddisa	F	37	Orthodox	Uneducated	2	0
65	Yeshi Bekela	F	38	Orthodox	Uneducated	4	2
66	Shashitu Soboka	F	31	Orthodox	Uneducated	4	0
67	Burtukan Assafa	F	35	Orthodox	Diploma	3	0
68	Worketu Dagaf	F	39	Orthodox	Uneducated	2	1
69	Metiku Alemu	M	56	Orthodox	Elementary	7	3
70	Alemitu Belecha	F	41	Orthodox	High school	1	3
71	Alamayo Eshetu	M	42	Orthodox	Uneducated	4	1
72	Mulu Tola	F	53	Orthodox	Uneducated	6	4
73	Addis Metafera	M	41	Orthodox	High school	5	1
74	Wude Ararsa	F	51	Orthodox	Uneducated	5	1
75	Demitu Tola	F	56	Orthodox	Uneducated	4	2
76	Birhenu Girma	M	45	Orthodox	Elementary	4	3
77	Worke Hundie	F	54	Orthodox	Uneducated	5	4
78	Dejane Eshetu	M	39	Orthodox	Uneducated	2	3
79	Erba Hundie	F	52	Orthodox	Uneducated	3	3

Appendix 1. Continued

80	Kasaye Alemu	M	38	Orthodox	Diploma	0	3
81	Workitu Tesema	F	39	Orthodox	Uneducated	1	6
82	Ababu Nugusu	F	37	Orthodox	Uneducated	3	2
83	Tadessa Tasema	M	27	Orthodox	Uneducated	0	0
84	Sissay Birhenu	M	39	Orthodox	High school	3	0
85	Alemitu Birhanu	F	43	Orthodox	Uneducated	7	4
86	Nadhe Alemu	F	54	Orthodox	Uneducated	5	3
87	Ayash Mahommed	F	34	Muslim	Uneducated	2	1
88	Kadir Ali	M	43	Muslim	Uneducated	6	0
89	Bashir Abdo	M	39	Muslim	Religious	3	5
90	Dasalegn Bulbula	M	32	Orthodox	Uneducated	1	3
91	Ali Birhanu	F	41	Orthodox	Elementary	5	3
92	Gadisse Ababa	F	46	Orthodox	High school	2	0
93	Buti Alemu	M	32	Orthodox	Religious	1	0
94	Soboke Eshetu	M	33	Orthodox	Uneducated	3	0
95	Yoseph W/mikeal	M	36	Orthodox	High school	2	1
96	Nagesh Assefa	M	36	Orthodox	High school	3	2
97	Eshetu Abbo	M	53	Orthodox	Religious	7	6
98	Dasalegne Tulu	M	36	Orthodox	High school	1	1
99	Ababa Tola	M	45	Orthodox	Unducated	5	6
100	Ali Birhenu	F	31	Orthodox	Elementary	2	3

Appendix 2. **Semi-structured interview** or questionnaires for herbs man/traditional healers or local community. The following questions are designed only to get sufficient information about Ethnobotanical study of medicinal plants and how you are discovered, used, investigated and management them. Please honestly and freely give this information.

List of **medicinal plants used for the treatment of** both human and livestock diseases or either of the two **diseases, their** scientific name, family name, local name, habit, parts used, diseases treated, methods of preparation, dosage used and route of administration. Keys: *indicated only human diseases, **indicated only livestock diseases; *** both, Or- Oromo, Am- Amharic

No	Scientific name and habit	Family name	Local name	Health problem	Part(s) utilized and Mode of preparation of the remedies	Route of application
1						
2						
3						
4						

1. Sex: male □ female □

2. Age: ___ , kebeles _____; Name of informant /participants_____

Religion_____, Family size; ____

3. Level of education:- Elementary □ high school □ Religious Education □

illiterate □ or □ others_____.

4.Job:-_____;

5.What are the major types of medicinal plants?

6. What are the other advantages of those plants in addition to their medicinal values?

7. What are the habitats of these medicinal plants?

Appendix 2. Continued

8.What are the habits of those medicinal plants? Shrub □ Herbs □ Trees □ climber

9.Are medicinal plants marketable? Yes □ No □

10.What are the major threats to those medicinal plants?

