

**ETHNOBOTANICAL STUDY OF MEDICINAL PLANTS USED BY  
PEOPLE OF GUMER WOREDA, GURAGE ZONE, SNNPR,  
ETHIOPIA**

**M.Sc. THESIS**

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**HARAMAYA UNIVERSITY, HARAMAYA**

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MASTER OF SCIENCE IN BOTANY**

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We hereby certify that We have read and evaluated the Thesis entitled "**Ethnobotanical Study of Medicinal Plants Used by People of Gumer Woreda, Gurage Zone, SNNPR, Ethiopia**" prepared under Our guidance by **Aliyu Jemal**. We recommend that it be submitted as fulfilling the thesis requirement.

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## **DEDICATION**

This manuscript is dedicated to my lovely Father Jemal Ahmed, my Mother Sofiya Hassen, my Sister Hawa Jemal, my lovely Wife Musliha Mustefa and all family members for their unlimited support.

## STATEMENT OF THE AUTHOR

By my signature below, I declare and affirm that this Thesis is my own work. I have followed all ethical and technical principles of scholarship in the preparation, data collection, data analysis and compilation of this Thesis. Any scholarly matter that is included in the Thesis has been given recognition through citation.

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## **BIOGRAPHICAL SKETCH**

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## **ACRONYMS AND ABBREVIATIONS**

<b>GWAO</b>	Gummer Woreda Agricultural Office
<b>GWEO</b>	Gummer Woreda Educational Office
<b>GWHO</b>	Gummer Woreda Health Office
<b>SNNPRS</b>	Southern Nation Nationalities Peoples Regional State
<b>UNEP</b>	United Nation Environmental Program
<b>WHO</b>	World Health Organization

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# ETHNOBOTANICAL STUDY OF MEDICINAL PLANTS USED BY PEOPLE OF GUMER WOREDA, GURAGE ZONE, SNNPR, ETHIOPIA

## ABSTRACT

*Ethnobotanical study of medicinal plants used by local people and associated indigenous knowledge was conducted in Gummer woreda, Gurage Zone, SNNPRS of Ethiopia. The purpose of this study was to investigate and document the traditional medicinal plants used by indigenous people of Gummer Woreda together with indigenous knowledge. Data collection tools were semi-structured interviews, field observations and group discussions. Descriptive statistics informant consensus factor, fidelity level, preference ranking and direct matrix ranking were also computed. A total of 70 Medicinal plant species distributed across 38 families were collected from the study area and identified. From the total collected plants, 81.4% were used for the treatment of 38 human ailments, while 5.7% were used for treating 9 livestock ailment. The remaining 12.9% of the species were used for treating both human and livestock ailments. Herbs represented by 35 species followed by shrubs with 23 species and trees with 12 species. The most commonly used route of administration was oral route of administration followed by dermal. Ear pain, hair rash, high blood pressure and appetite problem had the highest ICF value (1) followed by tuberculosis, wound, eye disease, muscles and bone pain related disease and anemia ( $> 0.90$ ). Percent fidelity level of **Dovulis abyssinica** to treat skin related disease, **Lepidium sativum** for treating bloating and **Aloe deibrana** to treat wound was 100%, suggesting that these plants may be specifically used to treat particular ailments. Preference ranking of 7 medicinal plants reported to treat skin related diseases showed that **Dovulisa byssinica** ranked first. Computation of direct matrix ranking showed that **Eucalyptus globulus** ranked first for being used for many purposes. For further scientific utilization, chemistry of medicinal plants with high ICF and FL values should be further investigated for drug discovery. Moreover, awareness rising works for the locals should be made on conservation of medicinal plants.*

**Key word:** Gummer Woreda, Indigenous Knowledge, key Informants, medicine practitioner and Traditional medicine

## 1. INTRODUCTION

A discussion of human life on this planet would not be complete without a look at the role of plants, because plants have been an integral part of human society since the start of civilization. Plants have multiple uses to humans including food, dye, medicine, pesticides, to protect crops(Shah, 2005).

Since the beginning of civilization, people have used plants as medicine. Also, plants continue to be a major source of medicines, as they have been throughout human history. It has been reported that between 35 000 and 70 000 species of plants have been used at one or other time for medicinal purposes (Farnsworth *et al.*, 1991). Medicinal plants, thus, play a vital role in the maintenance of human health throughout the world and notably in the tropics. Interestingly, many of today's drugs have been derived from plant sources. It is estimated that, plant materials are present in or have provided the models for 50% of western drugs (Robbers *et al.*, 1996).

However, native plant habitats are destroyed almost daily, many medicinally valuable plants are being lost before scientists can even investigate them. As the world's population increases, the threat to biodiversity becomes greater (WRI, 2000). It has been predicted that the present rate of global species extinction is 400 times faster than the rate in the geologic past, and that this rate is rapidly accelerating (Plotkin, 1995). The unpleasant conclusion is that the human race is causing one of the first reductions of global, vascular plant diversity since the origin of life (Plotkin, 1995). With this, we are losing a vast genetic base of variation in botanical and zoological species that has evolved over thousands of years.

The term Ethnobotany refers to all studies that are related to the reciprocal relationship between plants and traditional peoples (Martin, 1995; Cotton, 1996). Ethnobotany, in general, thus refers to the study of the utilization of plants for a wide variety of humans needs such as medicine, food, fodder, fiber, and goods required for their material culture and amenities. The importance of ethnobotany includes economic growth and development,

conservation of biodiversity, and most especially provision of medicine and healthcare. The importance of medical ethnobotanic research has been increasing, since potential sources for drugs could disappear in the future as a result of the rapid loss of biodiversity (Balick and Cox,1998).

The precondition for making ethnobotanical work effective is to be aware of the range of methods and approaches and to be able to choose the most appropriate ones for the problem at hand. This is not an easy task due to its multidisciplinary nature, thus the approaches should focus on the active substances, on the type of pathology to be treated, chemical composition, a laboratory approach concerned with the isolation and identification of active principles (Hoft and Cunnigham, 2000).

Most local communities have experienced indigenously endemic categorizations, where they use their perceptions and experiences to categorize plants. From their experience, a number of categorization and classification criteria were developed, which is important in plant diversity conservation and management. The most common criteria include plant use, habitat, life form, color, abundance, morphological characteristics and combinations (Martin, 1995; Cotton, 1996; Alexiades, 1996). This reliability enabled traditional people to develop several statements as (proverbs and poems) that apply to plants upon which they are so immediately and intimately dependent (Kokwaro, 1976; Cotton,1996). Moreover, the use of plants in medicinal area by local people over the past period take a huge concern as they have long years lineage of utilization and management.

Ethnobotany plays a crucial role in the study of traditional medicine (Pei, 2005). Traditional medicine is the sum total of all knowledge and practical application, whether explicable or not used in diagnosis, prevention, and elimination of physical, mental or social imbalance; and relying exclusively on practice and experience, and observations handed down from generation to generation, whether verbally or in writing (Ampofo and Johnson, 1978).

In many developing countries, medicinal plants have not been well studied, tested or documented. Most of the information is still in the hands of traditional healers and knowledge of

healers is passed from generation to generation by the word of mouth. Thus, ethnobotanical research is important to help documentation of the knowledge of the healers and reserve for future use (Tesfaye, 2004). In Ethiopia, some ethnobotanical studies have been conducted in different parts of the country since a couple of decades (e.g., Mirutse, 1999; Dawit, 2001). However, compared to the diverse plant resources and culture the country has, much remains to be done.

Traditional medication using plants is an important healthcare system in Gumer Woreda likewise it is elsewhere in the country. However, no ethnobotanical investigation has been conducted for the sustainable use of this plant resource and associated indigenous knowledge. As a result, this study was initiated to carry out ethnobotanical study on plants of medicinal value in the Woreda with the following objectives.

### **General objective**

- ❖ The Main objective of this study was to investigate and document the traditional medicinal plants used by indigenous people to treat both human and livestock ailments in Gummer Woreda

### **Specific objectives**

The specific objectives of this study are:

- ❖ To Collect, identify and document traditional medicinal plants that are used by the local people for the treatment of human and livestock ailments in the Gummer Woreda
- ❖ To Document indigenous knowledge of the people on the use of medicinal plants and conservation measures practiced in the study area.

## 2. LITERATURE REVIEW

### 2.1 Plant and people interaction

According to Martin (1995), Ethnobotanical studies are mainly useful in documenting, analyzing, and disseminating of knowledge on the interaction between plant biodiversity and human society, and how plant biodiversity is valued in different societies as well as how it is influenced by human activities. This implies that humans are dependent on other organisms for their life. This also shows that ethnobotany is interactive and dynamic field of study. Although various animal and mineral products contribute to human welfare, the plant kingdom is most essential to human wellbeing especially in supplying his basic needs. The indispensable dependency of humans up on plants for their livelihoods was primarily started by domestication and dates back to 10,000 years (Martin, 1995) .

Plants have been used as a source of traditional medicine in Ethiopia from time immemorial to combat different ailments and human sufferings (Zemedu *et al.*, 1999). Because of its long period of practice and existence, traditional medicine has become an integral part of the culture of Ethiopian people (Mirgissa, 1998). There is a large magnitude of use and interest in medicinal plants in Ethiopia due to acceptability, accessibility and biomedical benefits (Dawit, 2001). The continued dependency on herbal medicine along with the side of modern medicine is largely by economic and cultural factors (Aketch, 1992). In addition to these factors, the fact that modern medical services are inaccessible to the vast majority of the populations due to their costs made herbal medicines more acceptable.

Now a day Africa, including Ethiopia, the majority of people lack access to health care and where available the quality is largely below standard (Abbiw, 1996). Indigenous peoples and the local communities' reliance on plant resources account for anything up to 95% of their survival requirements (Archer, 1990). As reported by Abbiw (1996), herbal remedies are the world's therapeutic means to act against diseases for a large proportion of people of both rural and urban areas in developing countries like Ethiopia. Ethiopians have used traditional medicines for many

centuries, the use of which has become an integral part of the different cultures in modern Ethiopia. The indigenous peoples of different localities in the country have developed their own specific knowledge of plant resource uses, management and conservation (Pankhurst, 1965). Traditional remedies are sometimes the only source of therapeutics for nearly 80% of human population and 90% of livestock in Ethiopia of which 95% are plant origin. Dawit (1986), found that the majority of the population that lives in the rural and the poor people in urban areas rely mainly on traditional medicines to meet their primary health care needs.

In most cases the traditional knowledge in Ethiopia is passed verbally from generation to generation and valuable information can be lost whenever a traditional medical practitioner passes without conveying his traditional medicinal plant knowledge. In addition, the loss of valuable medicinal plants due to population pressure, agricultural expansion and deforestation is widely reported by different workers (Dawit, 2001). Therefore, it is a must to perform ethno botanical researches to document medicinal plants and the associated indigenous knowledge before they are lost.

## **2.2 Development of Ethnobotanical Study**

The term ethnobotany was for the first time used by Harshberger in 1895. Harshberger defined ethno botany as ‘the use of plants by aboriginal peoples’ yet during the century which has intervened, considerable attention has focused not only on how plants are used, but also on how they are perceived and managed, and on the reciprocal relationships between human societies and the plants on which they depend (Zemedet *al.*, 1997). There has been an ever increasing interest of botanists, anthropologists and explorers of the world to document the potential uses or economic potential of plants used by indigenous societies (Cotton, 1996). As the number of expeditions and scholarly communication became wider, there has been an intensified and continuous search by researchers in different fields to disclose traditional use of plants in different parts of the world by indigenous societies (Balick, 1996; Cotton, 1996).

The study of folklore medicine falls within the discipline of ethno botany. The term folklore medicine refers to healing practices and ideas of body physiology and health preservation known

to a limited segment of the population in a culture, transmitted informally as general knowledge, and practiced or applied by anyone in the culture having prior experience. There is worldwide interest in folklore uses of medicinal plants which leads to new sources of drugs. Folklore medicine is taken to mean knowledge and practice that have survived through only traditions in certain human societies, particularly among the primitive and rural societies (Balaji, 2013). Much of traditional medicine today has its origins in early discoveries.

Tribal-people, because they lack a writing system, generally record their experiences and history with medicine in oral traditions handed over from one generation to the next. Tribal and rural societies today have inherited ancient knowledge through oral folklore, and some still depend totally or largely on this knowledge and the practices based on it. Many renowned drugs of today would have gone into wider use decades ago if the folklore and traditions of tribal-people concerning certain plants had been taken seriously. Ethnobotanical data collection requires a systematic approach and information can be collected through actual field observation and interviews depending on the particular objective of the research (Martin, 1995). Alcorn (1984) also stated that ethnobotanist's collect information on the indigenous knowledge not only to preserve them but also to perceive their relevance to development and conservation.

