ADDIS ABABA UNIVERSITY

SCIENCE FACULTY

SCHOOL OF GRADUATE STUDIES

ETHNOBOTANICAL STUDY ON MEDICINAL PLANTS USED BY INDIGENOUS LOCAL COMMUNITIES IN MINJAR-SHENKORA WEREDA, NORTH SHEWA ZONE OFAMHARA REGION, ETHIOPIA

BY

GETU ALEMAYEHU LEGESSE

June, 2010

ADDIS ABABA

TABLE OF CONTENTS **Page**

LIST OF TABLES **Page**

LIST OF FIGURES

Page

LIST OF APPENDICES **Page**

ACKNOWLEDGMENTS

I would like to express my deepest gratitude to my advisors Prof. Ensermu Kelbessa and Dr. Zemede Asfaw for their consistent invaluable advice, comments and follow up from problem identification up to the completion of this work. The technical staffs of the National Herbarium, AAU have cooperated by allowing all the available resources during identification of voucher specimens.

I received much support from the Office of the Wereda Administration and Agricultural Department, chair persons and development agents of each kebele selected as a study site, and informants. I would like to thank them all.

Iam very much indebted to my wife, Etenesh knife w/meskel, for typing the thesise and consistent moral support and encouragement in the course of this study

ACRONYMS

IBCR-Institute of Biodiversity Conservation and Research

WHO-World Health Organization

UNEP-United Nation Environmental Program

MSWARDO-Minjar Shenkora Wereda Agricultural and Rural Development Office

MSWHO-Minjar Shenkora Wereda Health Office

EFAP-Ethiopian Forestary Action Program

IUCN-International Union Conservation of Natural Resource

ABSTRACT

An ethnobothanical study was carried out to document information on the use of medicinal plants by the Minjar Shenkora Wereda People. The main method of study was semi-structured interview and discussion with informants from among Minjars' elders and healers. A total of 118 plants species belonging to 53 families were identified for their medicinal value. Forty-eight species (40.67%) were shrubs, 46 species (38.98%) were herbs and 16 species (13.55%) were trees. Very few climbers (8 species; 6.77%) are used in the local traditional medical practices. The result shows plant species belonging to the families Astraceae and Lamiaceae are most used. A total of 75 plant species are used for treatment of human ailments and 18 species are used for treatment of cattle diseases and 25 species are used for treatment of both human and veterinary diseases. About 54% of the reported medicinal plants are taken orally. Most of the plant species are wild, which is 90 plant species (76.27%) and 25 plant species (21.18%) are cultivated, and 3 species (2.54%) are both in the wild and in cultivate which indicates that local people have little practice of bringing medicinal plants under cultivation. The prepared traditional drugs are administered through different routes of administration. The major routes of administration in the study area include; oral, dermal, nasal, anal, and ocular.Oral administration is the dominante route (54.21%) followed by dermal route (28.91%) in which liqude forms, smashed, jused, powdered forms; exudate forms are recorded methods of preparation techniques. Some of the medicinal plant species documented from the study area have multiple uses such as fuel wood which contains the highest value (44.26 %)followed by construction, and thus most of these plants are found under threats. The threats of medicinal plant species is also one and the main reason to the loss of the associated knowledge.

Key words: Indigenous knowledge, Medicinal plants, Minjar.

1. INTRODUCTION

The major role of medicinal plants in health care is demonstrated in the developing countries. It is estimated that about 80% of the people rely on traditional medicine for their primary health care WHO, 1978).Furthermore many modern day drugs owe their origin to plants (Bell, 1993; Farnsworth, 1996). Although traditional medicines involve the use of substances other than plants, plants form the back bone of these health care systems (Farnsworth, 1988, Dawit Abebe and Ahadu Ayehu, 1993). However, information on the number of plants employed in traditional medicine and how they are used in traditional therapy is not exhaustively documented. Many countries lack complete inventories to their medicinal plant species (WHO, 1993, Cunningham, 1993). Yet such inventories are important in survey to identify unique and valuable components and such inventories coupled with information from knowledgeable rural people, who have learnt through resource use, rather than formal training can be invaluable sources of information for plant utilization and conservation practices (Cunningham, 1997). In Africa the traditional knowledge on utilization of plants was unwritten science. Most of the knowledge acquired by the local people has been passed on to them by a word of mouth from one generation to the other (Kokwaro, 1983; Nyamwaya, 1992) .Such orally preserved information is liable to loss if left undocumented.

Thus considering Ethiopia's varied flora and varied ethnomedicinal healing system with socio cultural diversity of the country, studies and research works are much needed on conservation, management, cultivation and ethnobotanical improvement aspects including that of medicinal plant species (Dawit Abebe *et al.,* 2003). The Ethiopian indigenous medicinal plants knowledge which is available in rural communities and perpetuated by word of mouth within families and the communities is fragile traditional skills that are likely to be lost when communities emigrate to towns or to other regions with a different flora; and can also be lost by life style changes ,by industrialization, rapid loss of natural habitats, or if the local ecology is drastically altered due to anthropological events(Cunningham, 1993; Dawit Abebe and Ahadu Ayehu, 1993; Cunningham, 1996). Therefore the need of ethnobotanical researches and documentation of medicinal plants and the associated indigenous knowledge has to be an urgent task and very important to preserve the knowledge.

Despite their diverse role in treating various diseases in both humans and animals, medicinal plants are facing an increasing pressure from both natural and anthropogenic factors as many of the literature sources indicated. Several recommendations from the research findings of Zemede Asfaw (2006) are available to address the problems. He pointed out that dynamic indigenous knowledge practice for the optimization of the uses and management of plant resources particularly in the Ethiopian dry lands is among the key recommendation for the conservation, use and management of biodiversity. Frankel *et al.* (1995) noted that in contrast to forestry, medicinal plant use is usually not fatal to individual plants. On the other hand, Cunningham (1990) cited in Frankel *et al*. (1995) emphasized that in many cases, heavy or continued exploitation risks the regeneration of natural resource.

2. OBJECTIVES

2.1. General objective

1. To document plants species of medicinal value to the community in Minjar Shenkora Wereda and the associated knowledge on use ,management, preparation and other aspective of the indigenous knowledge of the people in Minjar Shenkora Wereda.

2.2. Specific objectives

1. To collect and identify traditional medicinal plant specimens used in the study area for treatment of human and livestock health problems.

2. To gather, record, and document indigenous knowledge of the people on the medicinal plant in the study area.

3. To document the management and conservation measures practiced in the study area.

3 .LITERATURE REVIEWE

3.1. Indigenous Knowledge System

According to the Stephan and Justin (2003), indigenous knowledge is the local knowledge that is unique to a given culture or society and the base for agriculture, health care, food preparation, education, environmental conservation and a host of other activities (Thomas, 1995)..Indigenous knowledge refers to the accumulation of knowledge, rules, standards, skills and mental sets, which are possessed by local people in a particular geographic area (Quanash, 1988). Indigenous knowledge also refers to people's creativity, innovations and skills. It is a body of knowledge built up by a group of people through generation of living in close contact with nature and it is cumulative and dynamic. The complex knowledge, beliefs and practices, generally known as indigenous knowledge develops and changes with time and space. Hence, such knowledge includes time-tested practice that developed in the process of interaction of humans with their environment (Alcorn, 1984).Therefore it is the result of many generations long year's experiences, careful observations and trial and error experiments (Martin, 1995), Indigenous people of different localities have developed their own specific knowledge or plant resources, use management and conservations (Cotton, 1996).

One of the widely used indigenous knowledge system in many countries is the knowledge and application of traditional medicine. Such knowledge known as ethnomedicinal knowledge involves traditional diagnosis, collection of raw materials, preparation of remedies and its prescriptions to the patients (Farnsworth, 1994).The immediate and intimate dependence of indigenous people on local resources resulted in the accumulation of indigenous knowledge, which helps the people to adapt and survive to the environments in which they lived (Martin, 1995). Indigenous knowledge on remedies in many countries including Ethiopia passed from one generation to the other generation verbally with great secrecy (Jansen, 1981).

Indigenous knowledge systems have evolved through trial and improvement as a natural process of human beings interacting with the environment.The purpose behind this being to ensure the survival progress and preservation of that Community (Kipuri, 1983). Local or indigenous knowledge systems have been variously described as ethno science, traditional wisdom, etc, but they all refer to a body of knowledge that evolves over time and is communicated orally from one generation to the

next (Martin,1995). Indigenous knowledge systems refers to sets of concepts, beliefs, and perceptions comprising the stock of knowledge as well as the process by which it is acquired, stored and transmitted. Like any other knowledge systems indigenous knowledge is dynamic and ever changing through creativity, innovation, and borrowing from other knowledge. It holds practical value for mounting cost-effective, sustainable and culturally acceptable options for appropriate development problem solving.

3.2. Indigenous Knowledge and the Environment

The significance of the natural environment and its resources, as well as the uses to which environmental resources are put (Kipuri,1983).Trees and shrubs, besides providing fodder to the livestock, have many other uses, the primary one being their medicinal value. Plants used for the treatment of various ailments are numerous and most of them have been very effective (Muta, 1996). It follows them for the indigenous knowledge, developed after many years of experiment with the various plants, must be protected and recorded. For example apart from simply preserving records, it is equally important to ensure that the uses for ethnomedicinal resources are conserved.

3.3. Ethnobotanical Study: Origin, and Development

Ethonbotany is defined as local people's interaction with their natural environment: how they classify, manage and use plants available around them (Martin, 1995). Ethonobotany is also defined as the study of the relationships between plants and people (Balick and Cox, 1996). It is also described as “a unit of ecological study specializing in the interaction of people and the plant world "(Ford, 1978). It is an attempt to understand how people view the world of plants and their relation to it. The Prefix “ethno” refers to the study of people or “the way that other people look at the world”, While the word “botany” refers to the study of plants (Martin, 1995). Traditional people around the world posses’ unique knowledge of plants resources on which they depend for food, medicine, and general utility including tremendous botanical expertise (Martin, 1995). Ethnobotanical work seems to have started with Christopher Columbus in 1492, at a time when he brought tobacco , maize, spices and other useful plants to Europe from Cuba (Cotton, 1996) and when other immigrants from the new world documented food, medicine and other useful plants of the Aztec, Maya and Inca peoples(Martin,1995).