11. Which parts of the plants used for medicinal purpose or value? Leaf □ Stem □ Root □ Fruit □ Flower □ Combination □

12.Which plant parts are mostly used for medicinal purpose more than the rests? Leaf □ Stem □ Root □ Fruit □ Flower □ Combination □

13.What are the major diseases that can be treated with medicinal plants? Human Diseases □ Livestock diseases □ both □

14. Is there medicinal plants that used only for human diseases or livestock diseases or both?

15. What mechanism of preparation do you use to make the medicinal plant available for your local people? Pounding □ Powdering □ Crushing □ Chewing □ other mechanism □

16. Which mechanism of preparations mostly used?

17. How are you investigated the medicinal plants you are using?

18. How are you investigated and studied Ethno botanical of medicinal plants?

19. What conservation mechanisms you are mostly using to make sustainable use of medicinal plants in your local areas?

20. What is Ethnobotany, what important does it has?

21. What are the method of collecting or gathering and preparation of medicinal plants?

23. How medicinal plants are cultivated?

24. When did indigenous knowledge appear on medicinal plants?

25. What types of medicinal practice common in your area? Traditional □ modern □ both □

26. What is the status of medicinal plants in your local areas today?

27. What associated knowledge does have with medicinal plants?

28. How do you collect and prepare medicinal plant?

Appendix 2. Continued

29. Do you have indigenous knowledge about medicinal plants? Yes □ No □

30 .Is there any recorded or documented medicinally plants in your local areas? Yes □ No □

31.What types of work done to record medicinal plants?

32. How is your knowledge of using medicinal plants? Little □ High □ Medium □ No □

33. For what purpose people primarily use medicinal plants?

34. Is Ethn botanical study of medicinal plants conducted before in your areas?

35. How long does Ethno botanical study of medicinal plants in your local area?

36. What types of studies or documentations of medicinal plants occured in your local areas?

37. Do you know how to conserve medicinal plants?

Thanks!!.

Appendix 3. List of medicinal plants from the study area

Scientific name	Family name	Local name	Medicinal uses	Part(s) used and preparation method	Administration route
Acacia abyssinica Hochst. **Leaf**	Fabaceae	Laaftoo(Or)	Goiter *(inniqqii)	**Leaf**: leaf Crushed and sniffed	Dermal
Allium sativum L **Bulb**	Alliaceae	Qullubi adii(Or)	Cough*and Common cold	**Bulb**: Bulb Crushed and Eaten as pain	Oral
Aloe monticola Reynolds **Root**	Asparagaceae	Araggisa(Or)	Anthrax** (Abba sanga)	**Root:** Root is pounded and mixed with cold water and local alcohol 'Tella 'then drunk	Oral
Aloe vera **Leaf**	Aloe	Haragessa(Or)	Asthma*	Leaf: juice from leaf will be drunk	Oral
Citrus limon L. **Fruit**	Rutaceae	Loomii(Am)	Common cold*	**Fruit**: Fruit Juice will be drunk with tea	Oral
Croton macrostachyus Hochst. ex Del **Sap**	Euphorbiaceae	Bakkanisa(Or)	Ring worm (Roobii*)	**Sap:** Rubbed with affected body part(s)	Dermal
Cardia africana Lam. **Leaf**	Boraginaceae	Waaddessa(Or)	Spider poison, (summii bofa)	leaf: leaf will be Crushed with goat feces and put on fire the ash with butter then applied.	Dermal
Catha edulis (Vahl) Forssk. ex Endl. **Shrub**	Celastraceae	Caati	Gonorrhea*	**Leaf**: Leaf will be infused into tea and drunk .	Oral

Appendix 3. Continued

Cucurbita pepo L **Seed**	Cucuribitaceae	Buqqee(Or)	Gonorrhea, (Cophoxoo)	**Seed:** seed powder is mixed with water , filtered and drunk.	Oral
Datura stramonium L. **Firut**	Solanaceae	Manjii(Or)	Scabies (cittoo)*	**Frui**t: 2-3 spoon of Powdered fruit is mixed with butter and creamed.	*Dermal*
Ekebergia Dermal Capensis Sparm **Sap**	Meliaceae,	Somboo(Or)	Hemorrhoid.*	**Sap**: exudate sap is directly applied to hemorrhoid.	*Dermal*
Eleusine filicifolia **Stem**	Poaceae	Cooqorsa(Or)	Snake bite poison*	**Stem**: Stem Rubbed to affected skin for 7 days with butter.	Dermal
Eucalyptus camaldulensis Dehn **Leaf**	Myrtaceae	Baargamoo diimaa(Or)	Stomachache*	**Leaf**:Leaf Chewed and swallowed.	Oral
Eucalyptus globules Labill. **Leaf**	Myrtaceae,	Baargamoo adii(Or)	Common Cold*	**Leaf** : leaf boiled and steam inhaled	Nasal
Euphorbia abyssinica Gmel. **Sap**	Euphorbiaecea	Adaamii(Or)	Ascaries* (maagaa)	**Sap**: 2-3 drop of sap is backed with teff and given to human.	Oral