In general, ethnobotany is the scientific investigation of plants as used in indigenous cultures in food, medicine, rituals, building, household utensils and implements, musical instruments, fire wood collection, pesticide, clothing, shelter and other purposes. Ethnobotany is also useful to define local community plant resource needs, utilization and management. Therefore, the conservation of ethno botanical knowledge as part of living cultural knowledge and practices between communities and the environment is essential for biodiversity conservation (Martin, 1995; Cotton, 1996; Balick and Cox, 1996).

### **2.3 Medicinal plants in Ethiopia**

Ethiopia is believed to be home for about 6000 species of higher plants with approximately 10% endemism, and hence one of the six plant biodiversity rich countries of Africa. The diversity is also considerable in the lower plants but exact estimate of these have to be made.

According to UNEP (1995), the genetic diversity contained in the various biotic make up is also high thus making the country a critical diversity hot spot for plants. Ethiopia has a significant portion of two of the world's 25 biodiversity rich areas (hot spots) i.e. the Eastern Afromontane Biodiversity Hotspot and the Horn of Africa-Biodiversity Hot Spot. These hotspots house a lot of the useful wild biodiversity, particularly that of medicinal plants. The biodiversity richness of Ethiopia was known since 5000 years ago when ancient Egyptians, Greeks and Romans used it as a source of unique commodities like Frankincense, Myrrh and other plant products, which are also used for medicine preparation (Thulin, 2004). French, British and Italian travelers, naturalists, pharmacologists and plant collectors who visited Ethiopia between about 1830 and 1930 gave lists of plants used medicinally and their conception by the local traditional medicine men (Griaule, 1930).

Dawit (1986) reported that most Ethiopian traditional medicinal knowledge is kept in strict secrecy; however, it is dynamic in that the practitioners make every effort to widen their scope by reciprocal exchange of limited information with each other or through reading the traditional pharmacopeias. Ethiopian traditional medicines give three treatment features which include curative, prophylactic and preventive. Sometimes, the treatment could have a curative as well as a prophylactic effect and it is occasionally claimed that the prophylaxis could even be genetically fixed and can protect the offspring. Preventive remedies are usually prepared as ornamental, to be borne by the patients against evil spirits or psychosomatic disorders. Other therapies of preventive nature are employed against snake bites, intestinal worms, and miscarriages. Regulatory drugs are also commonly used to correct the time and the amount of flow of the menstruation cycle of women. Rejuvenate and restorative remedies are also employed to counter the effect of aging, and to overcome impotence, malnutrition, infertility etc.

### **2.3.1 Medicinal plant diversity and distribution in Ethiopia**

Different vegetation types that are found in the various agro ecological zones of Ethiopia accommodate various types of medicinal plants (Edwards, 2001). She reported that the woodlands, montane vegetation including grasslands and forests and the evergreen scrubs and

rocky areas contain more medicinal plants with higher concentrations in the woodlands and observed that the microphyllous vegetation of the wood lands listed more medicinal plants species followed by the montane-grassland and riverine vegetation while the afro alpine vegetation ranked last.

According to Maffi (1999), the number of different languages spoken in Ethiopia approaches 90 and each corresponds to its unique socio cultural population thus amounting to the high human cultural diversity. Each of these cultural domains has its own set of written and/or oral pharmacopoeias with the medicinal use of some species being restricted to that given culture. Jansen (1981) asserts that Ethiopia has rich medicinal plant lore and points out that almost all plants of the Ethiopian flora are used somewhere somehow medicinally. Other workers on the other hand estimated about 60% of the flora to be medicinal, and most sources give about 10% of the vascular flora to be medicinal. The list covers plants that are widely used by the local communities in lowlands and highlands for treating human ailments and some of them for livestock ailments as well as for prevention of pests and vectors.

The greater concentration of medicinal plants are found in the south and south western Ethiopian parts of the country following the concentration of biological and cultural diversity (Edwards, 2001). The various citations made from various written records of medicinal plants from central, north and northwestern part of Ethiopia are thus small fractions of medicinal plants present in Ethiopia. Study on the Bale Mountains National Park in the South East Ethiopia revealed that the area, as much as it is a biodiversity hotspot, also turned out to be a medicinal plant hotspot with 337 identified medicinal species of which 24 are endemic (National Herbarium, 2004; Ermias, 2005; Haile, 2005). The species comprised of 283 used as human medicine, 47 used as livestock medicine and 76 species used for both human and livestock by the community healers, harvesters, traders and users. This work further suggested spots that could be considered medicinal plant micro - hotspots within the Bale Mountain area.

Most researchers indicated that the various parts of medicinal plants have been used such as leaves, roots and barks of the stem (Haile, 2005). But, leaves are regarded as the most cited plant parts used by healers for the preparation of traditional medicines. The various literature available

show the significant role of medicinal plants in primary healthcare delivery in Ethiopia where 70% of human and 90% of livestock population depend on traditional medicine similar to many developing countries particularly that of Sub-Saharan Africa countries.

### **2.3.2. Indigenous Knowledge and Medicinal Plants**

Indigenous knowledge refers to the accumulation of knowledge, rule, standards, skills, and mental sets, which are possessed by local people in a particular area (Quanash, 1998). It is the result of many generations' long years' experiences, careful observations and trial and error experiments (Martin, 1995). Traditional people around the world possess unique knowledge of plant resources on which they depend for food, medicine and general utility including tremendous botanical expertise (Martin, 1995). Over centuries, indigenous people of different localities have developed their own specific knowledge on plant resource use, management and conservation (Cotton, 1996).

Systematic application of indigenous knowledge is important for sustainable use of resources and sustainable development (Thomas, 1995). Various animal and mineral products contribute to human welfare; the plant kingdom is most essential to human well-being especially in supplying basic human needs. Since ancient times, human beings have been using plants for the purpose of disease control and prevention.

This close interaction and dependency of humans on plants is studied under the field of ethno botany. Such knowledge, known as ethno medicinal knowledge involves traditional diagnosis, collection of raw materials, preparation of remedies and its prescription to the patients. The documentation of traditional knowledge, especially on the medicinal uses of plants, has provided many important drugs of modern day (Balick and Cox, 1996). Indigenous knowledge on remedies in many countries including Ethiopia passes from one generation to the other generation verbally with great secrecy. Such secrecy 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 research.

## **2.4 The Role of Medicinal Plants in healthcare system**

According to Fassil (2001), about 75-90 % of the rural population in the world(excluding western countries) relies on traditional medicines as their only healthcare system.. More than 35,000 plant species are being used around the world for medicinal purposes (Lewington, 1993) and, in Ethiopia there are 800 or more plant species employed as medicinal agents (Tesema, 2002); which according to the data base of the National Herbarium has grown to 1000 and more will be added to the list as new studies bring as new medicinal plants from various cultures.

Traditional medicine remains the main resource for a large majority (80%) of the people in Ethiopia to treat their illnesses and veterinary diseases and maintain their health and a traditional medical consultancy including the consumption of the medicinal plants has a much lower cost than modern medical attention (Asfaw , 1999). However, this is not only because of poverty where people cannot afford to buy expensive modern drugs, but traditional systems are also more culturally acceptable and meet the psychological needs. Apart from their use in the traditional system of medical care at the local level, medicinal plants are currently used in the production of modern drugs as a source of direct therapeutic agents, as raw materials for the manufacture of complex semi-synthetic compounds and as taxonomic markers in the search for new compounds (WHO, 1998). Most pharmaceutical companies recently have developed mechanisms to involve indigenous people collect plant samples on the recommendation of traditional practitioners.

Medicinal plants have got special attention and regional offices were established by World Health Organization to coordinate basic and applied research activities on medicinal plants(WHO, 1978). This was linked to the establishment to record medicinal plants to improve accessibility and dissemination of information on medicinal plants (Tsige and Kaleab, 2001).

## **2.5 Medicinal plants in human healthcare system**

In Ethiopia, plants have been used as a source of traditional medicine from early time to combat different ailments and human sufferings (Asfaw, 1999). Due to its long period of practice and existence traditional medicine has become an integral part of the culture of Ethiopian people (Pankhurst, 1990, Mirgissa, 1996). It is common for people living in rural and urban centers to

treat some common ailments using plants available around them. (For example, the flowers of *Hagenia abyssinica* used to expel tapeworm, *Ruta chalepensis* leaves used to treat various health problems (Abbink, 1995). The continued dependence on herbal medicine alongside modern medicine is largely conditioned by economic and cultural factors (Abbiw, 1996).

Modern healthcare has never been and probably never will provide for the foreseeable future adequate and equitable health service anywhere in Africa, due to the financial limitations related to rapid population growth, political instability and poor economic performance (Anokbonggo, 1992). Due to incomplete coverage of modern medical system, shortage of pharmaceuticals and unaffordable prices of modern drugs, the majority of Ethiopian still depends on traditional medicine. The problem of ensuring the equitable distribution of modern healthcare has become more serious, as the gap between supply and demand has continued to widen. Hence, in present-day Africa including Ethiopia, the majority of people lack access to healthcare, and where available, the quality is largely below acceptable level (Abbiw, 1996).

It is also noted that since medicinal plants are often with an easy reach compared to modern rugs that are dispensed in remotely located health institutions most people in Ethiopia rely on the medicinal plants for their healthcare. Thus, medicinal plants continue to be in high demand in the healthcare system as components to the modern medicine (Cunningham, 1996). This indicates the need for in-depth investigation and documentation of plants of traditional value to rationally use and conserve the plant resources in indigenous knowledge (Dawit and Ahadu, 1993).

## **2.6 Threats and Conservation of Medicinal Plants in Ethiopia**

Ethiopia's traditional medicine as elsewhere in Africa is faced with problems of continuity and sustainability (Ensermu, 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, 1996). 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, 1992).

Most researcher(e.g., Mirutse, 2003) found 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. Beside, this researchers argue that medicinal plants are considered to be at conservation risk due to over use and destructive harvesting (Zemedede,2001).

Tewelde (1991), explained that the problem is further compounded by the fact that traditional knowledge on traditional medicine is also being lost at an alarming rate. There are two sources of threats to medicinal plants, i.e. human-made and natural causes. Rapid increase in population, the need for fuel, urbanization, timber production, overharvesting, destructive harvesting, invasive species, commercialization, 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 ,1992). Additionally, most of the medicinal plants utilized by Ethiopian people are harvested from wild habitats (Mirutse, 2003). Hence, this increase the rate of loss of taxa with related indigenous knowledge and loss of widely occurring medicinal plant species. The result 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.

## **2.7. Ethnoveterinary Medicine in Ethiopia**

In rural Ethiopia mixed farming which encompasses crop cultivation and herding is the major means of livelihood though some alternative income generating, activities such as fattening, petty trade, traditional bee keeping, firewood collection, hand craft, and wage based employments are also practiced to some extent (SWBS, 2007). In general, crop cultivation followed by herding remains the major livelihood activity in the country. Although the number of livestock population is many in number, disease play role in reduction. To overcome this problem, many people mainly use traditional medicines to treat their livestock ailments.

Mc Corkle and Mathias (1996) explained that ethno veterinary medicine involves the use of medicinal plants, surgical techniques and livestock management practices to prevent a range of animal disease. According to the Ethiopian Agricultural Research Organization (EARO, 1999 as

cited in Mirutse and Gobena, 2003), Ethiopia has the highest livestock population from Africa. In Ethiopia, livestock production directly constitutes important sources of livelihood, in addition to its contribution to crop production (Tafesse and Mekonnen, 2001).

Most developing countries including Ethiopia, animal disease remains one of the principal causes of poor livestock performance, leading to an ever increasing gap between the supply of, and the demand for, livestock products (Teshale, 2004). Pharmacotherapy is one of the most important means of controlling livestock disease, but it is possible only if livestock owners can afford to cover the cost of treatments. Livestock owners cannot rely on veterinary services for control of various important livestock diseases. This is due to the insufficient number of veterinarian drugs and the high cost of most of drugs which is out of the reach of the Ethiopian farmers and pastoralists (Mirutse ,and Gobena, 2003).This and other similar factors make Ethiopian livestock raises develop their own ways of keeping their animals healthy and productive using locally available materials, predominantly plants.

According to Ibrahim (1986), the practical solution to various important livestock diseases to develop socially acceptable and effective remedies from reasonably inexpensive sources that can complement modern medicine. In Ethiopia people have used traditional veterinary methods to treat livestock diseases for generations. Most plants comprise the largest component of the diverse therapeutic elements of traditional livestock healthcare practices.

Herbal medicine is the branch of traditional medical practices that is most agreeable to scientific investigation. Plants are also invaluable subject of international development. Knowledge of medicinal plants can empower livestock owners to solve animal health problems (Ibrahim., 1986).