The term ethnobotany was for the first time mentioned orally by John Hershberger in 1895 during a public lecture (Balick, 1996; Cotton, 1996; Hamilton *et al.*,2003).Currently ethnobotany has become a more diversified and multidisciplinary subject that require expert in various field of academic study such as Botany, Anthropology, Agriculture, Linguistics, Archeology and Economics (Alexiades, 1996; Balick. 1996,and Martin, 1995) There has been on the world to document the potential uses or economic potential of plants used by indigenous society (Cotton, 1996). Ethnobotanical studies are now growing and in fast progress throughout the world. One of the main driving forces behind this expansion is the increasing awareness of the considerable practical and social value of traditional knowledge. Ethnobotanical data collection requires a systematic approach and information can be collected through actual field observation and semi structured interviews depending on the particular objectives of the research (Martin, 1995). Ethnobotany is use full to define local community plant resources needs, utilization and management. Therefore, the conservation of ethnobotanical 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).

Cotton (1996) noted that identification of new drugs based on traditional medicinal plants in the areas of pharmaceuticals is among the potential application of ethnobotanical inquiry in recent decade. The world Health organization (WHO, 2002) defined traditional medicine as “the sum total of all knowledge and practices, whether explicable or not used in the diagnosis, prevention and elimination of physical, mental or social imbalances and relying exclusively on practical experience and observation handed down from generation to generation, whether orally or in writing”. The traditional medicine in Ethiopia includes also the medicinal preparations from plant. Plants in general and medicinal plants in particular are fundamental and most use full to almost all life on the earth. One of the most significant uses of plants is the phytomedicinal role. i.e. the benefits of medicinal plants. Plants have contributed to modern medicine, through providing ingredients for drugs or having played central role in drug discovering some drugs having botanical origin, extracted from plants.

Martin (1995) noted that laboratory analysis of medicinal and other useful plants is a costly and time-consuming endeavor. He further explained that colleagues who study the chemical components of plants must decide which species are apt to yield the most promising results before they precede

with extensive ethno pharmacological investigations. A good place to start with is first to know the relationship between the traditional knowledge and modern science that are tied together with a wide gulf based on empirical verification (Martin, 1995; Balick and Cox, 1996). It was also emphasized that if one is interested in taking a photochemical approach in his field work, referring to the chemical and ethnopharmacological literature to discover the existing knowledge about the various species of plants in his ethnobotancal inventory will avoid wasting time and money unnecessarily (Martin, 1995). Ethnobotanical studies are good sources of information for such investigations. Cotton (1996) added to the above concept that identification of new drugs based on traditional medicinal plants in the areas of pharmaceuticals is among the potential applications of ethnobotanical inquiry in recent decades.

In Ethiopian case, the passing of time does not seem to obliterate the long history of the use of medicinal plants by indigenous people of the country to treat various disease and ailments (Dawit Abebe *et al.*, 2003). Dawit Abebe and his co-workers also noted that persistence of traditional medicinal plant use to the present day is mainly attributed to two main reasons. In the first place, it is the possession of a conservative ethnomedical tradition. Secondly, it is attributed to residence in an area with diverse flora over many generations (Dawit Abebe *et al*., 2003).

It was stated that medicinal plants make 6% of home garden plant diversity among the garden crops in Ethiopia (Zemede Asfaw, 1997). Moreover, it was also noted that medicinal plants are among the diverse category of plants directly used from the wild (Frankel *et al*., 1995). In addition to the above point, ethnobotanical study of food and medicinal plants of Danio Gade (home gardes of Gamo people) by Belachew Wasihun *etal*.(2006) revealed that the majority of medicinal plants were herbs (66.6%) followed by shrubs (22.2%) for this particular study. Moreover, the study explained that the most frequently utilized plant parts are the leaves (66.6%) followed by the roots (16.6%). In terms of their growth location, the study showed that about 61.11% of the medicinal plants were wild while the remaining (38.9%) were grown close to home. From this study finding, one can easily imagine that those grow close to homes provide good evidence for home gardens being useful as habitat for medicinal plants. It was also reported that ethnoveterinary service is among the uses of medicinal plants (Debela Hunde *et al.*, 2004).

Similar studies by Kebu Balemie *et al.* (2004) indicated that malaria, jaundice, cough, kersho, and stomachache are among the human ailments treated with medical plants. It was also pointed out that veterinary problems due to leech, tsetse, anthrax, tick, and intestinal worms were among the diseases treated with medicinal plants recorded in the Fentalle study area, Eastern Shewa and upper Omo valley in southern Ethiopia. The study also underlined the indigenous knowledge of the Dawro people in herbal preparations that mostly involve concoction an infusion of leaves, fruits, seeds, stems and roots. His finding is in line with the findings of Debela Hunde *et al*. (2004) by their studies conducted on the use and management of ethnoveterinary medicinal plants by indigenous people in 'Boosat', Welenchiti area despite their diverse role in treating various diseases and ailments in both humans and animals, medicinal plants are facing an increasing pressure from both natural and anthropogenic factors as many of the literature sources indicated. The results of this ethnobotanical study are expected to give a clue on the current status of traditional knowledge and utilization of medicinal plants in Minjar Shenkora wereda.

3.4. Herbal Medicine as a Source of Modern Medicine

According to Levantine and Mahon (1996) about 75-90% of the rural population in the World (excluding Western countries) relies on herbal medicine as their only health care. WHO estimate that 70-80% of people in developing countries including Africa depend on traditional medicine for their health care (Cunningham, 1994). This is not only because of poverty when people cannot afford to buy expensive modern drugs, but traditional systems are also more culturally acceptable, and meet the psychological needs in away modern medicine does not (Brown, 1994). The integration of modern health system and traditional medicine will provide a better public health service. This on one hand will have truly effective and affordable health care for low-income groups in the developing world (Farnsworth, 1980).

Estimates show that about 25,000 to 75,000 species of higher plants have been used in traditional medicine (Farnsworth, 1980). Evidently, traditional knowledge of medicinal plants is important in development of new modern drugs. Currently there are more drugs (e.g. aspirin from *Ulmaria* (Rosaceae), Quinine from *Cinochona pubescens* (Rubiaceae), Morphine from *Papaver somniferum* (Papaveraceae) and ephedrine from *Ephedra sinica*) prescribed in the North America and Europe. Some photochemical studies have demonstrated that there is a better probability of encountering

active compounds from plants when an ethnobotanical approach is used rather than a random survey (Balick and Cox, 1996). Preliminary test of medicinal plants form central America in which in vitro anti-HIV screen was detected as being active 25% of these plants species were those classified as "powerful plants" by herbal healers, on the other hand only 6% randomly collected species were active (Balick and Cox, 1996). Another worth mentioning useful medicinal plants collecting method is a photometric survey where researchers choice close relatives of plans known to produce useful compounds (Balick and Cox, 1996). This approach might increasing the probability of encountering active compounds but unlike ethnobotanical information, little is known about their efficacy and safety, as they are not practical tested time and again through years. According to Balick and Cox (1996), the history of drug discovery implies that the ethnobotanical approach is the most productive of the plant survey methods and the recent findings confirm this impression.

3.5. Plants in Ethnoveterinary Medicine

Ethnoveterinary medicine which refers to traditional animal health care knowledge and practices comprising of traditional surgical and manipulative techniques, traditional immunization, magic-religious practices and beliefs, management practices and the use of herbal remedies to prevent and treat arrange of disease problems encountered by livestock holders (Tafesse Mesfine and Mekonnen Lemma, 2001). Ethnoveterinary medicine provides traditional medicines, which are locally available and usually cheaper than standard treatments. In Ethiopia, livestock production plays an important role in the lively hood and economy of majority of the population. Livestock offers in many harsh environments the only way of survival and constitutes a driving force for food security and sustainable development in developing countries like Ethiopia. Stock raisers, both farmers and herders have developed their own ways of keeping their animal health and productivity. They treat and prevent live stocks disease using sometimes age old home made remedies, surgical and manipulative techniques. These indigenous local animal health care beliefs and health care practices constitute an ethno veterinary medicine.

In spite of its permanent importance as livestock health care system, the various traditional veterinary practices remained undocumented in Africa and Ethiopia (Dawit Abebe and Ahadu Ayehu, 1993). Thus creation of awareness on Ethno veterinary medicine emphasizing on useful plants used for treatment of live stock has paramount importance to livestock management. In

addition, proper documentation and understanding of farmer's knowledge, attitude and practices about the occurrence, cause, treatments, prevention and control of various ailments is important in designing and implementing successful livestock production (Tafesse Mesfine and Mekonen Lemma, 2001).

3.6. Traditional Medicinal Plants in Ethiopia

According to Fassil Kibebew (2001), about 75-90% of the rural population in the world (excluding Western countries) relies on traditional medicine as their only health care system .Medicinal plants in traditional health care cover the useful plants for primary health care and as remedy for disease and injury, and plants used traditionally for foods and drinks and which are believed that they are good for health. Plants have been used as a source of traditional medicine from time immemorial to combat different ailments and human sufferings (Asfaw Debela *et al.,* 1999). Due to its long period of practice and existence traditional medicine has become an integral part of the culture of Ethiopian people (Migrssa kaba, 1996). Even today it is common for people living in rural and urban areas to treat some common ailments using plants available around them, example (*Hagenia abyssinica* to expel tape worms, *Ruta chalepensis* for various health problems) (Abbink, 1995) The continued dependence on herbal medicine is largely conditioned by economic and cultural factors (Abbiw, 1996).

Modern medical services are in accessible to the vast majority of the population due to their costs made herbal medicines more acceptable. Due to incomplete coverage of modern medical system shortage or 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 health care has become more serious as the gap between supply and demand has continued to widen. Since medicinal plants are often with an easy to reach compared to modern drugs that are dispensed in remotely on the medicinal plants for health care. Thus medicinal plants continue to be in high demands in the health care 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 and indigenous knowledge (Dawit Abebe and Ahadu Ayehu, 1993).

3.7. Ethnomedicinal Research in Ethiopia

In Ethiopia research and documentation on medicinal plants have been started only very recently (Mesfin Tadesse and Sebsebe Demissew, 1992).As this was neglected and considered irrelevant in the past (Dawit Abebe and Ahadu Ayehu, 1993) only little effort has so far been made to record and documents the medicinal plants use and the associated knowledge. Some of the works that have been carried out includes: Amare Getahun (1976); Jansen (1981); Dawit Abebe (1986); Dawit Abebe and Istifanos Hagose (1991); Dawit Abebe and Ahadu Ayehu (1993); Mirutse Giday (1999); Kebu Balemi *et al.*(2004); Debela Hunde *et al.* (2004); Ermias LuleKale (2005) and Haile Yinger (2005). Although, only small fractions of the worlds plants have been investigated scientifically so far, human kind already reaped enormous benefits from it (Farnsworth *et al.*, 1985).More than ever, plant diversity remains vital for human well beings and still provides a significant number of remedies required in health care. There for the crucial role played by plant derived products in human and livestock health, the need for systematic scientific investigation is unquestionable (WHO, 1998).