Appendix 3. Continued

Euphorbia tirucalli L. **Root**	Euphorbiaecea	Ananno/Qinchib (Or)	Tuberculosis	**Root**: Mixed crushed root with honey and water, drunk.	Oral
*Guizotia abyssinica (*L.f) cass. **Seed**	Asteraceae	Nugii(Am)	Cough*and Asthma*	**Seed**: Roasted, powdered and boiled seed and then drunk with honey.	Oral
*Hagenia abyssinica (*Bruce*)* J.F Gmel. **Powder**	Rosaceae	Kosso(Am)	Tape worm*	**Powder**: Powder Mixed with water and fermented overnight ,drunk in morning.	Oral
Hordeum vulgare L. **Seed**	Poaceae	Garbuu(O)	Urine retention	**Seed** : Seed made flour in to porridge and eaten.	Oral
Kalanchoe laciniata (L) DC. **Root**	Crassulaceae	Bosoqqee(Or)	Tonsillitis, (Harsasse)	**Root**: dried or fresh root will be Chewed.	Oral
Leucas martinicensis **leaf**	Lamiaceae	Bokkoollu(Or)	Ascariasis* and mich*	**leaf** : leaf Powdered and mixed with water and drunk.	Oral
Lepidium sativm L **Seed**	Brassicacae	Feexoo	Stomachache	**Seed** : seed crushed and eaten with *Injera.*	Oral

Appendix 3. Continued

Lippia adoensis **Leaf**	Verbenaceae	Kussayye(Or)	Ring Worm* (Roobbii)	**Leaf**: Leaf of *Lippia adoensis* is directly rubbed on affected skin.	Dermal
Linumusitatissi mum L. **Seed**	Linaceae	Telbaa(Am)	Placenta retention	**Seed**: seed powdered and drunk	Oral
Ocimum lamii folium Hochst.ex **Leaf**	Lamiaceae	Damakase(Or)	mich*(Or)	**Leaf**: leaf Crushed and mixed with water then drunk.	Oral
Olea europaea **Roo**t	Oleaceae	E jersaa (Or)	Stomachache	**Roo**t: fresh root chewed.	Oral
Rhamnus prinodes L .Her. **Leaf**	Rhamnaceae	Gesho(Am)	Snake bite**	**Leaf**: Leaf mixed with lemon juice and applied on wound.	Dermal
Ricinus communis L. **Seed**	Euphorbiaceae	Qobboo(Or)	Soften abdominal parts *	Seed: Oil drunk from the seed.	Oral

Appendix 3. Continued

Ritchiea albersii GiLg **Seed**	Capparaceae	Harbuu(Or)	Cough*, Haxiifuu(Or)	**Seed** :Drops from **stem** and tied on pounded the wound and mixed with tea/ H_2O	Oral
Phytolacca dodecandra **Root**	Phytolaccaceae	Andoode(Or)	leeches*** and Mollucides**	**Root**:Root pounded mixed with H_2O and drunk.	Oral
Podocarpus gracilis **Leaf**	Podocarpaceae	Birbirsa(Or)	Vomiting*	**Leaf**: Leaf juice will be drunk.	Oral
Ruta chalepensis L. **Leaf**	Rutaceae	Xeenaadaami (Am)	Stomachache*	**Leaf**: Chewed Leaf will be swallowed .	Oral
Solanum incanum L. **Root**	Solanaceae	Hidii (Or)	Stomachache*	**Root**: Chewed root tip will be swallowed .	Oral
Zingiber officinale Roscoe **Rhizome**	Zingiberaceae	Zinjiibilli(Or)*	Tonsillitis* (Harsasse)	**Rhizome** : Rhizome crushed with Solanum incanum flower and applied .	Dermal

Key: *indicated only human diseases , **indicated only livestock diseases as well as *** both

Language Keys: Or-Oromic, Am- Amharic