## **2.8 Threats to Indigenous Knowledge on Medicinal Plants**

Traditional herbal practitioners are important custodians of indigenous knowledge on the utilization of medicinal plants. Moreover, as a result of their experience they are skilled 'botanists' and have a great talent for locating the correct plant among the many plants species found around them. But, many are less cooperative to show their knowledge and skill on

traditional medicine to others. According to Pankhurst (2001), the knowledge on medicinal plants and method of use circulated mainly among practitioners and the beneficiaries of such practices. This has made the knowledge and skill on traditional medicinal plants and traditional medicine more hidden and less available to the public (Abbink, 1995). Because of the impact of modern education, increase in health coverage and urbanization, indigenous knowledge and usage of medicinal plants are being lost globally at a fast rate (WHO, 2002).

The issue is being even more serious in developing countries where such important information is not recorded in writing but passed on from one generation to the other orally; few are available in written records. To make matters worse, the younger generations of today, unfortunately, often have different ambitions and priorities. As a result, this traditional skill is doomed to be lost even faster than the plants themselves (Sofowora, 1982). Considering the role-played by plant-derived products in human and livestock health, the effective conservation of medicinal plants and associated indigenous knowledge, needs to be initiated as a matter of urgency.

## **2.9 Sources of medicinal plants**

Most researchers showed that medicinal plants species are grown in the natural ecosystem (Frankel *et al.*, 1995). In support of this, the work of Tesfaye and Sebsebe (2009) ,suggests that most of the medicinal plants in Ethiopia are collected from the wild while some are cultivated and some others are grown in home gardens either purposely for medicinal use or non-medicinal purpose (Zemedede and Ayele, 1995). About 6% of plant species cultivated in Ethiopia at home gardens for the purpose of medicine (Zemedede,1997).This number shows that a large number of medicinal plant species that are used by the herbalists are collected from the natural vegetation. Local forests are also sources of plant processes into therapies used in traditional medical system (Balick and Cox, 1996).

Endashaw (2007), Showed that the natural ecosystems like the forests, grass lands, wood lands, wet lands, field margins, contain a significant number of medicinal plants species. These are places where traditional healers and other members of the community collect medicinal plant species and use it.

## **2.10. Conservation of traditional medicinal plants**

There is some conservation actions that have been undertaken around the world designed to protect threatened medicinal plants from further damage (Cunningham, 1996). 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 (Zemedu, 2001). Medicinal plants can also be conserved by ensuring and encouraging their growth in special places, as they have been traditionally (Zemedu, 2001), this can be possible in places of worship (churches, mosques, grave yards, etc), sacred grooves, farm margins, riverbanks, road sides, live fences of gardens and fields.

Large concentrations of the useful plants found in Ethiopia are located in home gardens. Home gardens are agricultural spaces that typically contain wide plant diversity, including crops with excellent micronutrient properties. They are usually located close to the homestead; home gardens can accommodate women's food production and house hold responsibilities (FAO, 2005). The home garden agro-ecosystem in Ethiopia maintains a wide range of taxa of perennial and annual crop plants.

According to Zemedu (2001), medicinal plants can be conserved using appropriate conservational methods in gene banks and botanical gardens. This type of conservation of medicinal plants can also be possible in home gardens, as the home garden is strategic and ideal farming system for the conservation, Production and enhancement of medicinal plants. For poor rural people, medicinal plants represent affordable and locally available resources to address many diseases and health Problems. There is a need to conserve not only home garden but also wild plant community, because most of our medicinal plant found there.

## **2.11 Integration of traditional medicines with modern medicines**

In Ethiopia health care coverage, management of disease and disorders is believed to be improved by the integration of modern and traditional medicines. It is sure that the adaptability

and the development base of modern drugs are facilitated by keeping the efficacy, and quality of traditional medicines (Kebuet *al*, 2004). This promotes its integration to the modern health system of the country. The term integration in this case refers an increment of health coverage through collaboration, communication, harmonization of the modern system with that of the traditional one while ensuring intellectual property, right and protection of traditional medicinal knowledge. This integration system is believed to be crucial due to the fact that people with different cultures, beliefs and locality have their own unique knowledge of traditional medicines and this helps for the development of modern health system (Sofowara, 1982; Dawit and Ahadu, 1993; Yilmaet *al*, 1996; Dawit, 2001; Tsige and Kaleab, 2001; Bekele, 2004).

### **2.12. Research status of medicinal plants in Ethiopia**

In 1978, the WHO officially launched an international program to promote and develop basic and applied research in traditional medicine. Medicinal plants then got a focus of attention and regional offices were established to coordinate basic and applied research activities on such plants. This was associated with the establishment of data based on medicinal plants to improve accessibility and dissemination of information on medicinal plants (Farnsworth and Soejarto, 1991). Although the contribution of medicinal plant species to modern health system and the poor society who live mainly in the rural area is very high, lack of detailed descriptions of the medicinal plants has made it difficult for the researchers to decide the identity of these plants universally with the only reference being the local names of the plants and there is very little attention in modern research and development and the effort made to upgrade is not satisfactory. One of the main reasons is that the traditional medicinal plant species are not well described (Mesfin and Sebsebe, 1992).

Most researchers found that the detail information on medicinal plants of Ethiopia could only be obtained when studies are under taken in various parts of the country where little or no botanical and ethnobotanical studies have been conducted (Tesfaye, 2007). Most documents also explain that basic and applied researches on medicinal plants are interconnected and the basic research is primarily important in realizing new knowledge and serving as bases for applied research. As reported in Mesfin and Sebsibe (1992), most 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 recent. According to Tsigie and Kaleab (2001), research programs in traditional medicine must be realistic and based on the primary health care of the country, with an objective of developing safe, effective and quality phytotherapeutic preparation, which can supplement and or replace modern chemotherapy.

Various studies conducted on ethnobotany stated that most medicinal plants are being obtained from the wild. The study of Ethiopian medicinal plants has not been realized as fully as that of India or other traditional communities elsewhere (Iwu, 1993). Now aday, researchers have given attention on medicinal plants.

According to Kannon (2004), research on medicinal plants should direct for quality control and the research should examine active herbal constitute for efficacy and toxicity of the herbs. These research studies were carried out in different parts of the country to document the medicinal plants and associated indigenous knowledge in the areas studied. Thus there is a need to carry out similar studies in areas not previously covered in order to get a full picture of the country's medicinal plants potential in the future and that I have some objectives as mentioned above.

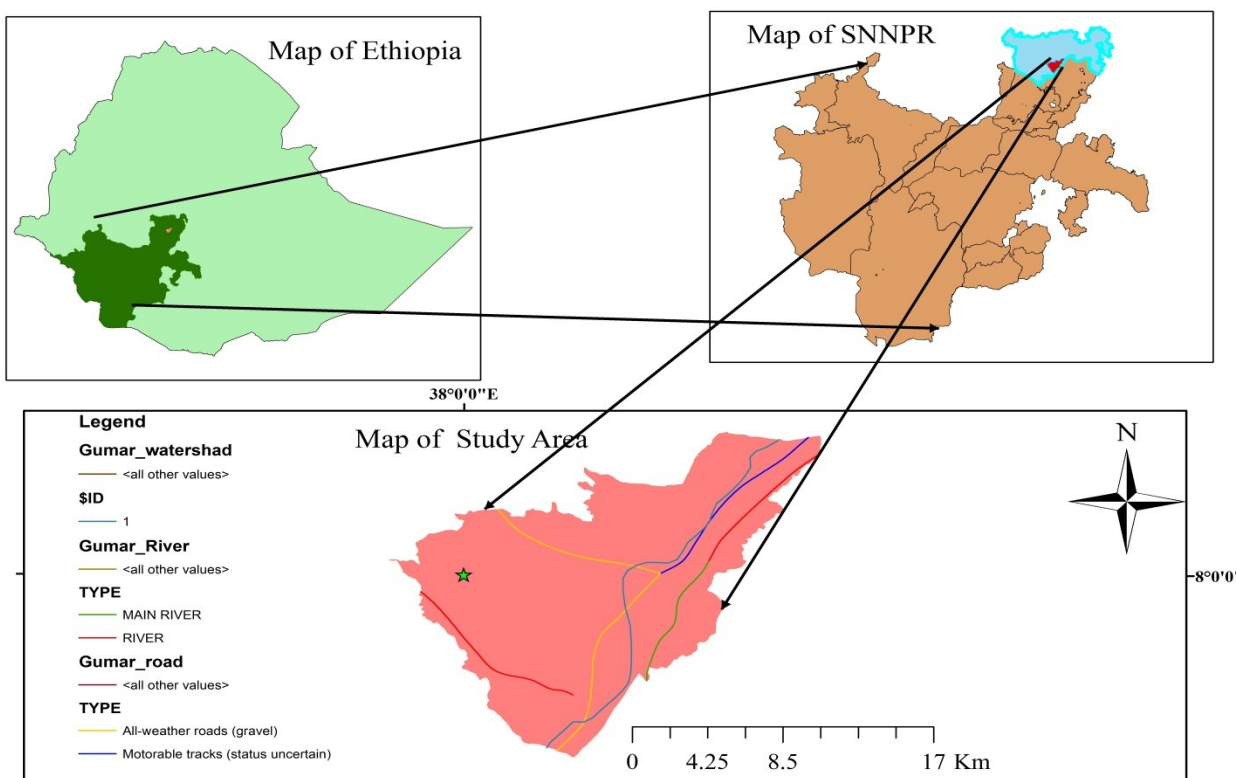
## **3 MATERIALS AND METHODS**

### **3.1. Description of the Study Area**

#### **3.1.1. Geographical location**

The study was carried out in Gummer Woreda, Gurage zone, Southern Nation Nationalities People Regional State of Ethiopia. The study area lies between  $7^{\circ}54'59.99''\text{N}$ -  $8^{\circ}5'59''\text{N}$  latitude and  $38^{\circ}04'60.00''\text{E}$ - $38^{\circ}12'00''\text{E}$  longitude and has an elevation range of 2400-3400m above sea level. The total area of this Woreda is about 24,604.78 hectares . This Woreda is named after one of the sub-groups of the Sebat Bet Gurage, found of 165 kilometers of the Gurage zone and bordered on the southeast by the Silt'e Zone, on the southwest by Geta Woreda, on the northwest by Cheha Woreda, and on the north by Ezha Woreda and it comprises 18 kebeles. The administrative town of this Woreda is Arekit found at 220 kilometers to the south west of Addis Ababa the capital city of Ethiopia..

## MAPS OF THE STUDY AREA



**Figure.1.** Map of Gummer Woreda (Source GWAO, 2016) in reference to maps of SNNPRS and Ethiopia

### 3.1.2 Climate

Agro ecologically, Gummer Woreda is classified as Dega (high altitude) climate zone (Ministry of Agriculture, 1998). The mean annual rainfall obtained from the monthly data on the bases of ten years records at the Gummer Woreda Agricultural Office is about 1600 mm. The average maximum and minimum temperatures from 2004 to 2014 were 30<sup>0</sup>C and 13<sup>0</sup>C, respectively (GWAO, 2016).

### 3.1.3 Demography

Based on the 2007 Census conducted by the CSA, this woreda has a total population of 80,178, of whom 37,495 are men and 42,683 women; 2,923 or 3.65% of its population are urban dwellers. The majority of the inhabitants were reported as Muslim, with 59.98% of the

population reporting that belief, while 29.81% practiced Ethiopian Orthodox Christianity, and 9.27% were Protestants (Census 2007).

. The two largest ethnic groups reported in Gummer were the Sebat Bet Gurage (58.17%), and the Silte (41.22%); all other ethnic groups made up 0.61% of the population. Sebat Bet Gurage was spoken as a first language by 42.94%, 32.99% Silte, and 0.55% spoke Amharic; the remaining 23.52% spoke all other primary languages reported. The majority of the inhabitants were Muslim, with 80.35% of the population reporting that belief, while 16.15% practiced Ethiopian Orthodox Christianity, 2.79% were Protestants, and 0.62% Catholic (census 1994). Concerning education, 20.06% of the population were considered literate, which is about the same as the Zone average of 20.62%; 13.24% of children aged 7-12 were in primary school, 1.94% of the children aged 13-14 were in junior secondary school, and 4.19% of the inhabitants aged 15-18 were in senior secondary school (Census,1994). Concerning sanitary conditions, 38.14% of the urban houses and 9.41% of all houses had access to safe drinking water at the time of the census; 18.98% of the urban and 7.54% of all houses had toilet facilities( Census, 1994).

### **3.2. Ethnobotanical Data Collection**

Prior to ethnobotanical data collection, four Kebeles, Amdom(2800masl), Deribonasene (3050masl), Bad(2600mas) and Armua (2450 meters above sea level), were purposively selected from among the 18 kebeles. These Kebeles were purposively selected to represent different altitudinal ranges. also, access and availability of traditional medicine practitioners were considered as criteria to select these kebeles.