Traditional medicine has been practiced for the last several thousands of years but only found its legitimate place in the WHO program only about 35 years ago (WHO, 1978).furthermore, pharmaceuticals industries and western researches on plant based drugs have now re -discovered that plants have much to contribute to the discovery of new, effective, safe and profitable therapeutic agents (Pistorius and VanWiik, 1993). Most pharmaceuticals companies recently have developed mechanisms to involve indigenous people collect plant samples on the recommendations of the traditional practitioners. This approach is reported to be more successful than random collections of sample of medicinal plants (Balick and Cox, 1996; Alexiades, 1996; Asfawe Debela *et al*., 1999). Since medicinal plants are the main often only source of traditional medicine for the rural population and are of high demand in the health care system of this population when compared to modern medicine, ethnomedicinal activities need special consideration and back up (Abbiw, 1996)..This is partially because modern medicinal services are either unaffordable or un available to the vast majority of local people due to their sky rocketing cost coupled to lack of transport to and from health care centers.

WHO established a worldwide program to promote and develop basic and applied research in traditional medicine (WHO/IUCN, 1978).Medicinal plants then have got special attention and regional offices were established by world health organization to coordinate basic and applied research activities on medicinal plants. To preserve indigenous knowledge of plant use in general and traditional medicine in particular, an ethnobotanical survey of losses studied socio cultural group is very crucial. However in Ethiopia research and documentation on medicinal plants have been started only very recently, limited number of papers dealt with specific socio cultural groups in specific areas when compared to the countries varied Flora and the socio cultural diversity this studies incomplete as medicinal plants healing systems differed from culture to culture. Hence, attention should be given to the field of ethno medicine of the country with all necessary endeavors to have a full picture of the countries medicinal plant potentials.

3.8 Advantages and Disadvantages of Plant Based Traditional Medicine

3.8.1 .The advantages of medicinal plants as traditional medicine

Plants in general and medicinal plants in particular are invaluable, fundamental and most useful to almost all life on the earth, one of the most significant uses of plant is the phytomedicinal role, i.e., the benefits of medicinal plants. Medicinal plants play typical role in the lives of many people in terms of health support, financial income and lively hood security (Hamilton, 2003; Abdulhamid Bedri *et al*., 2004; Hamilton, 2004). Plants have been indispensable and the most important sources of both preventive and curative traditional preparation for human beings and livestock since time immemorial. By their capacity of photosynthesis, plants form the basis of the biological food web, and producing oxygen which is the key for our lives and they are balancing the gases of our environment. Plants are also recycling essential nutrients, establishing soils and soil fertility, protecting areas of water catchments. They keep ecological and climatic balances and helping to control rainfall through the process of transpiration. And all these benefits of plants are directly or indirectly linked with health care (Kelbessa Urga *et al*., 2004; Hamilton, 2004). Therefore, health care and botany have evolved as inseparable domain of human activities since various plant products are of paramount importance in traditional health care systems.

The world health organization (WHO) estimates that about 80% of the world' people relay chiefly on traditional medicine, mostly of plant origin to meet their primary health care needs (Farnsworth *et al., 1985;* Duke, 1992). According to Mekonnen Bishaw (1990) and Tesema Tanto *et al.* (2003) about 80% of human population and over 90% livestock in Ethiopia rely on traditional medicine. The livestock or ethnoveterinary medicine provides traditional medicines which are locally available and usually cheaper than standard treatments. Not only in Ethiopia but also globally and in all developing countries and especially in tropical Africa, using traditional medicinal plants is common and form the back bone of traditional therapy since the majority of the people depend on this traditional medicinal plants for their health care, and this global importance and utilization of medicinal plants has considerably increased in the last two decades. And thus, today, medicinal plants play a great role also world wide of the health services.

In Ethiopia, there is a large magnitude of use and interest in medicinal plants due to socio –cultural acceptability, accessibility, affordability, and biomedical benefits of the traditional medicinal plants. In other words, in all regions of the country, traditional medicine has high acceptability since it is an integral part of the local culture and hence, people often rely on their efficient and less costly alternative health care (Mwambazi, 1996; WHO, 2000; Konno, 2004). It is also noted that since medicinal plants are often within easy reach compared to modern drugs that are dispensed in remotely located health institutions, so most people in Ethiopia rely on the medicinal plants for treating their livestock and themselves (Abbiw, 1996; WHO, 2000; Dawit Abebe, 2001; Konno, 2004).

Medicinal plants have also economic importance besides their critical role in the health care provision of much of the world population (Medihn Zewdu *et al.,* 2001). These plants are commonly traded in various forms in different countries (Lange, 1998), currently large number of medicinal plants have been found their way as raw materials of modern bio-pharmaceutical industries (Rai *et al.,* 2000). Ethiopia is endowed with a number of economically useful medicinal plants. But Ethiopia is not known in developing the low for importing and exporting medicinal plants legally. The country exports only some agricultural products such as coffee, cotton, niger seed, linseed, castor seed and *catha edulis* as a means of getting foreign currency.

3.8.2. Disadvantages of traditional medicine

Each and every type of medicine, whether it is traditional or modern has its own useful aspects and harmful aspects. One of the main disadvantage of traditional medicine are the lack of scientific proof of its efficacy which could result in the decrement of its acceptance specially by educated and most urban dwellers who entirely depend on modern medicine (Dawit Abebe, 1986).In addition, the imprecise diagnosis given by some traditional healers and when they use several types of medicinal plants species and other types of traditional medicine in combination (without scientific proof) which could result in health damage is the other negative side of the traditional medicine. Lack of precise dosage which could lead to toxicity is also the other disadvantage of traditional medicine (Dawit Abebe, 1986).

3.9. Threats and Conservation of Traditional Medicinal Plants

3.9.1. Major threats to medicinal plants and associated indigenous knowledge

The loss of species of medicinal value is greater as there is evidence that extinction of such plants species is obvious. Disturbance and over exploitation by humans are causing major global reduction of plants diversity (Allen and Barnes, 1985; Bownder, 1987; IUCN, 1991). According to IUCN (1978) an average of one out of species of vascular plants known are rare or are under sever threat. According to WHO/IUCN (1986), 90 % of plant materials used as medicinal plants are collected from the wild with parallel regeneration programs and as a result many medicinal plant species are driven to extinction or sever genetic loss. However as observed by WHO/IUCN (1986), detailed information is not available. When a population may suffer both from hetrozygosity and allelic diversity loss and if such threats continue genetic drift can be avoided.

Over exploitation may lead to scarcity and incase of medicinal plants this means more time will be needed to collect parts of plants required by traditional healers. Cunningham (1996) observed that with increased scarcity, commercial trade develops and price rise and this means more exploitation will occur. Actually, this is what brings unsustainable models (Brigham *et al.,* 1996). Another threat to medicinal plants is a result of demand of botanicals locally and/or at international level which

results in over exploitation and lack of regeneration programs. In 1994 Worldwide leading importers of materials for medicinal purposes namely; Hong Kong, Japan, Germany, France, USA and South Korea imported a total of 244,783 tones.

Many people of our world exploit our Earth mercilessly, as if there were no tomorrow, the greatest danger elsewhere in our country is losing the indigenous knowledge of our own cultural and our biodiversity resource including the medicinal plants of our locality. people use many wild species of plants for food, medicines, clothing, shelter, fuel, fiber, income generation and the fulfilling of cultural and spiritual needs throughout the world (Zemede Asfaw, 2001) Recent evidence from Ethiopia as well as other countries indicates that the existence of these indigenous resources are threatened. The most serious proximate threats generally are habitat loss, habitat degradation, and over harvesting (Hamilton, 1997). Environmental degradation, deforestation, agricultural expansion, over exploitation and population growth is the principal threats to medicinal plants in Ethiopia (Ensermu Kelbessa *et al.*, 1992, Zemede Asfaw, 2001, Kebu Balemie *et al.,* 2004). Medicinal plants can have uses other than sources of medicines and threats from over harvesting may be due to or partly due to their collection for purposes other than the medicinal uses.

Thus, as elsewhere in Africa, in most region of Ethiopia, Ethiopia's plant based traditional medicine is faced with problems of continuity and sustainability (Ensermu Kelbessa *et al.* 1992);Tesfaye Bekele, 2000; Zemede Asfaw, 2001; Abebe Demissie, 2001; Kebu Balemie *et al*.,2004. In Ethiopia the traditional medicinal plants and its knowledge which is available in rural communities and perpetuated by word of mouth within families and the communities is fragile traditional Skills that are likely to be lost when communities emigrate to towns or to other region with a different flora; and can also be lost by life style changes, by industrialization, rapid loss of natural habitats.

In other words, since the knowledge on traditional medicine are commonly passed from generation to generation orally, valuable information can be lost whenever a medicinal plant is lost or when a traditional medical practitioner dies without passing his / her indigenous knowledge to others (Cunningham, 1993; Mathias and McCorkle, 1996; Cunningham, 1996; Cunningham 2001; Getachew Birhan and Shiferaw Dessie, 2002). Gebre Markos Wolde Sillessie (1998), Showed that the drought and famine that repeatedly visited Ethiopia for the last few decades and punished many lives of humans, animals and plant species by causing shortage of rain fall and change of

weather conditions is related to deforestation and environmental degradation (EFAP, 1994).The uncontrolled and unwise exploitation of forest areas by different anthropogenic factors has led to the threat, as well as the decline in number and area of distribution of many plant species including various species of the medicinal plants (Tesfaye Bekele, 2000).

3.9.2. Conservation and sustainable use of medicinal plants

The word "conservation" refers to the care of wise use and appropriate management of natural environment and its natural resources. It is also defined as the sustainable use of resource is then linked with the development that meets the need of the present without compromising the ability of future generation to meet theirown needs. The "phrase" sustainable development" by itself broader than the word conservation and it encompasses economical, social, cultural, security and participatory in decision making processes. The proper conservation of diverse habitats and genetic resources in country like Ethiopia can only be achieved through a well established system under which biological resources are sustainably exploited for immediate use and species continue to evolve with dynamic force of their habitats.

According to Getachew Berhan and Shiferaw Dessie (2002) the knowledge of medicinal plants is commonly passed from generation to generation. In this process valuable information can be lost whenever a medicinal plant is lost or when a traditional medical practitioner dies without passing his/her indigenous knowledge to others. As stated Zemede Asfaw (2001) in Ethiopia, traditional medicine as elsewhere in other developing countries is faced with a problem of sustainability and continuity mainly due to loss of taxa of medicinal plants, loss of habitats of medicinal and other categories of plants and cultures. Conserving the diverse cultures with indigenous medicinal and other knowledge that exists with the traditional communities has also contributed greatly in giving value to the biodiversity and maintains the resource for generation (Medhin Zewdu, 2002).

Thus for the conservation of plant biodiversity, both in-situ and ex-situ conservation methods can be applied (Frankel *et al.,* 1995).The growing recognition of the importance of medicinal plants in meeting local and global health care needs provides an important opportunities for conservationists, traditional medicine practitioners, local communities and others to work together to develop mutually supporting solutions to problems associated with forest loss and biodiversity erosion. Now

a day's sustained and co-ordinate efforts are needed to transform currently unsustainable practices of medicinal plants mining from wild sources to more ecologically sustainable, socially acceptable, and economically equitable production and utilization systems (Parrotta, 2002). Generally, there are some conservation measures that have been under taken around the world aimed at protecting threatened medicinal plant species from further destruction (Cunningham, 1993). This includes in-situ conservation (on their natural habitats like natural reserves and parks) and ex-situ (field gene bank, seed bank and botanical garden) conservation. In order to conserve useful plants (including medicinal plants) which are threatened due to natural or manmade factors in Ethiopia, in-situ and ex-situ conservation strategies should be complimentarily implemented (Abebe Demissie, 2001).

4. MATERIALS AND METHODS

4.1. Description of the study area

4.1.1. Geographical location

The study was carried out in Amhara Region; Central high lands of Ethiopia, North Shoa Zone in Minjar Shenkora Wereda. The study area lies between latitudes 90°6'and 90°5' north and longitude of 39°46'and 39°26' East with total area of about 229,463 hectares and an elevation range of 1400-2400m.a.s.l. The administrative town of Minjar Shenkora Wereda is Arerti, which is located at 135 kms to south east of Addis Ababa.

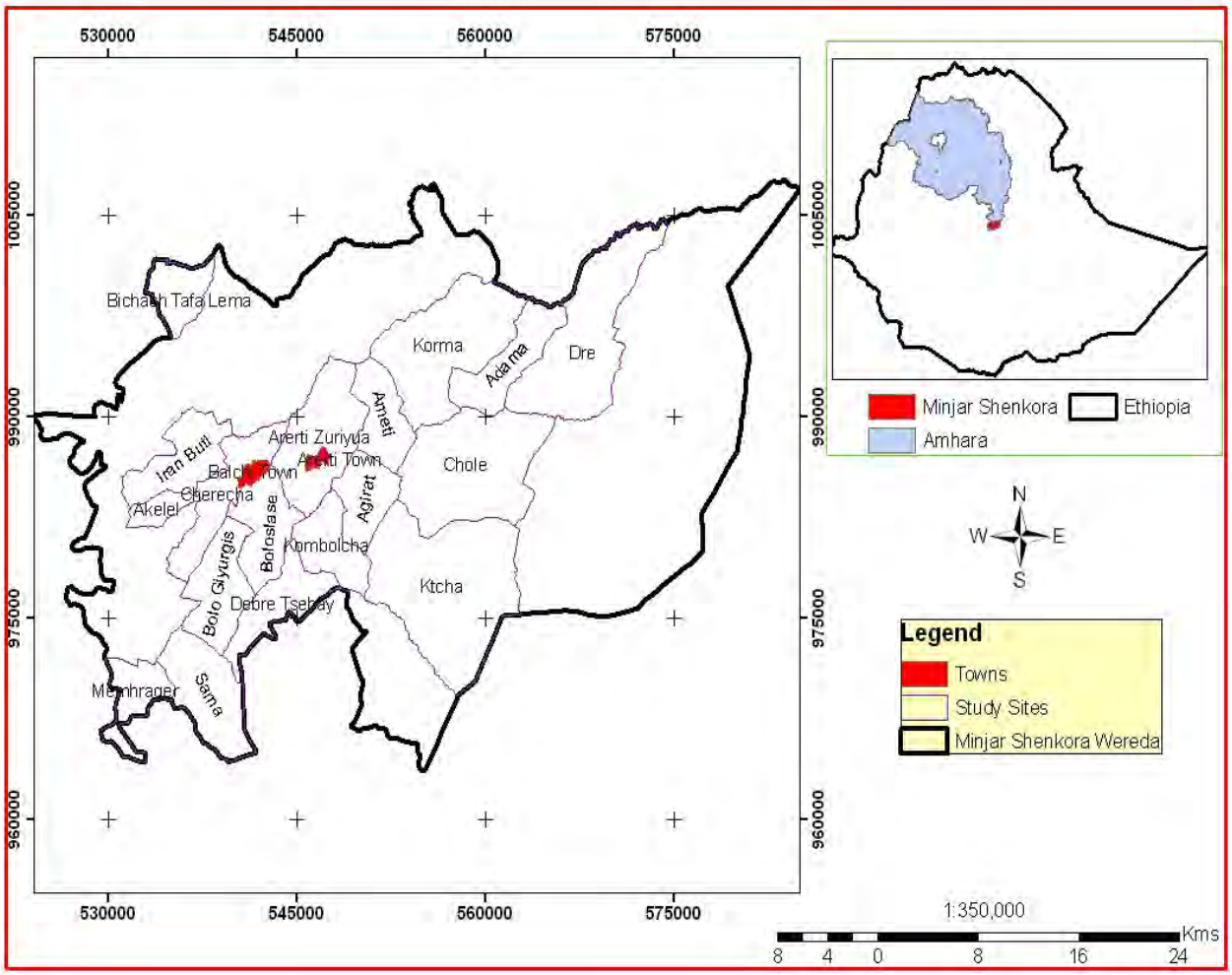

Fig.1 Location map of the study Wereda .The selected study kebeles are:

4.1.2. Topography

The topography of the wereda lands are characterized by diverse geomorphologic features distributed over the three major agroclimatic zones, Dega (high lands), Weinadega (mid lands) and kola (low lands). Unpublished data from the wereda administration office indicates that 84% of the land area to be plain followed by 2% hilly, 1% clefts topographic features.

4.1.3. Soil

With respect to soil type 19.5% of the soil belongs to the grey soils, followed by 19% black soil, 15% of the soil belongs to the red soil and the remaining 46.5% belongs to others.

4.1.4. Vegetation

Major indigenous and introduced tree species growing in the wereda include Bisana (*Croton macrostachyus*), Wanza (C*ordia africana*), Birbera (*Millettia ferruginea*), Sholla (*Ficus sur),* and key bahirzzaf (*Eucalyptus camaldulensis*). The seed farming complex is a common practice in the area where Teff (*Eragrostis tef),* Noug (*Guizotia abyssinica*).barely (*Hordeum vulgare*), sorghum (*Sorghum biclolor* L.), beans (*Vicia faba* L.), peas (*Pisum sativum* L.), wheat (*Tritrcum. sp*) and maize (*Zea mays*), chickpeas (*Cicer arietinlum*), are widely cultivated crops. According to the wereda agricultural office annual report (2008), 5.5874 hectares' of the wereda lands are suitable for plough of which only 33,595 hectare is ploughed, 20,406 hectares of land is for grazing and 15,406 hectare is forest land.

4.1.5. Climate

Metrological data taken from Addis Ababa National Meteorology Service Agency indicates that Minjar area obtains high rain fall between June to August and low rain fall in March to May, and dry season extends from September to February. The highest mean annual rain fall of the study area within eleven years was 1028mm, whereas the lowest mean total was 162.8mm. The lowest mean annual temperature over ten years was 7.3 ^{o}c, whereas the highest was 20 ^{o}c (Figure 1). Based on the current agro-ecological classification three major agroclimatic zones characterizing the wereda are

tropical (Kola, 24.8%), subtropical (Weinadega, 70.9%) and temperate (Dega, 4.3%) (MSWARDO,2008).

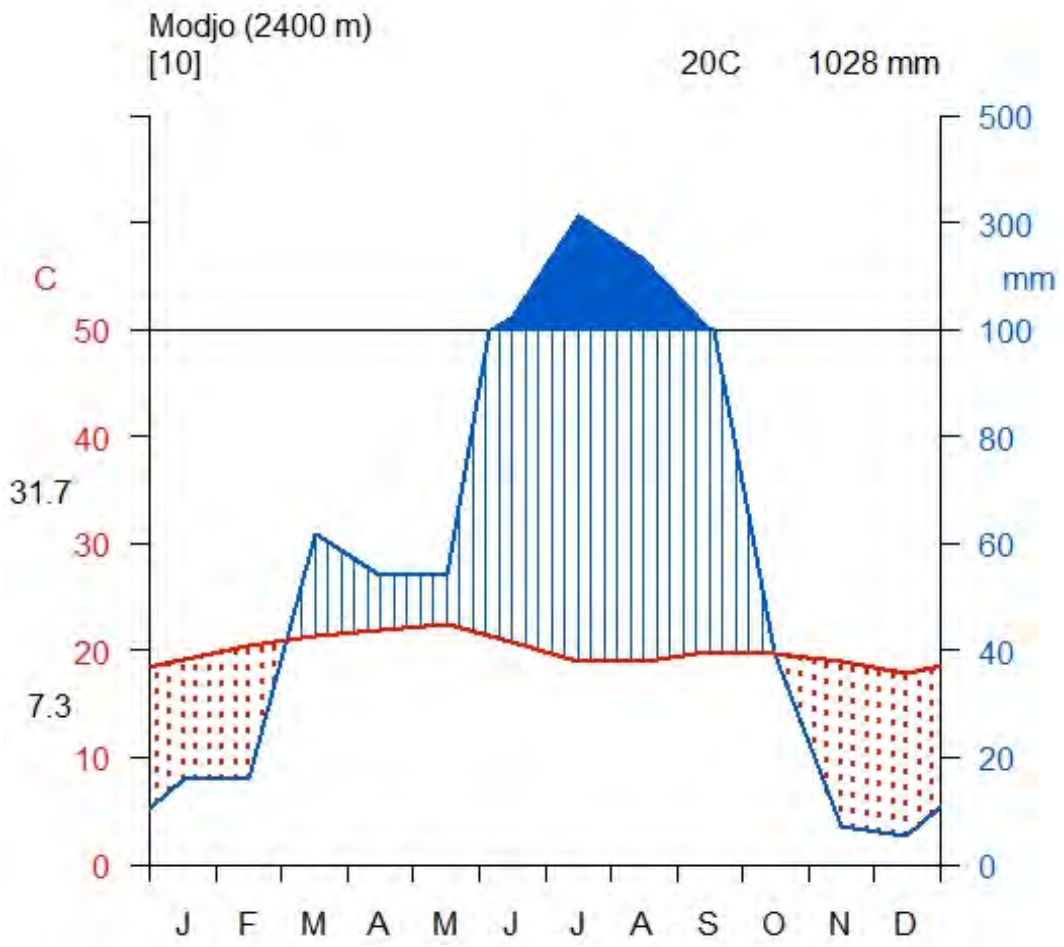

Fig.2 Climadiagram of the study area

Data source**:** National Metrological Service Agency **(**NMSA).