Totally, 100 respondents (aged >15) of which 82 were ordinary residents and 18 as key informants (traditional healers) participated in this study. Key informants were selected based on the information gathered from the local people while other respondents were randomly selected. Ethnobotanical data were collected between 30 July and December, 2016 in four field trips. Data collection methods were semi-structured interviews focused, group discussions, and guided field walks with key informants. Key informants 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, methods of gathering, methods of preparation, route of application, dosage, side effects of the treatment, uses of the plants other than medicine and management methods. Thereafter, group discussions were made with them and asked for field walk for onsite observation of the plants. Similar procedure was also applied with randomly selected non-practitioners. Voucher specimens were collected, pressed, and dried for identification. For some species, preliminary identification was done in the field. In addition, further identification of all specimens was done by comparison with authentic specimens, illustrations and taxonomic keys from Flora of Ethiopia and Eritheria edited by different authors (Gilbert, 1995; Tewolde and Edwards, 1997; Sebsebe, 2003; Friis and White, 2003, and Friis, 2009). Finally, the accuracy of identification species was approved by an expert from National Herbarium at Addis Ababa University. The identified specimens were deposited in Haramaya University Herbarium.

### 3.3. Data Analysis

Ethnobotanical data were summarized using descriptive statistical method (e.g., percentage and/or frequency and chart) the data on medicinal plants, use and associated knowledge. The most useful information gathered on medicinal plants reported by local people: medicinal value, application, methods of preparation, routes of administration, disease treated, parts used and habit was analyzed through descriptive statistics. .

**Informant consensus factor (ICF).** In order to evaluate the reliability of information during the interview, informants were contacted at least two times for the same ideas to check the validity of the information recorded. If the ideas of the informants contradict with the original information, it was rejected since it is considered as unreliable. It was calculated for categories of ailments to identify the agreements of the informants on the reported cures using the formula used by Rodrigo *et al.* (2005) and Tilahun (2007). ICF was calculated using the following formula.

$$\text{ICF} = \frac{n_{ur} - n_t}{n_{ur} - 1}$$

Where:  $n_{ur}$  is number of use citations for each ailment,  $n_t$  is the number of species used for that ailment.

**Fidelity level:** The fidelity level (FL), the percentage of informants claiming the use of a certain plant for the same major purpose, was also calculated for the most frequently reported diseases or ailments using the following equation (Tilahun, 2007).

$$FL(\%) = \frac{NP}{N} \times 100$$

Where:  $N_p$  is the number of informants that claim the use of a plant species to treat a particular disease, and  $N$  is the number of informants that use the plants as a medicine to treat any given disease.

**Preference ranking:** To compare the most effective medicinal plants used by the community to treat the particular disease, preference ranking was conducted following Martin (1995) and Cotton (1996) for most important medicinal plants used in treating skin diseases. For this, ten key informants were selected to identify the best preferred medicinal plant species for treatment of the illness. Each informant was provided with the mentioned medicinal plants reported to cure the illness with leaves of medicinal plant used being paper tagged then was asked to assign the highest value for the most preferred species against the illness and the lowest value (1) for the least preferred plant and in accordance of their order for the remaining one. The value of each species was then summed up and the rank for each species was determined based on the total score.

**Direct matrix ranking:** Based on information gathered from informants, ten multipurpose plant species were selected out of the total medicinal plants. Seven use diversities of these plants were listed for six randomly selected key informants to assign use values to each species in their respective localities. The seven use values include medicinal, fodder and food, fuel and charcoal, construction, fencing and furniture making. Direct matrix ranking was used to compare multipurpose use of a given species and to relate this to the extent of its utilization versus its dominance (Martin, 1995). Each key informant was asked to assign use values (4= best, 3= very good, 2= good, 1=least used and 0= not used). Consequently, each key informant use values for

the ten multipurpose medicinal plant species, average value of use diversities for the species was taken and the scores of each species was summed up and ranked.

## 4. RESULTS AND DISCUSSION

### 4.1. Indigenous Knowledge of the People of the Study Area

A total of 70 Medicinal plant species were collected from the study area. Most of the reported medicinal plants are used to treat human ailments. Indigenous people of the study area in general, elders and other knowledgeable community members in particular have well developed knowledge about their environment

In this study a total of hundred informants were interviewed that includes knowledgeable elders, women and youngsters. Most of the informants were not intentional to tell their knowledge on traditional medicine due to the belief that the traditional medicine could not work if it is told to everybody and most used this as secret. They transfer their knowledge to the youngsters considering their conduct and through wish and preying to them to have the power of healing patient. When these traditional healers cure a patient they will be given money, sheep and other material but giving money is a recent culture to the study area. If the cured person cannot do this he has to invite the healer in his house. This cultural trend might cause the local healers not to sale in high cost.

Traditional healers or practitioners in the study area use very common way of traditional medicine preparation by using different plant parts. They do not have knowledge associated with unclear spiritual words or written materials. They serve local people by preparing remedies for different types of diseases. Such types of traditional medicine practices are also common in any other parts of the country and world as whole. The local people of the study area appointment to traditional healers for different human and livestock ailments such as yeletitwefbashe (liver disease), yatinent and yetunchabashe (bone and muscles disease), yequedabashe (skin and skin related disease), gambisa) (cold disease), dinague (cough), yesambuabashe (TB and related diseases), Yequlalitbashe (kidney and urine related disease), yesinbashe (tooth and mouth related disease ), areshi and buda (eye evil), meza (wound), mich and megagna (dingegna) etc. than modern medication.

Knowledgeable healers especially elders in the study area treat these ailments by their special remedies with little change. All of the healers responded that they keep their medicinal plants hideaway and said that free transfer could only be possible with family and family members or close relatives. In the study area medicinal plants are harvested as necessary. Some plants were reported to be harvested when parts (such as seeds, fruits and flowers) were fully matured. The informants also reported that the gathering and processing of remedies are restricted to traditional healers.

People should get information on the cultural and social factors that affect health. In the effort made to capture information on the indigenous knowledge of the people, it was observed that the indigenous people of study area deserved credit to their health. They called their health “Fennet” which is taken as special wealth offered by God. In their day-to-day communications and greetings, the people in the study area is appreciating and deserved essential credit to their health, for example by saying “Wehaminihe? Are you fine? “Fennetahebemiru?” are you healthier?, “Gemojahebemiru?” are you strong? “Wehahir!” Be well! “Fenetahewehaeyehir!” Be healthy! etc. These sayings and proverbs show that, health is viewed as great asset that is vital to accomplish daily life activities in the area.

#### **4.1.1. Age, sex and marital status of the informant**

Based on the information gathered from the local people, the interest of younger generation in knowing and using traditional medicine is very less. This study also clarifies the presence of traditional medicinal knowledge difference with respect to sex and age difference. It provides us with information necessary to predict medicinal plants knowledge with respect to sex difference. Higher averages were calculated for men than women, for older people than younger ones and that males are more knowledgeable in traditional medicine practice than that of female. In similar way many researchers (Ermias *et al.*, 2008) revealed that the knowledge of medicinal plant is directly related to the age.

According to the respondent, the traditional knowledge in the family or community is passed from male parent to his first-born son. This study also supported by previous finding of (Tilahun and Giday; 2007).

Table.1 Age and marital status of the informants

Age	No. of informant	%	Marital status			%
20-40	19	19%	Male	Married	48	48
41-60	53	53%		Single	8	8
≥61	28	28%		Divorced	7	7
				Total	63	63
			Female	Married	27	27
				Single	3	3
Divorced	7	7				
Total	37	37				

#### 4.1.2. Educational status of the informants

The majority of the informants (59%) were not illiterate but the knowledge of giving and informing about medicinal plant not acquired by education rather by adapting the culture of the study area.

Table.2. Educational status of informants

Educational status	Male	Female	Total	Percentage
Illiterate	17	17	34	34%
1-12	40	19	59	59%
Certificate	6	1	7	7%
Total	63	37	100	100%

## 4.2. Ethnomedicinal Plant Species of Gummer Woreda

The number of medicinal plants recorded and identified was 70 species distributed in 38 families. These plants are used to treat 38 different types of human and 9 livestock diseases, respectively. The most diverse families were Asteraceae 7, Lamiaceae and fabaceae 6 spp each followed by Poaceae and Rosaceae each with (5 spp); Euphorbiaceae, Brassicaceae, Solanaceae each with 3 spp, Apiaceae and Acanthaceae each with (2 spp.) and the rest families were represented by one species each. This finding is in agreement with that of Mersha (2011), who reported some of these families as dominant medicinal plant families in his study conducted in Guji Agro-pastoralists, Blue Hora District of Borana Zone, Oromia Region, Ethiopia.

Table 3. List of the most common families of medicinal plants in study area

No.	Family	No . of spies	%
1	Asteraceae	7	10%
2	Lamiaceae	6	8.6%
3	Fabaceae	6	8.6%
4	Poaceae	5	7.1%
5	Rosaceae	5	7.1%
6	Other 33 families	41	68.7%

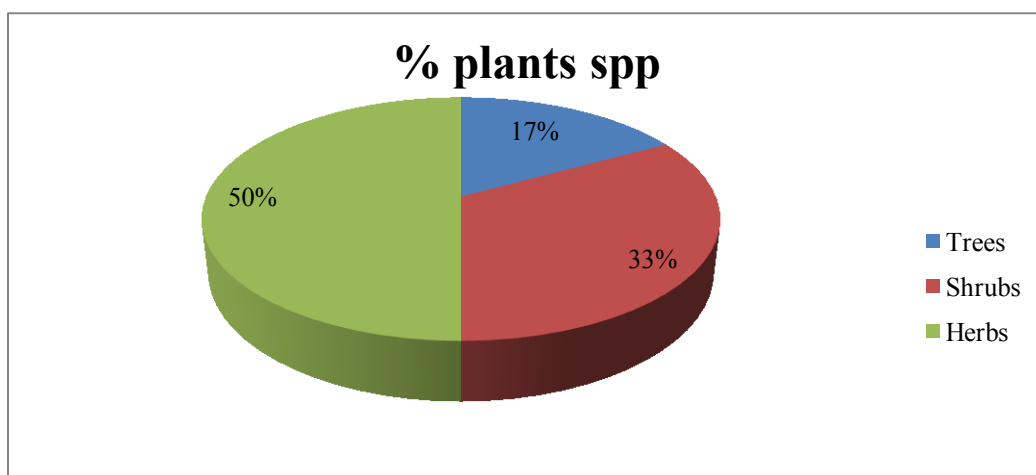
## 4.3. Growth forms of medicinal plants and their distribution in wild and home garden

As the result showed that the growth forms of those collected medicinal plants (figure. 2) reveals that herbs covers the largest category (35 species, 50%) followed by shrubs (23 species, 32.86%). Trees took the remaining position which covers about (12 species, 17.14%). In most parts of Ethiopia, herbs are the predominant plants for traditional medicine (Tilahun and Mirutse, 2007) and this also seen in the study area. This study also showed that the most widely used medicinal plants habit s are herbs followed by shrubs. This may be due to these species exhibit high level of abundance and easy to obtain them. Additionally, this study also revealed that similar proportions of growth form of medicinal plants are used in medicinal a practice that

possibly contributes for slowing threat rate of medicinal plants coming from limited habit collection.

In most previous studies (e.g., Tilahun and Mirutse, 2007; Endalew, 2007; Ermias, 2005; Debela, 2001) conducted in different parts of Ethiopia, herbs are the predominant plants for traditional medicine use. Contrary to this, Tigistet *al.* (2007) reported trees as dominantly used for medicine in “*Dheeraa*” town, Arsi Zone, Ethiopia. On the other hand, Mersha (2011) reported shrubs as dominant medicinal plants in Bule Hora, Oromia Regional State Ethiopia.

**Fig 2.**Habits of medicinal plant used in study area



**Table 4** .List of Medicinal Plants collected and identified the study area with their family, local name, diseases they treat, preparation, dosage and their habits .