4.1.6. Population

The majority of people living in Minjar Shenkora Wereda belong to the Amhara Nationality. The three largest ethnic groups reported in Minjar Shenkora Wereda were Amhara (93, 78%), the Oromo (3.11%), Argoba (2.65%), all other ethnic groups constitute (0.46%) of the population. Amharic is

spoken as a first language by (96.93%) and Oroimiffa was spoken by (2.79%), the remaining (0.3%) speak other primary language. The majority of inhabitants are followers of the Ethiopian Orthodox Christianity, with 94.74% reporting that as their religion, while 5.15% were Muslim. Source based on figures published by the Central Statistical Agency of Ethiopia (CSA, 2007) indicated that the Wereda has an estimated total population size of 128,741 of whom 66,843 were men and 61,895 women; 12,233 of the population are urban dwellers and the remaining 116,508 live in rural areas.

4.1.7. Livestock and human health service

According to Minjar Shenkora Wereda Agricultural and rural development office report (2008), livestock population is shown as**:** cattle (101025), sheep (51535), goat (63395), donkey (27190), camel (2895), and mule (1876) constitute the livestock population. The major livestock disease reported in the study area are grouped under three main categories, bacterial (Blackleg, Anthrax) Protozoan (Trypanosomiasis) and viral infection (sheep and goat pox). The wereda has only one central veterinary clinic and three veterinary health workers. Due to this there is poor access to modern medicinal service in addition to low income level of most farmers and thus, most of the local people use the local traditional medicine and traditional ethnoveterinary medicine (MSWARDO, 2008). Regarding the human health of the area, Minjar Shenkora Wereda Health Office report (MSWHO, 2008) indicates that acute fever, wounds, malaria, and urinary tract infections are the top human diseases of the wereda. Human health service coverage is less than 50%.The underlined reason reported by Minjar Shenkora Wereda Health Office is that there is shortage of material, skilled human resource, medicine and logistic supports. Therefore, about128, 741 human population of the wereda are supported by forty seven health extension workers, ten clinical nurses, two health officers, and one Sanitarian.

4.2. Reconnaissance survey

A Reconnaissance survey of the study area was conducted from September 16 to30, 2009 and determined to include 20 study kebeles out of the total 29 kebeles. Thus the study was carried out in three altitudinally varying 20 sites.Areas with higher altitude (1800-2400m.a.s.l) (Eranbutie, Agirate, Balichi, Memhireager, Sama, Debretshaye)are located south east of arerti town, lower altitude areas (1400-1800m.a.s.l) (Adama,Amite,Akelale,Bichashe,Cheli,Chercha,Deri) around west of arerti town and medium altitudinal area(1700-1900m.a.s.l) (Arerti zuria, Bolo giorgise, Bolo silassie, Korma, Kombolcha,which are located in north eastern of arerti.The study area is found within the range of 1400-2400 m.a.s.l.

4.3. Informant's selection

As pointed out by Martin (1995), when recording indigenous knowledge held by certain social groups and by knowledgeable traditional healers, the selection of key informants was made through preferential methods to draw necessary information and to include at least four traditional medicinal practitioners in each study site. Information regarding the knowledge of traditional practitioners was first gathered from the local people in the site and the selection of key informants was undertaken with local administrative people, elders and development agencies.

A total of 29 kebeles were present in the wereda, out of these 20 kebeles were selected for the study. Four informants each from 20 kebeles were selected, giving total of 80. From these, 60 were men and 20 were women informants with the age of 18 to 60years. Out of these, 40 key informants were identified following Martin (1995) based on the recommendations of elders and local authorities or development agents, local administrative leaders. The rest 40 informants were selected randomly.

4.4. Ethnobotanical information

4.4.1. Group discussion and semi-structured interview

A brief group discussion was made at each site prior to important medicinal plant collection with all informants of the study site. During the discussions an attempt was made to encourage the healers in such a way that their cooperation is of great benefit to the country and at the same time the revelation of their knowledge of medicinal plants will not in any way interfere with the continued practices of their art and the confidentiality of their medicinal plants use knowledge (detailed method of preparation, specific dosage system and application routes) is kept by the researcher. A semi-structured checklists consisting of questions or issues (Appendix 9) were prepared in advance. The interviews were based on and around these checklists and some issues arose promptly depending on responses of an informant. All of the interviews were held in Amharic the vernacular language of the local people. The place and time for discussion were settled on the interest of the informants.

4.4.2. Data collection

Ethnobotanical data was collected between November 2, to December3, 2009 on field trips made to the site based on methods given by Hedberg (1993); Martin (1995) and Cotton (1996), and Alexiades (1996).The ethnobotanical techniques employed to collect data on knowledge and management of medicinal plants used by the local people of the study area were group discussion, semi-structured interviews, preference ranking, direct matrix ranking, paired comparison and specimen collection. Most of the interviews and discussions were held in Amharic directly by the investigator and information was gathered technically by speaking to the villagers and accessible informants on an informal base to maximize the source of information of health problems treated, diagnosis and treatment methods, local name of medicinal plants used, source of collection(wild/cultivated), growth form, degree of scarcity, plant part used, methods of preparation and application, threats to medicinal plants and conservation practices of respondents.

4.4.3. Informant's consensus/medicinal plant use reports

During the course of the study, each informant was visited 2-3 times in order to confirm the reliability of the ethnobotanical information. Consequently, the responses of an informant that were not in harmony with each other were rejected since such responses were considered as unreliable and then, informant rejected since they were considered as irrelevant/unreliable. Thus only relevant ones were taken and used for calculating an informant consensus value of each documented medicinal plants based on the proportion of informants who independently claimed its medicinal use, regardless of its specific medicinal application (Alexiades, 1996). Plants which are popular in the study area to treat wide range of disease have local name and well known by the local people/healers of the area. Based on the informants' consensus conducted in the study area, certain species which were independently cited by many of the informants for their medicinal uses against human and livestock ailments are listed in (Table10)**.** These are the relevant ones that were taken in to account and statistically analyzed.

4.4.4. Paired comparison

After identification of the seven most important plants based on their high use values as perceived by the informants, paired comparisons were employed as described by Martin (1996).in this study seven informants were randomly selected from the key informants and allowed to show their responses independently for pairs of traditional medicinal plants noted for treating sudden sickness. A list of the pairs of selected items with all possible combinations is made and sequence of the pairs and the order within each pairs randomized before every pair is presented to selected informants and their responses recorded and total value was summarized. Accordingly, seven informants were identified to rank the seven selected medicinal plants according to their efficacy in treating sudden sickness. Each rank is stated by integer values 0, 1, 2, 3, 4, and 5.the most effective plant is stated by highest value5 while the list important is stated by a value of 0**.**

4.4.5. Preference ranking

Preference/priority ranking was conducted for evaluating the degree of preferences or levels of importance of certain selected plants or parts of plants following Martin (1995) by using six selected

key informants who were invited to rank five medicinal plant species that are used for the treatment of skin rash. Values of 1 to 5 were used in this ranking (1= least used, 2 = less used, 3= good, 4= very good, and 5= excellent) and the ranking were based on the informants perception of the study area. Accordingly, each informant assigned the highest value which was 5 for the most preferred plant species, and the lowest value which has 1 for the plant species that is the least preferred.

4.4.6. Direct matrix ranking (use value matrix)

Direct matrix ranking exercise was done following Martin (1995) in order to compare multipurpose use of given species and to relate this to the extent of its utilization versus its dominance. In the direct matrix ranking exercise, each key informant was asked to assign use values / 5= excellent, 4= very good, 3 = good, 2 = less used, 1 = least used, 0 = not used, for each species. Accordingly, each key informant gave use values for the eight multipurpose medicinal plants and average values of use diversity for species was taken and the values of each species were summed up and ranked.

4.4.7. Market survey

Market survey was conducted at selected two local market places (Arerti and Baliche) that are more central to the study sites. And semi-structured interviews were made with medicinal plants sellers to assess the variety and amount of the medicinal plant materials of the area. Thus, the main purpose of the market survey was to record the marketability; variety and amount of medicinal plants sold the markets and to record information on the use of diversity and sources of the medicinal plants and finally to analyze with the relevant information of the area such as threats and conservation of the medicinal plants.

4.5. Medicinal plant specimen collection, identification and description

In order to classify and describe plant communities by dominant and co-dominant plant species and assess the distribution of medicinal plants in the study area, specimen collection was carried out between, November 2 to December 3, 2009.The collected plant specimens include the traditional medicinal plants of both humans and veterinary value. The local name, habits and associated information of the plant specimens were recorded for each of the plant species, then, the plant

specimens were pressed, dried and taken to the National Herbarium (ETH) Addis Ababa University. Identification of the plant specimens was done both in the field, and later at the National Herbarium (ETH) using taxonomic keys, Flora of Ethiopia and Eritrea, other Floras and books. This was further verified by taxonomic experts. Voucher specimens with labels containing scientific name, vernacular name, and collection numbers for all medicinal plants (Appendix 1) and families of plants recorded from the study area (Appendix 2), were stored at the National Herbarium, College of Natural Science, after confirmation by one of my two advisors ,Professor Ensermu Kelbessa.