Botanical name and plant habit	Family	Local name	Disease treated	Part(s) used, Preparation method and dosage	Coll. No
<i>Acacia abyssinica</i> Hochst.exBenth <b>Tree</b>	Fabaceae	Girrar	Muscles and back pain	The leaves of this plant is crushed and boil it with water then drunk half of coffee cup when there is back pain and muscles pain	HU67
<i>Afrocarpus falcatus</i> (Thunb.) R. Br. ex <b>Tree</b>	Podocarpaceae	Zygba	Evil eye	Stem of this plant is burned and smoke inhale orally	HU10
<i>Ajuga integrifolia</i> Buch.-Ham.ex D.Don <b>Herb</b>	Lamiaceae	Akembiye	Knee and leg pain.	The leaves of this plant crushed and boiled with water then cooled and drink a cup with empty stomach with 2 days gap.	HU20
			Diarrhea	Whole plant part added to hot water then filter and tea glass drunk.	
<i>Allium cepa</i> L <b>Herb</b>	Liliaceae	Shinkurt	Hypertantion	The bulb of <i>Allium cepa</i> crushed properly and added to water then filtered and drunk when there is hypertension	HU62
<i>Allium sativum</i> L. <b>Herb</b>	Alliaceae	Tuma	Common Cold, wound	Root of <i>Allium sativum</i> cut and grinded and then swallowed when there is common cold.	HU32

				Put on wound.	
			TB and cough	Root of this plant cut and grinded and then swallowed all morning with half of spoon.	
			Dingetegna of livestock	The whole part of <i>Allium sativum</i> is crushed and allowed to smell when livestock have cough and for sudden illness	
<i>Alistema afra</i> L. <b>Herb</b>	Asteraceae	Chiyanchiy	Gonorrhea and Syphilis	Stem and leaf of <i>Alistema afra</i> is ground, powdered and mixed with little water one then drunk every morning for three days	HU12
<i>Aloe deibrana</i> Christiana <b>Shrub</b>	Aloaceae	Mertdye	Ring worm	The latex of the young leaves is collected and crushed then eat frequently until the ring worm stop to harm the host and creamed the affected area by the latex of the young leaf	HU21
			Wound	The stem of this plant pilled and put on wound	
			Eye disease	The sap/latex <i>Aloe Vera</i> will be applied directly into the eye	
			Tooth ache	The stem of this plant pilled and put on pain teeth.	
<i>Argemone mexicana</i> L <b>Herb</b>	Papaveraceae	Yimaresoh	Skin rash	The root of this plant is crushed and mixed with the root of <i>Justicia schiperiana</i> and	HU42

				added to water then washed the whole body through it	
<i>Artemisia abyssinica</i> afraqL. <b>Herb</b>	Asteraceae	Wotambo	Kidney pain.	The leaves of <i>Artemisia abyssinica</i> is crushed and mixed with water and then drink a glass when there is kidney pain.	HU25
			Tonsillitis,cold and sickness in child	Infusion of the whole plant is drunk when there is diseases of cold, Tonsillitis and sickness in child.	
<i>Artemisia afra</i> jacq.exwilld <b>Shrub</b>	Asteraceae	Natrar	Head ache	The fresh leaves of <i>Artemisia afra</i> Put on head when there is headache.	HU03
<i>Bambus spp</i> L. <b>Shrub</b>	Poaceae	Enet	Small baby diarrhea	Leaves of this plant is crushed and added to water then allowed to drink in tea spoon frequently until the diarrhea stop	HU65
<i>Beta vulgaris</i> L. <b>Herb</b>	Chenopodiaceae	Keysir	Anemia	The root of this plant is cooked and eat with food like enjera and kocho	HU31
<i>Brassica nigra</i> Koch. <b>Herb</b>	Brassicaceae	Tebeque	Abdomen ache	The leaves of <i>Brassica nigra</i> crushed and mixed with water then drink when there is pain of abdomen ache	HU38
			Tooth ache	The fresh leaves of this plant is put on teeth	
<i>Brassica oleracea</i> L. <b>Herb</b>	Brassicaceae	Ambir	Abdomen dryness	The leaf of <i>Brassica oleracea</i> cooked and eats without stopping until watery stool is	HU55

				released.	
<i>Carissa spinarum</i> L. <b>Shrub</b>	Apocynaceae	Burat	Ear pain	Stem of this plan rubbed with ear smoothly	HU23
<i>Catha edulis</i> (Vahl)Forssk.exEndl. <b>Shrub</b>	Celactraceae	Khat	Coughing	Boil the leaves and stem of <i>Catha edulis</i> and added to water then add with honey and sometimes add to butter, finally drink when it cool.	HU59
<i>Cordia Africana</i> Lam. <b>Tree</b>	Boraginaceae	Wanza	Wound	The fresh root of <i>Cordia africana</i> crushed and cut with knife and then put on wound.	HU19
			Evil eye	The stem of <i>Cordia africana</i> burn smoothly and inhale it properly.	
<i>Croton macrostachyus</i> Hochst <b>Tree</b>	Euphorbiaceae	Bisana	Gonorrhea	Its root of this plant is chewed and swallowed.	HU29
			Ringworms and spider bite	The latex of this plant is collected and then applied on the affected part until recovery or the leaf of <i>Croton macrostachyus</i> is crushed and smashed the extract is creamed on affected area.	
<i>Cucumis ficifolius</i> A.Rich <b>Shrub</b>	Cucurbitaceae	Embuerepue	Sudden illness,	The fresh fruit of this plant cut and smell and oral inhale.	HU60
			TB and cough	The fruit is washed, dried and crushed then	

				boiled, and drunk the juice with butter every morning until it treat the disease properly	
			Wound	The fruit is washed with water, then squeezed between palms and the latex is applied on the wound.	
<i>Cynodon dactylon</i> (L.)Pers. <b>Herb</b>	Poaceae	Tereh	Skin rash	Whole part of <i>Cynodon dactylon</i> crushed and mixed with water then washed with it.	HU11
<i>Daucus carota</i> L. <b>Herb</b>	Apiaceae	Carrot	Sight problem	Fresh root of <i>Daucus carota</i> eat until decrease its effect.	HU48
<i>Dovulis abyssinica</i> (A.Rich) warb <b>Herb</b>	Flacourtiaceae	Yetayessoh	Rheumatic Pain	The root powder of <i>Dovulis abyssinica</i> is together with the pounded young shoot of <i>Cordia africana</i> smoked.	HU57
			skin disease	The fresh root of <i>Dovulis abyssinica</i> crushed and added to water ,then after one day passed washed with it	
<i>Echinops kebericho</i> Mesfin <b>Herb</b>	Asteraceae	Chosa	Mich and dingetegna for both human and livestock	Root of this plant burned and smoke inhale orally	HU13

<i>Ensete ventricosum</i> (Welw.) Cheesman  <b>Shrub</b>	Musaceae	Esset	Bone break, tooth ache muscle pain, liver pain, gonorrhea and syphilis	The of Root of <i>Ensete ventricosum</i> is cooked and eat with yoghurt for bone break, muscle pain, gonorrhea and syphilis but with different varieties.	HU16
			liver pain	The stem sap of one special variety of <i>Ensete ventricosum</i> which is termed "demert" locally, drink continuously when there is this disease.	
<i>Eucalyptus globulus</i> Labill.	Myrtaceae	Eche	Foot smell	The fresh leaves of <i>Eucalyptus globules</i> crushed and Added into shoes	HU15
<b>Tree</b>			Mich and dingetegna for human and livestock	Drinking the stem sap of this plant	
			fibril illness,	The young leaves and immature tip stem are boiled in water the inhaled by the patient during the bed time until recovery.	
			Eye infection	Boil it with leaves of <i>Carica papaya</i> in water and inhale its vapor	
<i>Euphorbia ampliphylla</i>	Euphorbiaceae	Kulkual	Ring Worm	Fresh leaf is pounded, mixed with water then after 3 days apply to the affected part	HU30

Pax Tree					
			Wound	Stems are rubbed on the affected area until it recovers.	
			Black leg of livestock	The sap of <i>Euphorbia ampliphylla</i> Rubbed to the leg of livestock	
<i>Fragaria ananassa</i> Duch. Shrub	Rosaceae	Embuehna	Stomach ache	Fresh fruit of this plant are chewed continuously when there is stomach ache	HU50
<i>Foeniculum vulgare</i> Mill. Herb	Apiaceae	Enselal	Stomach ache, Urinary problem	Fresh leaf together with garlic are grounded, mixed with water then given orally with tea spoon.	
			Gonorrhea Digestive problem	The leaves of <i>Foeniculum vulgare</i> boiled and drink when there is such problem	HU26
<i>Impatiens tinctoria</i> Herb	Balsaminaceae	Inshoshila	Arthritis	The roots of this plant are chopped, boiled, crushed and drunk.	HU14
			Foot and finger toe disease	Root of <i>Impatiens tinctoria</i> is cut and crushed and add with water and tie with rope on toes	
<i>Indigofera amorphoids</i>	Fabaceae	Yefurgetere	Body swelling	Rubbing the swelling area with crushed leaves of <i>Indigofera amorphoids</i> .	HU58

Jaub-and Spach <b>Herb</b>			Wound	The Whole plant part this plant is dried, powdered and applied on the wound until recovery.	
<i>Inulaconfer tiflora</i> A.Rich <b>Shrub</b>	Asteraceae	Monare	Eye pain of livestock	Leaf of <i>Inulaconfer tiflora</i> is crushed and mixed with water then sprayed on eye of sheep.	HU01
			Eye evil of human	Leaf of <i>Inulaconfer tiflora</i> is crushed and mixed with water then washed with it for 7 continuous days	
<i>Hagenia abyssinica</i> (Bruce) J. F. Gmel <b>Tree</b>	Rosaceae	Chima	Tape worm	The leaf and seed of <i>Hagenia abyssinica</i> Crushed and drunk with water	HU17
			Lice and ticks of cattle's	The fresh leaves of this brought the rubbing whole parts of the cattle day today until lice removed	
<i>Hordeum vulgare</i> L. <b>Herb</b>	Poaceae	Ehir	Muscles illness and bone break Wound of live stoke	The seed of this plant is powdered and added to water then dried and eat every morning continuously.  Feeding the seed of barley when livestock have sever wound	HU27
<i>Hypoestes triflora</i>	Acanthaceae	Yeteyibere	Anemia and	Cooking the leaf of <i>Hypoestes triflora</i> then	HU02

(forssk) rome and schult <b>Herb</b>			excessive bleeding	drink continuously with half of a glass when mother born to new baby and for excessive bleeding.	
<i>Justicia schiperiana</i> (Hochst. Ex Nees) T. Anders <b>Herb</b>	Acanthaceae	Sensel	Skin rash and external parasite ex lice	Leaf decoction of this plant is added to water and washed the body with it.	HU44
<i>Juniperus procera</i> Endl. <b>Tree</b>	Cuppressaceae	Det	Evil eye	Oil of this plant is smoke and inhale orally	HU52
<i>Kalanchoeshimpetian</i> aA. Rich <b>Herb</b>	Crassulaceae	Andahula	Ascaris	For ascaris, the root is cut with a knife of horn and chopped on un movable stone, and mixed with water; it is squeezed between palms, applied in the left nose.	HU43
<i>Leonotis nepetifolia</i> (L.) R.Br. <b>Herb</b>	Lamiaceae	Enbuda	Over Blood Pressure	The leaves of <i>Leonotis nepetifolia</i> is Crushed, squeezed and drunk with tea when blood pressure is over than normal blood pressure.	HU08
<i>Lepidium sativum</i> L. <b>Herb</b>	Brassicaceae	Shif	Bloating of livestock,	Seed of <i>Lepidium sativum</i> and bulb of <i>Allium sativum</i> are pounded together and given to cattle.	HU40
			Mich and dingetegna	The seed is chewed and smoke inhale	

			both for human and livestock		
			Cough, tonsillities ,tooth ache	Seed of <i>Lepidium sativum</i> and bulb of <i>Allium sativum</i> are pounded together and given to human with honey for five days	
<i>Leppia adonesis</i> L. <b>Shrub</b>	Verbenaceae	Koseret	Appetite problem	Leaves of <i>Leppia adonesis</i> Plant is dried and crushed then soaked and properly then mixed with butter added, finally eat food with ingredient when their appetite problem.	HU51
<i>Lippia adoensis</i> Hochst .ex.Walp.* <b>Shrub</b>	Lamiaceae	Kessay	Mich(fibril illness), Headache	The leaf and immature stem of this plant is ground, pounded and mixed with small amount of coffee and then drunk during sickness time	HU18
<i>Linum usitatissimum</i> L. <b>Herb</b>	Linaceae	Telba	Amoebisis Constipation	The pound seed is drunk in an empty stomach. Seeds are soaked in water over	HU36
			Stomach ache	night and the water solution is drunk	
<i>Lobelia giberroa</i> Hemsl <b>Shrub</b>	Lobeliaceae	Gimar	Evil eye	Leaf of this plant is crushed and added to water then washed the whole body with it.	HU04
<i>Melia azedarach</i> L.	Meliaceae	Neem	Toothache	Young stem is chewed and kept on the teeth.	HU63