4.6. Data analysis

Descriptive statistics

Descriptive statistical methods such as percentage and frequency were employed to analyze and summarize the data on medicinal plants, associated knowledge, management method, use and conservation. The most useful information gathered on medicinal plants reported by local people; medicinal value, application, methods of preparation, route of application, disease treated, dosage, part and habit used were analyzed.

5. RESULTS AND DISCUSSION

5.1. Medicinal Plant Resources of the Study Area

A total of 118 medicinal plants were collected and identified .Of these, the majority of medicinal plants are from the wild vegetation. These plants are distributed under 53 families .Family Asteraceae was represented by 11 species, followed by Lamiaceae (10 species); Fabaceae (9 species); Solanaceae (7 species); Euphorbiaceae (6 species); Malvaceae (3species). The remaining7 Families had (3 species) each; 11 Families had (2 species) each and 29 Families had (1 species) each. Regarding habit diversity; shrubs were the most common and stood first with (48 species), followed by herbs (46 species), trees (16 species), and climbers (8 species).Of the total, 75 species (63.55%) noted to treat only human ailments while 18 species 15.25%) are used to treat livestock ailments. Twenty five species (21.18%) are used to treat both livestock and humans. Out of the total medicinal plants studied 8species were endemic and 5species were rare. The existence and utilization of such a large number of medicinal plants by people in the study area indicates that the majority of the people used and continued to use indigenous medicinal practices for divers' ailments.

The families Asteraceae, Lamiaceae, and Fabaceae were represented by higher number of medicinal plant species than other families. This could be an indication that the study area consists of considerable diversity of plant species within these families. The first two families are among the largest families in the flora of Ethiopia and Eritrea; these families also have high contribution to Ethiopian medicinal flora (Zemede Asfaw, 1999; Tessema Tanto *et al.*, 2003; Mirutse Giday and Gobena Ameni 2003; Mesfin Tadesse *et al*., 2005; Endale Amenu, 2007).

This study shows that out of the total medicinal plant species of the Wereda 114 species (96.6%) had local names (Appendix 1). Having local names could indicate their popularity and their importance as well as their diversity in the study area, while the remaining 4 species (3.38%) are absence of local names. From the total of 118 medicinal plant species documented in the Wereda, 90 species (76.27%) were collected from the wild/natural vegetation and this indicates that there is a significant harvesting pressure on the wild plant source of the study area. However, the remaining percent, constitute 3 species (2.54%) are either from cultivated and/or from wild vegetation, whereas 25 species (21.18 %) are from cultivated fields **(**Figure 3**).** The dominance of the wild vegetation is also

reported by Mirutse Giday (1999); Bayafers Tamene (2000); Debela Hunde (2001); Kebu Balemie *et al*. (2004); Mutha *et al*. (2006); Mirutse Giday (2001) and Tena Regassa (2008).

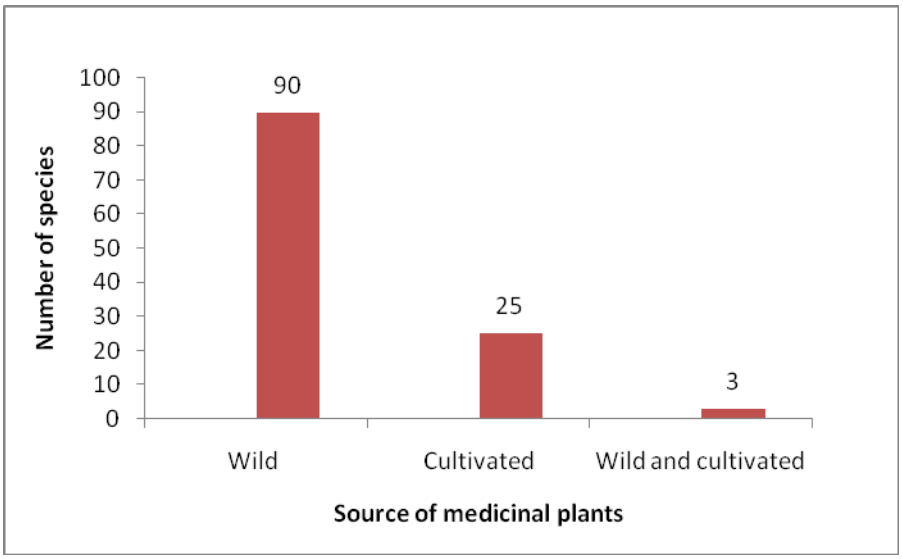

Fig.3 Number and sources of medicinal plant species used to treat human, livestock, or both human and livestock ailments.

5.2. Medicinal Plants Used for Treating Human and Livestock Ailments

5.2.1. Disease types and the medicinal plants used to treat human ailments

Out of the total 118 medicinal plant species documented from the area, 75 species 63.55 % are used to treat about 45 types of human ailments (Appendix 6), and one plant species can treat a single disease or a number of diseases. Similarly, one ailment can be treated with multiple plant species or a single plant species (Appendix 3). For instance, skin disease treated with 12 plant species or (9.44%), different human wounds were treated with 10 different plant species (7.87%), Acute sickness, febrile illness, treated with (8 species ,6.29%) of the medicinal plants as shown in Table 1

Table 1 List of the major treated human illnesses and corresponding number and % of medicinal plant species used for the treatments of each human ailment.

S. No	Disease treated	Local name	Number of plant species used	Percent of plant
1	Skin disease	Yekoda besheta	12	9.44
2	Wounds	kusel	10	7.87
3	Acute sickness	Dingetegna	8	6.29
4	Febrile illness	Tekusate	8	6.29
5	Malaria	Weba	7	5.51
6	Evil eye	Buda	7	5.51
7	Ear ache	Yejero hemem	7	5.51
8	Liver disease	Gubet	5	3.93
9	Stomachache	Hode kurtet	5	3.93
10	Body inflammation	Yesewnet ebtet	5	3.93
11	Tonsillitis	Tonsil	4	3.14
12	Ring worms	kukucha	4	3.14
13	Intestinal parasite	Yeanjet besheta	4	3.14
14	Cough	Sale	3	2.36
15	Toothache	Terse kurtemate	3	2.36
16	Snake bite	Yebabe nekesha	3	2.36

Out of the 75 species (63.55 %) of the plant used for treating human ailments in the area, 31 species (41.33 %) were shrubs, 29 species (38.66%) were herbs,12 species (16 %) were trees, whereas climber constitutes,3species (4%) respectively. As shown in figure 4, the rank indicates that herbs and shrubs constitute most of the medicinal plants used for treating human ailments in the study area. This is in agreement with the studies of Bayafers Tamene (2000); Debela Hunde (2001) and Kebu Balemie *etal*. (2004).

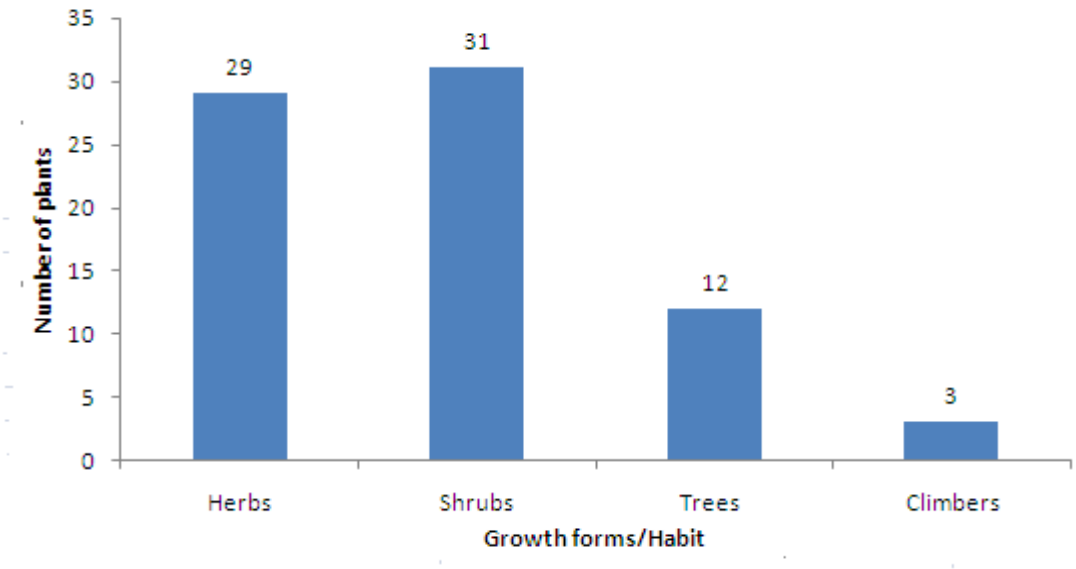

Fig. 4 Number and habit of medicinal plants used to treat human ailment.

The practitioners mostly harvested leaves, (29 species, 31.52%) and roots (17 species, 18.47%) for treating ailments. The other parts include fruits (11 species, 11.95%), Whole part (5 species, 5.43%), stem (1 species, 1.08%), seed (3 species, 3.26%) and others (28.29%). Studies showed that local communities in many other parts of the country use leaves in their remedial preparation (Milliken and Albert, 1996; Bayafers Tamene, 2000; Hilgert, 2001; Belachew Wasihune *et al.*, 2003; Mesfin Tadesse *et al.*, 2005; Mirutse Giday, 2007). The investigation showed that leaves are most harvested resulting in a threat to rare plants, in the area. However, the second most collected plants are root, which negatively affects the growth and physiology of the plant results in the death of mother plant at the end (Odera, 1997).

5.2.2. Descriptions of the most frequently reported medicinal plants used to treat human ailments only.

Brief notes on some morphological parts, ecology and medicinal use of each species are given below

***Withania somnifera* (L) Dunal (solanaceae) Gizwa**

It is a perennial shrub or woody herb, up to 2m tall. It grows, in disturbed places in the high lands, on lake shores, along temporary streams, on river banks, and in disturbed places in open woodlands

and in Acacia bush land, in the lowland in altitude range of 600-2700m, Solanaceae (Friis, 1905).It has narcotic properties, in traditional medicine decoction of the plant are used as pain killer. In Ethiopia this plant is distributed in Gonder, Gojam, Arsi, Sidamo, Kefa, and Gamogofa and in Africa it is found in Djibouti, Somalia, wide spread in the Mediterranean area and Asia. In the study area it is the most effective medicinal plant to treat Diarrhea and evil eye.

Vernonia amygdalina Del. (Astraceae) Girawa

Is shrub or small tree usually branched from near the base and it is 2-10m high .Avery common species Podocarpus forest, secondary forests ever green woodland and bushland, roadsides, Westland, also grown in gardens in altitude rang of 1200-3000m, Asteraceae (Mesfin Tadesse,1994). The leaves are together with those of *Rhamnus prinoides* used in the preparation of locale beer (Tella). In Ethiopia it is found in Bale, Game-gofa, Gonder, Gojam, Tigray, Shewa, and Illibabor. Elsewhere in Ethiopia, the leaves and bark are bitter and used in local medicine for instance, in the study area it is used for the treatment of skin infections and sudden sickness (Dingetegn)

Solanum incanum **L** (**Solanaceae**) Zerech embway

Is a shrub up to 1.5m high, but often less, seasonally deciduous, found in heavily grazed areas, Waste places, in altitude of above 2100m, Solanaceae (Friis ,1905).In Ethiopia it is found in Gonder, Sidamo, Bale, Shewa, Tigray, Gamo-gofa. This form is common in Somalia and the Sudan and widespread in tropical Africa, the Middle Eastland India. In the study area it is most effective for the treatment of bleeding.

Ocimum lamifolium Hochst **.ex Benth. (Lamaceae) Damakessi**

Is sub shrub or shrub, 0.7-3m tall a very common species of primary and secondary mountain forest and Bush lands, tall grasslands, rarely also cultivated as an ornamental in Altitude rang of 1200-2900m , Lamiaceae (Ryding,1962).In Ethiopia it is found in Gojam, Gonder, Kefa, Shewa, Ilebabore, and Welega. In Africa it found in East Africa, Malawi, Democratic republic of Congo and Cameron. In the study area this plant is used for treatment of head ache and eye disease.

Ziziphus mucronata (Willd) (Rhaminaceae) Qurqura

Shrub or tree 2-15m young branches with a pair of pointing in different directions leaves glabrous or slightly hairy; Flowers, yellowish, green; Fruits, yellow or red, globose in shape. It Occurs along rivers, bush lands, in cultivated fields, woodlands, grasslands, at altitude of 1950m and below, Rhaminaceae (Vollsen,1958).Wide spread in Ethiopia, Tanzania, Uganda, Senegal to Arabic, South Africa and Madagascar. In the study area this plant is used for treatment of stomach ache.

Clerodendrum myricoides **(Hochest) Vatke (Lamiaceae) Misrch**

A week shrub that grows to about 2m tall stems .Slightly angular. Leaves arranged in two or four, deeply toothed; Corolla blue, corolla limb glabrous. Occurs in grass lands, scrublands, open wood lands on black cotton soils and rock out crops. It can be found at an altitude range of 900-2500 m, Lamiaceae (Ryding, 1962). In Africa it is found in Zaire, Rwanda, Sudan and Somalia. In the study area this plant is used for treatment of wound, fire burn and skin rash

5.2.3. Medicinal plant species used to treat livestock health problems only.

Medicinal plants recorded in this study area for their veterinary use by the medicinal practitioners to treat livestock ailments are 18 species (15.55%) (Appendix 5).They belongs to 18 families. Family Asteraceae is represents by (4 species), followed by Fabaceae (3 species) and the rest of the families have (1 species) each. The majority of these plants are collected from the wild (18 species, 15.55. %) Table 4 depicts plants growth forms for veterinary uses, i.e. shrubs (9 species, 50%), herbs (6 species, 33.33 %), and climbers (3 species, 16.66%).Regarding the plant parts for veterinary uses leaves are widely used part for a range of preparations than the other parts. As shown in figure 5 leaves account for greatest preparations. (9.40 %), followed by root (2.56 %), flower (1.70 %), fruit and others preparations are (0.85%). Debela Hunde (2001) and Kebu Blemie *et al.* (2004) reported similar proportion of root and leaf requirement for remedy preparation to treat of livestock diseases.

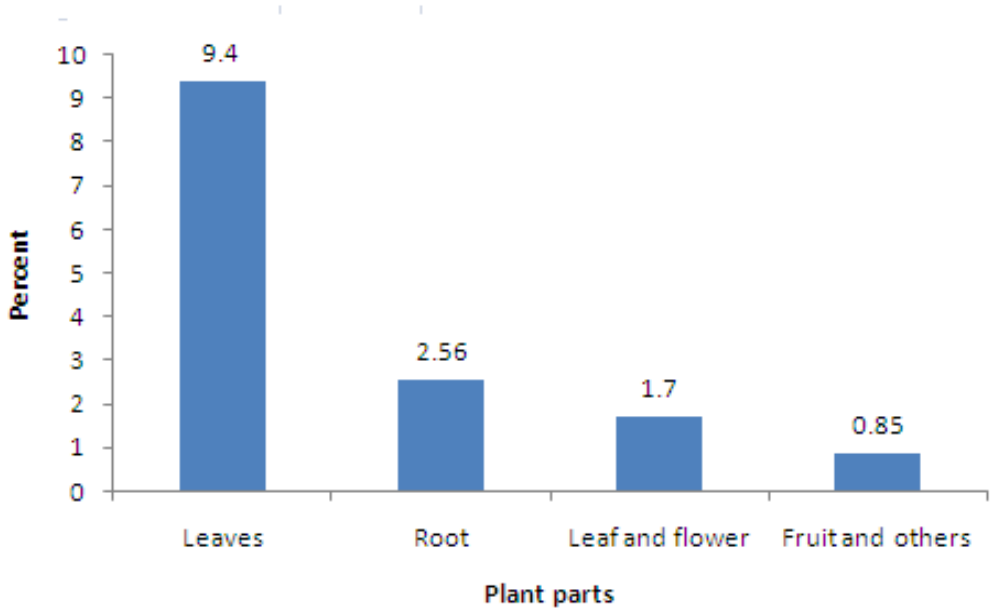

Fig.5 percentage of plant parts used for the treatment of livestock.

A leaf remedial preparation technique requires easier and quieter methods than root. However, root is used for a range of preparations for livestock treatments. People of the study area are acquainted with more knowledge of treating human ailments than that of livestock. Because people of the area exercise sedentary agriculture, livestock population is limited.

In present study ,10 different types of health problems in livestocks were reported to be treated by medicinal plants.From118 medicinal plants recordred,18 of them treat only livestock ailments.among the medicinal plants,4 species (22.22%) used to treate eye disease ,3 species (16.66%) treaets sudden sickness,2 species (11.11%) treat cough and another 2 species(11.11%) used to treat rabies (Table2).The species used to treat only livestock ailments were very few,when compared to species used to treat human ailments, and to the species used to treat both human and livestock ailments .This could be due to the therapeutic experiences of the local people and the healers for the treatment of human ailments than livestock ailments, or it could be due to the sedentary life style of the local people depending on mixed farming system of the area this contrasts with that of pastoralists where ethnoveterinary knowledge is more elaborated in many study results such as Haile Yineger (2005); Mirutse Giday (2007); Endale Amenu (2007),and Etana Tolassa (2007).

Table 2 Diseases of livestock frequently treated.

S.No	Disease treated	Local name of the disease	Number of plant species used	% of plant species used
1	Bloating	Hode menfate	1	5.55
2	Cough	Sale	2	11.11
3	External parasite	Kichame	1	5.55
4	Eye disease	Yayne besheta	4	22.22
5	Diarrhea	Tekmate	1	5.55
6	Sudden disease	Dingetegna	3	16.66
7	Anthrax	Abagorba	1	5.55
8	Rabies	Yewesha besheta	2	11.11
9	Retained placenta	Kerate yengedalege	1	5.55
10	Wound	kusele	2	11.11

5.2.4. Descriptions of the most frequently reported medicinal plant species used to treat livestock ailments.

***Nicotiana tabacum* L. (Solanaceae) Tinbaho.**

An erect and it is annual or biennial herb growing to 2.5m high. It is a cultivated plant in home gardens in some parts of the country and sometimes escaped into waste ground and along streams at altitudes range of between 1700 and 2400m, Solanaceae (Friis,.1905). In the study area, it is found in farmers' home garden or under the shade of life fence. It has a medicinal use for internal parasites, Trypanosomiasis, Eye infection and Head ache. The local people use this plant to treat for human disease.)Leaf of *Nicotiana tabacum* is pounded with root of *Carissa spinarum*, mixed with water and cup of tella given to human, in addition dried and powdered leaf of *Nicotiana tabacum* sniffed by human for relive to headache ,and its leaves with the leaves of *Capparis cartilaginea* used to treat cough.

Capparis cartilaginea Decne. (Capparidaceae) Ankorsa

Scrambling Shrub and it is up to 3(4) m tall, generally waxy, branches sometimes covering a wide area.Costal or succulent scrub, along dry river beds, of among rocks or stony ground, an altitude of above1300m, Capparidaceae (Kers, 1915). In Ethiopia it is found in Harergie, Sidamo, Shewa, and Eastern Eretria. In Africa it is found in Somalia and Djibouti South to Tanzania, North West in to Egypt and Libya, and out of Africa Found in Arabian Peninsula, East to Pakistan and India. In the study area this plant is used for treatment of cough of donkey

Acokanthera schimperi (DC.) Schwenif (Apocynaceae) Merenze

Shrub or Tree and it is 1-9m tall. Bark soft, brown, slash cream with fine orange streaks. It is found in wood lands and degraded forest. It is found an altitude rang of 800-2100m, Apccinaceae (Leeunberg, 1990). In Ethiopia it is found in Gojam, Harerga, Sidamo, Bale, Gonder, and Shewa. In Africa It is found in Somalia, Djibouti, Kenya, Uganda, Rwanda, and North Tanzania. The flesh fruit pulp is edible, enjoyed by shepherd boys. However, the latex is poisonous and has been used to make arrow poison. In the study area this plant is used for treatment of rabies.

Gossypum barbdense L. (Malvaceae) Tite

Is shrub to 3m tall, branch lets sub glabrous. Originally it is found from America, now widely cultivated in all tropics and sub tropics, Malvaceae (Vollsen, 1980). In Ethiopia it is wide spread an altitude rang from sea level to 2000m,and it is closely resembling to *Gossypum hirsutum* but the

leaves are more deeply 3-5 lobed, middle lobe distinctly longer than wide. In the study area this plant is used for treatment of diarrhea.