<b>Tree</b>			Anthrax and some insect bite	The fine powder of dried bark is added to a glass of water and applied through the mouth only once.	
<i>Mentha spicata</i> L. <b>Herb</b>	Lamiaceae	Nana	Kidney infection and pain	Crushed and drunk at empty abdomen for 5 continuous day	HU33
<i>Nicotiana tabacum</i> L. <b>Shrub</b>	Solanaceae	Tinbahue	Leech Infestation and stomach ache	Leaf of this plant crushed and mixed with water then allowed to drink	HU41
<i>Ocimum basilicum</i> .L <b>Shrub</b>	Lamiaceae	Azmoreni	Bloating and stomach ache livestock	Its fresh leaves of <i>Ocimum basilicum</i> . with the bulb of <i>Allium sativum</i> , salt are ground together and then one liter of the solution is given to cattle and one coffee cup is given to human	HU69
<i>Ocimum lamifolium</i> .Hochst. ex Benth <b>Herb</b>	Lamiaceae	Damakesie	Common cold and other viral disease like influenza	Leaves of <i>Ocimum lamifolium</i> crushed and boiled with water for half day and then cooled and drink half of a glass with 3 days gap continuously until the disease stop.	HU05
<i>Olea europehe</i> (Wall. ex DC) <b>Tree</b>	Oleaceae	Weyra	Evil eye	Stem and leaves of <i>Olea europaea</i> are burned and smoked and inhaled smoothly.	HU49

<i>Persea americana</i> Mill. <b>Tree</b>	Lauraceae	Avocado	Face rash	Fruit of this plant allowed maturing and the crushed then rubbed face properly after proper washing.	HU54
<i>Phragmites australis</i> (Cav.) Trin. ex Steud Shrub	Poaceae	Gerefa	Skin rash and infection	The whole part of this plant is crushed and powdered then washed whole affected skin	HU37
<i>Pisuvem satium</i> L. <b>Herb</b>	Fabaceae	Getere	Muscles illness and bone break	Seed of <i>Pisuvem satium</i> is crushed and powdered then added to butter then eat with kocho (food of enset)	HU24
<i>Parochetus sp.</i> <b>Herb</b>	Fabaceae	Yekimarchza	Hair lice	The whole part of <i>Parochetus sp.</i> Crushed and washed hair with it continuously.	HU28
<i>Phytolacca dodecandra</i> L <b>Shrub</b>	Phytolaccaceae	Endode	External parasite and skin infection	Root and leaf are grounded mixed with water and wash for 4 consecutive days	HU45
<i>Prunus persica</i> (L.) Batsch peach <b>Tree</b>	Rosaceae	Kok	Dingetegna for human and livestock	The fresh leaves of <i>Prunus persica</i> crushed and smell gently.	HU35
<i>Rhamnus prinoides</i> L. Her. <b>Shrub</b>	Rhamnaceae	Gesho	Tonsilities	Chew the leave until it stop the sense of illness	HU 64
<i>Ricinus communis</i> L. <b>Shrub</b>	Euphorbiaceae	Azaza	Tooth ache	Seed of <i>Ricinus communis</i> burn gently and smoke inhaled orally	HU47

			Livestock lice and ticks	Fresh broad leaves of <i>Ricinus communis</i> brought and rubbed the whole part of calves and all cattle with it .	
<i>Rosa abyssinica</i> R. Br. ex Lindl. <b>Shrub</b>	Rosaceae	Guara	Calf cold	Leaves and stem of this plant grinded and added to water and allow to drink when there calf cold.	HU70
			Eye evil	Leaves and stem of <i>Rosa abyssinica</i> grinded and added to water washed the whole body frequently.	
<i>Rosa spp</i> Mill. <b>Shrub</b>	Rosaceae	Tsigereda	Bleeding	The flower of this plant is crushed and added its juice in to nose after bleeding.	HU61
<i>Rumex nephalensis</i> Spreng. <b>Herb</b>	Polygonaceae	Tuya	Hair rash and hair produce powdery like structure	The leaves and flower of this plant crushed and added to water and then washed the hair with it frequently when hair produces powdery like structure.	HU68
			Wound	The fresh Root of <i>Rumex nephalensis</i> cut to small piece and added to wound.	
			Mich and Dingetegna	A leaf of this plant is crushed and smells it properly.	
<i>Ruta chalepensis</i> L. <b>Herb</b>	Rutaceae	Chanye	Abdominal ache and coughing and common cold	The leaf of <i>Ruta chalepensis</i> crushed and boil with water then drink at morning or the fresh leaves of this plant is added to coffee	HU09

				or tea then drink	
<i>Sidas chimperi</i> Hochst.ex.A.Rich. <b>Shrub</b>	Malvaceae	Awdatirk	Evil eye	The stem of <i>Sidas chimperi</i> burned and smoke inhale orally.	HU56
<i>Solanecio gigas</i> (Vatke) CJeffery** <b>Herb</b>	Asteraceae	Fuetera	Abdominal dryness	Its fresh leaves are cooked and then eat frequently.	HU66
<i>Solanum tuberosum</i> L. <b>Herb</b>	Solanaceae	Dinicha	Abdomen dryness and hard stool	The tuber of this plant is cooked properly and eats frequently until stool is come back to normal condition and until abdominal dryness stopped.	HU46
<i>Tauarnieta abyssynica</i> L. <b>Herb</b>	Poaceae	Yegifirchiza	Skin rash and mich	Fresh leaf of this plant is crushed and added to water then drink it juice and finally washed the body with it	HU34
<i>Thymus vulgaris</i> L. <b>Herb</b>	Lamiaceae	Toshine	Continuous cough	The whole part is powdered and mixed with water then drunk during pain time with empty abdomen.	HU07
<i>Urtica simensis</i> Hochst.Ex A.Rich.Herb	Urticaceae	Sama	Skin disease.	The root of <i>Urtica simensis</i> is crushed and mixed powders of barley then cooked and eat.	HU53
			Gonorrhea	The root and leaves of this plant crushed and mixed with powder of wheat or barley then	

				cooked and eat continuously for 7 days.	
<i>Vernonia amygdalina</i> Del. <b>Shrub</b>	Asteraceae	Grawa	Skin infection	The leaf is pounded and the patient body washed by the plant or the leaf of <i>Vernonia amygdalina</i>	HU39
			fever and Sudden illness	The leaves of this plant crushed and put it nose.	
			Calf cold and stomach ache of livestock	The leaves of this plant crushed and mixed with water then allow drinking for livestock.	
<i>Vica faba</i> L. <b>Herb</b>	Fabaceae	Bakela	Bone break	Its seed burn smoothly and crushed then butter added to the powder and eat with empty stomach until it repair the broken bone	HU22
<i>Withania somnifera</i> L. <b>Shrub</b>	Solanaceae	Gisawa	Eye evil	The leaves of <i>Withania somnifera</i> with leaves of <i>Artemisia abyssinica</i> , <i>Vernonia amygdalina</i> , <i>Ruta chalepensis</i> and <i>Allium sativum</i> bulb and the seed of <i>Lepidium sativum</i> are finely crushed together and sniffed at the sickness time. Root of <i>Withania somnifera</i> be crushed and smoke inhaled	HU06

#### 4.4. Familiarity index of medicinal plants

The results of this study showed that some medicinal plants are more frequently cited for their medicinal value than others, and hence popular. *Allium sativum* was the most popular medicinal plant cited (by 55 informants) followed by *Enset ventricosum* (cited by 50 informants) for the treatment of bone and muscles related diseases, *Aloe deibrana* (by 42 informants) for treating of tooth and wound and *Hagenia abyssinica* cited (by 40 informants) for treating tape worm and different livestock external parasites such as lice (Table 5). Popularity of these medicinal plants may also be due to their availability that many people can easily access them without secrecy

Table5. List of the most popular medicinal plants of the study area cited by  $\geq 24$  respondents

Scientific Name	No. of informants	% of informants
<i>Allium sativum</i>	55	55%
<i>Enset ventricosum</i>	50	50%
<i>Aloe deibrana</i>	42	42%
<i>Hagenia abyssinica</i>	40	40%
<i>Vernonia mygdalina</i>	33	33%
<i>Phytolacca dodecandra</i>	30	30%
<i>Vicia faba</i>	30	30%
<i>Ricinus communis</i>	30	30%
<i>Pisum sativum</i>	30	30%
<i>Olea europaea</i>	29	29%
<i>Ocimum lamifolium</i>	28	28%
<i>Echinops kebericho</i>	28	28%
<i>Artemisia abyssinica</i>	27	27%
<i>Nicotiana glauca</i>	26	26%
<i>Hordeum vulgare</i>	25	25%
<i>Daucus carota</i>	25	25%
<i>Ajugain integrifolia</i>	25	25%
<i>Justicia schimperiana</i>	25	25%
<i>Brassica nigra</i>	25	25%
<i>Rumex nepalensis</i>	25	25%
<i>Eucalyptus globulus</i>	24	24%
<i>Ruta chalepensis</i>	24	24%
<i>Parochetus sp.</i>	24	24%

#### **4.5. Parts of medicinal plants used to treat human and livestock diseases**

Most widely used plant parts by the local people in the study area to treat human and livestock diseases include leaves, stems, roots, barks, flower, seed, Bark and leaf, Leaves and stem, Leaf and root, Stem and root, flower and leaf, whole plant parts and others. A maximum number of species (35.71%) were harvested for their leaves to prepare remedies, followed by roots (11.42%), leaves and stems (10%) and the remaining 42.87% covered by other parts. Such wide harvesting of leaves and roots, which are important for the survival of plants has a negative influence on the survival and continuity of useful medicinal plants and hence affects sustainable utilization of the plants. This result of the study agreement with the previous works (Gidey, 2001; Gidey, 2010; Gidey *et al.*, 2011).

The result also showed that highest value of the remedies consisted of a single plant part and more than one part for preparation. However, some of the remedies consisted of different parts of the plant species to treat single or more disease. Moreover, a single plant is used for more than one disease. Because of the period of harvesting plant material as well as the availability of the plant part may affect the plant part used in herbal preparations. According to informants 60% of herbal preparations are from fresh plant parts, whereas 21.4% are from dried parts followed by fresh/dried parts (18.6%). The local people employ several methods of preparation of traditional medicines from plants. Crushing/powdering constituted the major (44.2%) remedy preparation method where the crushed/powdered substances are homogenized in water for administration. The local people also use some other products as additives in their preparations. For example, salt, sugar, butter and milk were additives used in remedy preparation.

Oral administration by way of drinking, chewing/eating are the dominant route (45%) of remedy usage followed by dermal route (19%) which covers rubbing against the skin, creaming and washing and nasal which covers 13%. Predominance of oral and dermal routes of herbal drug application in the study area may be because of high prevalence of intestinal and skin related problems in the area (Kebu *et al.*, 2004). The measurements used to determine the dosages are not similar and standardized and depend on the age and physical

appearance of the patient, socio-cultural explanation of the illness, diagnosis and experience of individual herbalist. Children are given small doses of medicine than considered in case of adult patients.

As a result the local healers simply prescribe small amount such as drops, hand palms, coffee cups and for larger dosages the water glasses or other local materials that are used for drinking. Local healers have special care for pregnant women. Drug addicted and weak persons are not given those medicines that have observable adverse effects such as stomach ache, vomiting and diarrhea result. The frequency of treatment depends on the type of illness and its severity. Most of the remedies were reported to have no serious adverse effects except vomiting, diarrhea and temporary inflammations unless over dosage being used. According to the healers, these effects are generally due to an overdose of the remedy. For counteracting the side effects of treatments, the patients are ordered to vomit or drink milk. The people of the study area use cow milk as common antidote. Similar finding was reported by some other researchers, for example, Ermias *et al.*, (2008).

Table .6. Forms of application of remedies in the study area

Method	No. preparation	%	Condition of preparation	No. plant species	%
Washing	12	12%	Fresh	42	60%
Eating and drinking	40	40%			
Chewing	5	5%	Dry	15	21.4%
Put on	6	6%			
Rubbed	4	4%			
Fumigate and Inhaling	13	13%	Both	13	18.6%
Creamed	3	3%	Total	100	100%
Others	17	17%			

## **4.6. Informant consensus factor (ICF) and Fidelity level**

### **4.6.1. Informant Consensus factor**

Human diseases of the study area have been grouped into different categories based on the site of occurrence of the disease, condition of the disease as well as treatment resemblance. The informant consensus factors were then calculated for each disease category (Table 3). The result showed that ICF ranged from 0.65-1.00. Ear pain, hair rash, high blood pressure and appetite problem had the highest ICF value (1) followed by tuberculosis, wound, eye disease, muscles and bone pain related diseases, anemia ( $> 0.90$ ), suggesting good agreement of these plants to cure each disease category. Besides, ICF for most other disease categories also was high showing people of the study area in general agree on curative property of the suggested diseases.

**Table 4.** Informant consensus factor by categories of diseases in the study area

Category	Species	Use citation	ICF
Tooth ache	6	42	0.87
Stomach ache	8	25	0.70
Common cold and cough	10	24	0.60
TB	2	14	0.92
Tonsillitis	3	8	0.71
Eye evil	9	24	0.65
Wound	5	42	0.90
Intestinal parasites	5	40	0.89
Eye disease	3	25	0.91
Ear pain	1	10	1.00
Muscles and bone pain	4	50	0.93
Anemia	2	17	0.93
Kidney pain and other urinary problem	6	27	0.80
Head ache	3	22	0.90
Fibril illness, leg and foot illness	4	25	0.87
STDS	5	15	0.71
Insect bite	4	10	0.66
Skin related diseases	7	25	0.97
Bleeding	1	15	1.00
Liver pain	2	50	0.97
Blood pressure	1	6	1.00
Diarrhea	2	19	0.94
Rheumatic Pain	2	20	0.94
Appetite problem	1	10	1.00
Hair rash	1	24	1.00

#### 4.6.2 Fidelity level index of healing potential of medicinal plants

Fidelity level (FL) quantifies the importance of a species for a given purpose. Hence, fidelity level values were calculated for commonly used individual medicinal plants against the some

selected ailments. Percent fidelity level of *Dovulis abyssinica* to treat skin related disease, *Lepidium sativum* for treating bloating and *Aloe deibrana* to treat wound was 100%, suggesting that these plants may be specifically used to treat particular ailments. Others however had values less than 90% suggesting their use for some other diseases treatment as well.

**Table 5.**Fidelity index of some selected medicinal plant

No	Medicinal plants	Disease	Np	N	FL	FL%	Rank
1	<i>Aloe deibrana</i>	Wound	42	42	1.00	100%	1 <sup>st</sup>
2	<i>Dovulis abyssinica</i>	Skin disease	20	20	1.00	100%	1 <sup>st</sup>
3	<i>Lepidium sativum</i>	Bloating	20	20	1.00	100%	1 <sup>st</sup>
4	<i>Ricinus communis</i>	Tooth ache	26	30	0.86	87%	4 <sup>th</sup>
5	<i>Foniculum vulgare</i>	Gonorrhea	10	12	0.83	83%	5 <sup>th</sup>
6	<i>Artemisia abyssinica</i>	Kidney infection	20	27	0.74	74%	6 <sup>th</sup>
7	<i>Enset ventricosum</i>	Bone break	35	50	0.70	70%	7 <sup>th</sup>
8	<i>Melia azedarach</i>	Insect bite	7	10	0.70	70%	7 <sup>th</sup>
9	<i>Linum usitatissimum</i>	Stomach ache	12	18	0.67	67%	9 <sup>th</sup>
10	<i>Hagenia abyssinica</i>	Tape worm	25	40	0.62	62 %	10 <sup>th</sup>

#### 4.7. Preference ranking of plants used to treat skin and skin related diseases

Skin related diseases were mentioned to be treated by 7 medicinal plant species. When there are different species prescribed for the same illness, people show preference to one over the other. As a result, preference ranking of 7 medicinal plants that were reported for treating skin and skin related diseases was conducted after selecting 10 key informants. The informants were asked to compare the given medicinal plants based on their efficacy, and to give the highest number (7) for the medicinal plant which they thought most effective in treating skin and skin related diseases and the lowest number(1) for the least effective plant in treating skin and skin related diseases. Result showed that *Dovulis abyssinica* ranked first and hence is the most effective medicinal plant to cure skin and skin related diseases. The second, third, fourth and fifth most preferable medicinal plants against this disease are *Justicia schiperiana*, *Phytolacca dodecandra*, *Vernonia amygdalina* and *Phragmites australis*, respectively, while the least

preferable species compared to other those listed species are *Argemone mexicana* and *Tauarnieta abyssynica* (Table 7).

**Table 7.**Preference ranking of medicinal plants used for treating skin and skin related diseases

Plant species	Informant labeled 1-10										Total	Rank
	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10		
<i>Dovulis abyssynica</i>	6	7	7	7	7	7	7	7	7	7	69	1 <sup>st</sup>
<i>Justicia schiperiana</i>	7	7	7	6	7	7	5	5	7	7	66	2 <sup>nd</sup>
<i>Phytolaccado decandera</i>	5	5	5	7	5	4	5	4	5	4	49	3 <sup>rd</sup>
<i>Vernonia amygdala</i>	3	2	2	6	6	6	7	3	3	1	39	4 <sup>th</sup>
<i>Argemone mexicana</i>	1	2	2	4	4	4	7	6	3	3	36	5 <sup>th</sup>
<i>Phragmites australis</i>	1	2	3	4	4	4	4	4	7	4	34	6 <sup>th</sup>
<i>Tauarnieta abyssynica</i>	2	5	2	2	3	5	2	3	7	2	33	7 <sup>th</sup>

#### 4.8. Direct Matrix Ranking

In this study area, it was found that 54 species (77.14%) of medicinal plants have values other than their medicinal role. Of these, ten commonly reported multipurpose species and seven use-categories were used to calculate direct matrix ranking with the help of six informants. Result showed that *Eucalyptus globulus* ranked first and hence it is the plant most exploited for various purposes followed by *Juniperus procera*, *Trichilia dregeana*, *Enset ventricosum*, *Hagenia abyssinica*, *Olea europehe*, *Hordeum vulgare*, *Rosa damascene*, *Allium sativum*, *Lepidium sativum* (Table 8). So, the top ranked species are most likely to be highly threatened as they are used for many purposes and deserve attention for conservation.

**Table.8.** Direct matrix ranking of ten plant species by six informants based on seven use criteria

Plant Species	Use Categories							Total	Rank
	Food and Fodder	Fuel and Charcoal	Fiber Rope	Construction	Fence	Medicine	Furniture		
<i>Olea europehe</i>	0	4	0	3	2	4	0	13	6 <sup>th</sup>
<i>Enset ventricosum</i>	4	0	4	2	0	4	3	17	4 <sup>th</sup>
<i>Allium sativum</i>	2	0	0	0	0	4	0	6	9 <sup>th</sup>
<i>Hagenia abyssinica</i>	1	3	0	2	2	4	4	16	5 <sup>th</sup>
<i>Eucalyptus globulus</i>	0	4	0	4	4	4	4	20	1 <sup>st</sup>
<i>Hordeum Vulgare</i>	4	0	0	0	0	4	0	8	7 <sup>th</sup>
<i>Bambus spp</i>	2	1	0	3	2	4	4	18	3 <sup>rd</sup>
<i>Juniperus procera.</i>	0	4	0	4	4	4	3	19	2 <sup>nd</sup>
<i>Rosa spp</i>	0	0	0	0	4	4	0	8	7 <sup>th</sup>
<i>Lepidium Sativum</i>	1	0	0	0	0	4	0	5	10 <sup>th</sup>

(4= best, 3= very good, 2= good, 1= least used, 0= not used).

#### 4.9. Threats to medicinal plants and conservation practices

In study area various factors that were considered as main threats for medicinal plants were reported informants. The most claimed factors claimed were agricultural expansion(1<sup>st</sup>) reported by forty-five respondents, Construction material (2<sup>nd</sup>) reported by forty two respondents, Disforestation(3<sup>rd</sup>) reported by thirty five respondents, Fiber and timber production (4<sup>th</sup>) reported by thirty two respondent and overgrazing and browsing , Un safe harvesting for medical uses, Charcoal and firewood, Medicinal plant trade covers the remaining position (Table.8.). These results are consistent with the findings of various ethnobotanical research elsewhere in Ethiopia, such as that of (Odera, 1997) and Seyani and Chikuni, 1997) indicates some similar investigation. They revealed that anthropogenic factors harsher in losing of plant genetic diversity and threatening the very survival of human kind with erosion of some lifesaving medicinal plants of wild plant existence. So that loss of medicinal plants associates with the missing advantages gained from medicinal plants and indigenous knowledge associated with plants. Traditional beliefs in the area also have their own unintentional role in conservation and sustainable utilization of medicinal plants. However, giving little conservation priority for identified threatened medicinal plants become wipe out from the area.

**Table 9.**Major threats of medicinal plant in study area

Threats	No. Informants	%	Rank
Agricultural expansion	45	45%	1 <sup>st</sup>
Construction material	42	42%	2 <sup>nd</sup>
Disforestation	35	35%	3 <sup>rd</sup>
Fiber and timber production	32	32%	4 <sup>th</sup>
Un safe harvesting for medical uses	25	25%	5 <sup>th</sup>
Overgrazing and browsing	25	25%	5 <sup>th</sup>
Charcoal and firewood	20	20%	7 <sup>th</sup>
Medicinal plant trade	15	15%	8 <sup>th</sup>
Natural factors	15	15%	8 <sup>th</sup>

#### 4.10. Management and conservation of medicinal plants

People of the study area manage the local vegetation to not only meet their fodder, fuel and charcoal, construction, commercial values, cultural and spiritual needs but also for their medicinal attributes, as the knowledge is with them. An informant from Gumer Woreda as shown that the knowledge on medicinal plants in the area passes from generation to generation as there is opportunity of knowledge exchange and transfer to the young. The above grounds and other similar reasons are the problems for the management of medicinal plants and associated knowledge. Even though, there are many problems as well as high population growth and thus there are over exploitation of medicinal plants for different purposes and for getting the daily income, the significant numbers of the local people of the area know the importance of conserving the plants in both natural habitat and outside their natural habitat conservation methods. For instance, some people started conserving the plants by in-situ method (in original/natural habitat), fenced/protected pasture land different worship areas (churches, mosques, etc) in their (farms' field/farm margins and so on. And also conserving by ex-situ method/ outside the original/ natural habitat/ like in and around their farmers' home gardens, live fences of the gardens, plantation fields, and even planting as crop in home garden (*Enset ventricosum* widely cultivated medicinal plant in home garden around study area).

## 5. Summary, Conclusion and Recommendations

### 5.1 Summary and conclusion

This study was conducted in Gummer Woreda, Gurage zone to document ethno medicinal plants and indigenous knowledge on their use for medicine. Hundred people have participated in this study as respondents. Data on medicinal plants use were collected through semi- structured interviews, field observation, group discussion and guided field walk. Totally 70 medicinal plant species treating human and livestock diseases were documented. Herbs were found to be the dominant growth forms used for the preparations of traditional remedies followed by shrubs, and leaves were the most frequently used plant parts followed by roots for preparation of remedies. The most commonly used route of administration was oral followed by dermal. Ear pain, hair rash, high blood pressure and appetite problem had the highest ICF value (1) followed by tuberculosis, wound, eye disease, muscles and bone pain related diseases, anemia ( $> 0.90$ ). Percent fidelity level of *Dovulis abyssinica* to treat skin related disease, *Lepidium sativum* for treating bloating and *Aloe deibrana* to treat wound was 100%, suggesting that these plants may be specifically used to treat particular ailments. Others however had values less than 90% suggesting their use for some other diseases treatment as well. Preference ranking of 7 medicinal plants reported to treat skin related diseases showed that *Dovulisa byssinica* ranked first. Computation of direct matrix ranking showed that *Eucalyptus globulus* ranked first for being used for many purposes

### 5.2. Recommendations

Based on the findings the following recommendations have been made.

- ❖ Local people must be taught of growing medicinal plants in home gardens mixing with crops in the farm lands and live fences.
- ❖ Scientific investigation should be done on rehabilitation of previously lost medicinal plants
- ❖ Chemistry of medicinal plants with high ICF and FL values should be further investigated for drug discovery
- ❖ Awareness rising works for the locals should be made on conservation of medicinal plants

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## 7. APPENDICES

### Appendix 1. Semi-structured interview schedule to be employed in the research area

1. Name \_\_\_\_\_ Sex \_\_\_\_\_ Age \_\_\_\_\_

Kebeles \_\_\_\_\_

Religion: Orthodox \_\_\_\_\_ Islam \_\_\_\_\_ Protestant \_\_\_\_\_ Others \_\_\_\_\_

Marriage Status: Married \_\_\_\_\_ Unmarried \_\_\_\_\_

Educational Status \_\_\_\_\_

#### 2. Health status

2.1 What types of traditional medicines do you use? For how many times did you use it?

2.2 What are the major human diseases in this area?

2.3 What are the major livestock diseases in this area?

2.4 How do you treat the diseases that you know?

#### 3. About the plant medicines

3.1 List the medicinal plants used to treat humans?

3.2 Which traditional medicinal plants are used to treat livestock ailments?

3.3 Which medicinal plants are used to treat human and livestock ailments?

3.4 Where do the medicinal plants obtained (grow)? In home gardens or in the wild or both

4. Which part of the plant is used as remedy? (Leaf, stem, root, flower, bark, fruit, seed, latex, or whole plant) and what is the method of preparation of the medicine? (Crushed and pounded, Powdered, concoction, used alone or mixed with others)

#### 5. Form of the medicinal plant used

5.1 In fresh form

5.2 In dry form

5.3 In fresh or dry form

6. Is there difference in dosage among age or sex groups?

7. Is the way of administration internal or external? If internal how?? Oral, nasal? If external how?

8. What solutions people use to the side effects of the traditional medicines? (Anti dote)

9. Is the medicinal plant marketable?

10. What are the ways of transferring of knowledge of the healers to the next generation?
11. Are the medicinal plants easily accessible? If not why?
12. How does modernization interfere with traditional medicinal knowledge?
13. How do you judge the price of the traditional medicine with that of the modern medicine?
14. Do the communities use only traditional medicine?
15. What are the threats and conservation measure as to the medicinal plants?
16. What is the status of using traditional medicine in the moment?
17. Do the traditional healer use only a single traditional medicinal plant to prepare the remedies or by mixing with others
18. Is there any restriction or taboos in collection of medicinal plants?
19. At what time do the patients take the traditional medicine?
20. What is the status of using traditional medicine at the moment?
21. How is the knowledge of traditional medicine passed to a family member/younger?
22. Any other additional information

**Appendix.2.** Informant name participated in ethnobotanical study.

No	Name	Sex	Age	Kebele	Religion	Educational level	Marital status
1	ZeynuZulal	M	47	Amdom	Islam	12	Married
2	KedirHualid <sup>K</sup>	M	45	Amdom	Islam	4	Married
3	FarisTeleha	M	54	Amdom	Islam	10+3	Single
4	Yordanos W/metkin	M	52	Amdom	Otthodox	10+3	Single
5	Jemal Ahmed	M	70	Amdom	Islam	4	Married
6	TelehaReshid	M	65	A m d o m	Islam	8	Married
7	AssenHualid <sup>K</sup>	M	74	Amdom	Islam	2	Married
8	AlemuShikur	M	63	Bad	Protestant	9	Married
9	DemishishShiketa <sup>K</sup>	F	65	Amdom	Orthodox	No	Married
10	DenifezeOsi <sup>K</sup>	F	62	Amdom	Islam	2	Married
11	BizuneshTeni	F	49	Amdom	Orthodox	4	Married
12	Murshida Ahmed <sup>K</sup>	F	54	Amdom	Islam	No	Married
13	JemalAnsa	M	53	Amdom	Islam	No	Married
14	ShemsuAbrar	M	59	Amdom	Islam	10	Married
15	AmruHusein	M	33	Amdom	Islam	12	Married
16	WujiraAnsa <sup>K</sup>	M	47	Amdom	Protestant	No	Married
17	MitkuZewda	M	28	Dirbonassenen	Orthodox	Degree	Married
18	HeyiruShifa	M	35	Dirbonassenen	Islam	Degre	Single

19	TsehayWarga	F	48	Amdom	Orthodox	10	Married
20	GiftyShafo	F	57	Amdom	Islam	No	Married
21	BeshirBereka	M	50	Amdom	Islam	No	Married
22	Gemberu Siraje	M	67	Armua	Islam	No	Married
23	AyishaHashim	F	50	Armua	Islam	8	Divorce
24	BelayineshWerku <sup>K</sup>	F	59	Armua	Orthodox	No	Married
25	SemiraSeid	F	45	Armua	Islam	9	Married
26	TsebeluGebre	M	47	Armua	Orthodox	7	Single
27	ArgaShimelis	M	39	Armua	Protestant	12	Married
28	AlemuDendir <sup>K</sup>	M	45	Armua	Orthodox	No	Married
29	Menesha W/metikin	F	27	Amdom	Orthodox	8	Single
30	SityAlli	F	66	Amdom	Islam	No	Divorce
31	TiruneshEndale	F	53	Amdom	Orthodox	7	Married
32	JemilHassen	M	51	Armua	Islam	7	Married
33	BedriaShamil	F	41	Armua	Islam	10+3	Married
34	NikechiMitiku	F	38	Dirbonasenen	Protestant	4	Married
35	AlemineshNure <sup>K</sup>	F	45	Dirbonasenen	Islam	No	Divorce
36	SisayShashego	M	45	Dirbonasenen	Orthodox	7	Married
37	AlemuTiruha <sup>K</sup>	M	41	Dirbonasenen	Orthodox	10	Married
38	ZermechiSisay	F	56	Bad	Orthodox	6	Married
39	KebedeZerga	M	70	Bad	Orthodox	12	Married
40	MeleseZeprye	M	49	Bad	Protestant	No	Divorce

41	SowdaHeyiru	F	61	Bad	Islam	4	Married
42	Ahmed Temam	M	64	Bad	Islam	6	Married
43	SofiyaAssen	F	47	Bad	Islam	No	Married
44	LylaSani	F	42	Bad	Islam	10	Married
45	HeyiredinSifir	M	39	Bad	Islam	No	Married
46	AyishaSherfa <sup>K</sup>	F	64	Bad	Islam	No	Married
47	MubarikDelil	M	61	Bad	Islam	No	Divorce
48	MukeremHashim	M	63	Bad	Islam	11	Married
49	MulezebJemal	M	29	Amdom	Islam	10	Single
50	Daniel Kebede	M	36	Amdom	Orthodox	9	Single
51	MeleseEndale	M	33	Armua	Orthodox	10	Single
52	SemiraYassin <sup>K</sup>	F	61	Armua	Islam	No	Married
53	HashimBereka	M	75	Armua	Islam	No	Married
54	Daniel Barkiny	M	49	Armua	Orthodox	8	Married
55	HutihirTigistu	M	33	Bad	Orthodox	7	Single
56	Zuleyiha Jabir <sup>K</sup>	F	54	Armua	Islam	No	Divorce
57	FekedeAgiza	M	65	Amdom	Orthodox	12	Married
58	Degife Kergedada	M	60	Amdom	Orthodox	12	Married
59	SewdatShikur	F	52	Armua	Islam	6	Divorce
60	KedirAwel	M	64	Amdom	Islam	Degree	Married
61	AwelJibiril <sup>K</sup>	M	54	Dirbonasenen	Islam	12	Married

62	RukiyaReshad	M	61	Bad	Islam	No	Married
63	YisresheLeja	F	57	Dirbonasenen	Protestant	No	Married
64	SefaHaletu	M	29	Amdom	Islam	7	Married
65	TibebeTuri	M	71	Amdom	Orthodox	10	Married
66	SalihatAbrar	F	52	Armua	Islam	4	Married
67	MunaAbdella	F	47	Armua	Islam	No	Divorce
68	JilaluZewge	M	41	Bad	Islam	8	Divorce
69	HayatuKedir	M	53	Dirbonasenen	Islam	10	Married
70	A/semmedMifta <sup>K</sup>	M	61	Dirbonasenen	Islam	Degree	Married
71	BeharuZewde	M	50	Amdom	Protestant	6	Married
72	BesratuDendir	M	45	Bad	Protetant	No	Divorce
73	Sultan Alli	M	59	Armua	Islam	No	Married
74	TesfayeEndashow	M	54	Dirbonasenen	Orthodox	12	Married
75	SedikArgani	M	72	Dirbonasenen	Islam	7	Married
76	LemilemAlemu	F	40	Armua	Islam	10	Married
77	YabewerkDargaze	F	43	Bad	Orthodox	12	Single
78	A/shikur Ahmed <sup>K</sup>	M	65	Bad	Islam	No	Married
79	ShemimatNesru	F	56	Armua	Islam	No	Married
80	TadelechShiketa	F	44	Dirbonasenen	Protestant	No	Married
81	AreboMuhdine	M	55	Dirbonasenen	Islam	No	Divorce
82	Aster Neri	F	34	Dirbonasenen	Orthodox	No	Single
83	YirgalemSibany	M	64	Armua	Orthodox	7	Married

84	Demises Mare	M	51	Dirbonasenen	Orthodox	10	Married
85	Behrya Denu <sup>K</sup>	F	55	Bad	Islam	No	Married
86	Shamil Arega	M	39	Bad	Islam	7	Married
87	Senya Bedewi	F	33	Armua	Islam	5	Married
88	Sirchewa Hashm	M	46	Bad	Islam	6	Married
89	Nimaga Mare	M	65	Amdom	Protestant	No	Married
90	Yirga Teka	M	38	Bad	Protestant	4	Divorce
91	Abdo Redi	M	40	Dirbonasenen	Islam	8	Married
92	Reshid Shifa	M	43	Bad	Islam	No	Married
93	Zelege Bongor	M	54	Armua	Orthodox	No	Married
94	Nure Shafo	M	50	Dirbonasenen	Islam	8	Married
95	Biru Lega	M	70	Bad	Orthodox	12	Married
96	Aboye Gebre <sup>K</sup>	M	59	Bad	Orthodox	10	Married
97	Miryifeze Kassa	F	54	Dirbonasenen	Protestant	No	Divorce
98	TenayeBejadu	F	39	Amdom	Orthodox	No	Single
99	SityAbdela	F	65	Dirbonasenen	Islam	7	Married
100	JemilaSirgaga	F	49	Dirbonasenen	Islam	No	Married

**Appendix.3.** Major Food crops grown in study area

<b>Crop types</b>	<b>Scientific name</b>	<b>Local name</b>	<b>English name</b>
Vegetables	<i>Daucus carrota</i>	Carrot	Carrot
	<i>Allium sativum</i>	Tuma	Garlic
	<i>Brassica carinata</i>	Ambir	Cabbage
	<i>Ensete ventricosum</i>	Esset	Inset
	<i>Allium cepa</i>	Shinkurt	Onion
Cash crop	<i>Nicotiana tobaccum</i>	Timbahue	Tobacco
	<i>Catha edulis</i>	Chat	Chat
Cereals	<i>Hordeum vulgare</i>	Ehir	Barley
	<i>Zea mays</i>	Bekuelo	Maize
	<i>Triticum aestivum</i>	Sinay	Wheat
Pulse	<i>Pisuve satium</i>	Getere	Pea
	<i>Vicia faba</i>	Bakela	Beas
Root crop	<i>Solanum tuberosum</i>	Dinicha	Potato
Oil crops	<i>Linumus itatissimum</i>	Telba	Line seed
Fruit	<i>Malus domestica</i>	Pom	Apple
	<i>Prunus persica</i>	Kok	Peach
	<i>Persea americana</i>	Abocato	Avocado

**Appendix.4.** Human diseases and number of plant species used in study area.

<b>Diseases</b>	<b>Total Species</b>	<b>Percent</b>
Tooth ache	6	8.6%
Stomach ache	8	11.42%
Common cold and cough	10	14.28%
TB	2	2.85%
Tonsillitis	3	4.28%
Eye evil	9	12.85%
Wound	5	7.14%
Intestinal parasites	5	7.14%
Eye disease	3	4.28%
Ear pain	1	1.42%
Muscles and bone pain	4	5.71%
Anemia	2	2.85%
Kidney pain and other urinary problem	6	8.6%
Head ache	3	4.28%
Fibril illness, leg and foot illness	4	5.71%
STDS	5	7.14%
Insect bite	4	5.71%
Dingetegna	6	8.6%
Skin related diseases	7	10%
Amoeba	1	1.42%
Bleeding	1	1.42%
Liver pain	2	2.85%
Blood pressure	1	1.42%
Diarrhea	2	2.85%
Body swelling	1	1.42%
Appetite problem	1	1.42%
Hair rash	1	1.42%

**Appendix 6.** Ways of preparations of human and livestock medicinal plants

<b>Preparation</b>	<b>Number</b>	<b>%</b>
Boiling	6	8.6%
Crushing	23	32.86%
Squeezing	6	8.6%
Burning	6	8.6%
Harvesting	17	24.28 %
Homogenizing in water	6	8.6%
Powdering	8	11.42%
Crushing and concoction	5	7.14%
Filtering	4	5.7%
Homogenizing in water and mixing	6	8.6%
Cooking	8	11.42%

**Appendix.7.** Some locally identified species of inset and their uses

<b>Local name</b>	<b>Uses</b>	<b>No. respondent</b>
Yeshirakinque	Food only	10
Kibnar	Used to treat muscles and bone illness , food and fodder	46
Zobir	Food and fodder	6
Separa	Food	12
Agade	Used to treat human back pain and food for both human and livestock	50
Tereket	Food and fodder	6
Astara	Used to treat muscles and bone illness for both , food and fodder	45
Lemat	food and fodder	9
Donkinat	Used to treat human liver pain	20
Teteret	Food and fodder	7
Guarye	To treat wound and repair bone break	32
Zigbat	Food and foder	8
Nichiwe	food and fodder	42
Ankefuye	food and fodder	10
Tegaded	Used to treat wound ,to repair damaged muscles and used as food	30
Terye	Used to soften dried breast of mother and in the same way for cow	40
Dere	To treat wound and repair bone break	30
Shiryet	Food	10
Badedate	Used for food and fodder	45
Demert	Used as food and used to treat liver diseases	45