5.2.5. Medicinal plant species used to treat both livestock and human ailments.

Twenty five (21.18 %) medicinal plant species of human and veterinary importance were gathered and documented in this study. Those plants are classified under 25 families. Family Vitaceae accounted by (5 species), Euphorbiaceae, Lamiaceae, and Fabaceae accounted by (3 species) each, Family Brassicaceae and Asteraceae accounted by (2 species) each and the rest of the families had only one species for each. The majority of these plants are collected from the wild (18 species, 15.38%), and few (7 species, 5.98%) were cultivated. According to this study, out of the total 118 medicinal plant species documented from the Wereda, (75 species,63.55%) were used to treat human ailments only, (25 species,21.18%) were used in the treatment of both human and livestock ailments and (18 species,15.25%) were used to treat livestock ailments, as shown in Appendix 3,4,5 respectively. As shown in Figure 7 the growth forms of medicinal plants of human and livestock ailments or out of the 25 species of the plant used for treating human and livestock ailments in the area, 11 species (44%) were herbs, 8 species (32%) were shrubs, 4 species (16%) were trees, where as climber constitutes 2 species (8%). As shown in figure 6 the rank indicates that herbs and shrubs constitute most of the medicinal plants used for treating human ailments in the study area.

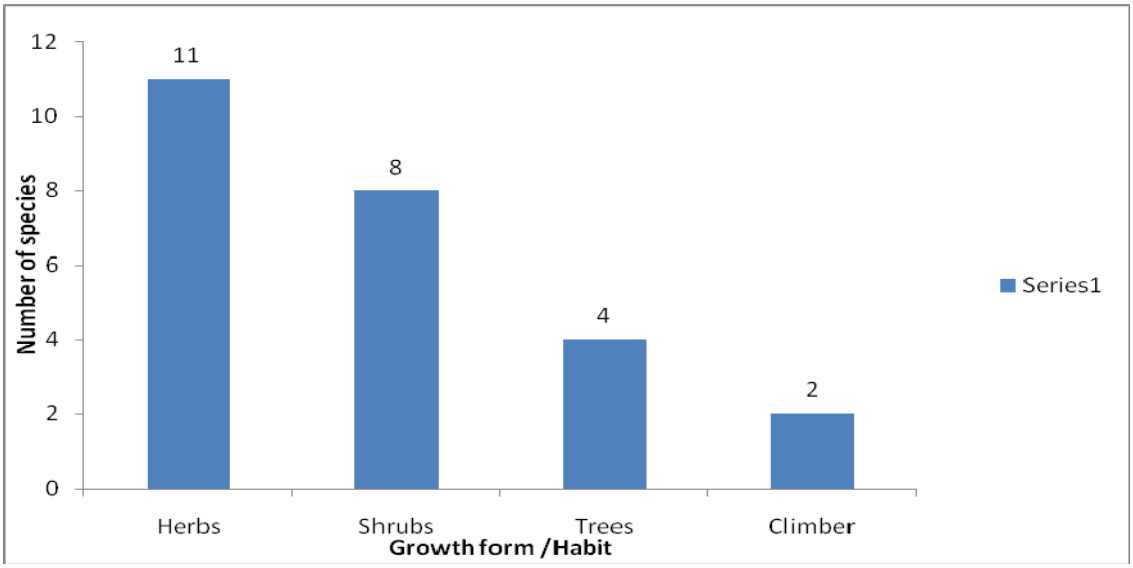

Fig.6 Number, growth forms of medicinal plants used to treat human and livestock ailments.

Each of the growth forms of medicinal plants used for treating health problems of human, livestock as well as, both human and livestock in the study area is indicated in Table 3.

Table 3 Growth forms of medicinal plants used for treating health problems of human , livestock as well as both human and livestock.

Growth forms of plant species	**Human only**		**Human &livestock**		**Livestock only**	
	Number of plant species	% of plant species	No of plant species	% of plant species	No of plant species	% of plant species
Herbs	29	38.66	11	44	6	33.33
Shrubs	32	41.33	8	32	9	50
Trees	12	16	4	16	-	-
Climbers	3	4	2	8	3	16.66
Total	75	100%	25	100%	18	100%

5.2.6. Descriptions of the most frequently reported medicinal plants used to treat both human and livestock disease.

***Croton macrostachyus* Del. (Euphorbiaceae) Bisana**

It is shrub or tree, 2-25m long. Found in forest margins and secondary woodlands, extending in to disturbed areas and along edges of roads, mostly in soils of volcanic origin, an altitude range so far recorded for the plant is 500-2350m, Euphorbiaceae (Gilbert, 1995).In Ethiopia, this plant is found in Tigray, Gonder, Gojam, Wello, Shewa, Arsi. Wellega, Illibabur, Kefa, Sidamo, Bale and Harerge .In Africa it is distributed West to Guinea, south to Angola, Zambia, Malawi and Mozambique. The stem bark of this species is also known for its medicinal value in treating leprosy. In the study area this plant is more effective for the treatment of ringworms, gonorrhea and rabies.

***Phytolacca dodecandra L.Herit. (*Phytolaccaceae) Endode**

It is semi- succulent, scrambling shrub to 10m tall or more. It grows in ever green bush lands, forest edges and distributed places in altitudinal range of 1500-3000m, Phytolacaceae (Kers, 1930). In Ethiopia, this plant is found distributed in Tigray, Bale, Gamo-Gofa, Gonder, Wollo, Gojam, Wellega, Shewa, Illubabore, Kefa, Arsi, Sidamo and Hararge regions. It is also found in other African countries in Eritrea, Madagascar and in tropical and South Africa. It is widely used as soap specially for cleaning cotton cloths, also as Molluscicides for the control of the snails that are vectors of Bilharzias.The importance of this plant due to molluscidal properties has led to setting up of the Endod Foundation, with its head quarter in Addis Ababa. Endod varieties with high molluscidal content have been identified and are now being cultivated by farmers. In the study area this plant is used for treatment of malaria and rabies.

***Cucumis ficifolius* A.Rich. (Cucurbitaceae) YemiderEmboy**

It is perennial herb to 4m tall. Avery common species in grass and wooded grasslands, Acacia wood land, rocky slopes, also in secondary vegetation and cultivated places in altitude rang of 1300-2400m, Cucurbitaceae (Jeffrey, 1981). The root extract recorded as used in local honey Wine TEJ in making beverage more intoxicated. In Ethiopia it is found in all region of the country. In Africa it is found in Uganda, Kenya, Rwanda, and Tanzania. In the study area this plant is used for treatment of sudden sickness, stomachache and rabies.

5.3. Modes of Preparation of Medicinal plants.

The total plant species documented from the study area were 118, but since one plant species can be used to treat more than one disease, and thus has more than one remedial preparation, the total number of the plant preparations were166.Traditional medicine preparation was also varied in plant species compositions. In this study, the preparations using one or more species have different percentages for instance from one species (60.24%), from two species (28.3%) and from three species (8.43%) was prepared as shown in Table4.

Table 4 Percentage distribution of composition of herbal preparation

No	Composition of preparation	Number of preparation	% of preparation
1	One species	100	60.24
2	Two species	47	28.3
3	Three species	14	8.43
4	Four/more/ species	5	3.02
	Total	166	100%

This composition of herbal preparation as single drug and in mixed ingredient forms is not changed depending on the patient age ,sex etc but the dose may be changed with age, level of the disease, physical appearance (body weight) of the patient. According to this study, preparation from single species is greater than the other mixed ingredient form. Thus, the widely using of single plant species for the preparation of local medicines in the study area is in agreement with the finding of Mirutse Giday (1999); Bayafers Tamene (2000); Kebu Balemie *et al.*(2004); Debela Hunde *et al.*,2004); Mirutse Giday (2007).

The major forms of preparation/dosage form of plant medicines in the study area include; 50.60% as liquid forms (liquid obtained after crushed), exudates form (sap and drop form (9.03%), powdered forms (22.28%), smashed, juiced, boiled or filtered form (12.04%) and (6.03%) as unprocessed plus other forms in the study area (Table 5) .The dependency of local people on fresh materials of the plants put the species under series threat than the use of a drier form. As fresh materials are harvested directly and used soon with its extra deterioration with no chance of preservation, i.e. not stored for later use. However, local people argue that fresh materials are effective in treatment as the contents are not lost. This agrees with the findings of Bayafers Tamene (2000) and Debela Hunde (2001).

Table 5 Forms of medicine preparation.

Forms of Preparation	preparation	%
Liquid forms	84	50.60
Smashed, Juiced, boiled or filtered	20	12.04
Powdered forms	37	22.28
Exudates form(Sap and drop form)	15	9.03
Other forms	10	6.02
Total	166	100**%**

The popularity of the liquid preparations may be due to easy method of the liquid preparation form and due to property and availability of water as solvent. The widely using of the liquid preparations forms in this study is in agreement with findings in other parts of the country by Mesfin Tadesse (1986);Dawit Abebe and Ahadu Ayehu (1993), and Abiyot Berhanu (2002).

5.4. Route of Administration of the Traditional Medicine.

The prepared traditional drugs are administered through different routes of administration. The major routes of administration in the study area include; oral, dermal, nasal, anal, and ocular and others /local, topical, etc/.In this study ,the most popular way of administration of herbal medicins were oral which accounted for 90(54.21%) ,followed by48(28.91%) dermal,and 10(6.02%)ocular(Table 6).

Table 6 Routes of administration and number of application of herbal medicine

Route of administration	Total application	%
Oral	90	54.21%
Dermal	48	28.91%
Ocular	10	6.02%
Nasal	9	5.42%
Anal	5	3.01%
Total	166	100%

Findings of various ethnobotanical researches elsewhere in Ethiopia such as that of Dawit Abebe (1986); Bayafers Tamene (2000); Getachew Addis *et al.* (2001); Debela Hunde (2001); Kebu Balemie *et al*. (2004); Endale Amenu (2007); Mirutse Giday (2007) and Tena Regassa (2008) are

mostly similar to this study. Both the dominant routes of administration (oral and dermal) routes permit rapid physiological reaction of the prepared medicines with the pathogens and increase its curative power.Previous reports such as Dawit Abebe (1986), Bayeferse Tamene (2000) and Kebu Balemie *et al.* (2004) agrees with this current finding. In addition, informants reported that there are related restrictions to enhance rapid physiological reaction and to increase its curative power of remedies.

5.5. Major Sources and Marketability of Medicinal Plants

5.5.1. Major sources of medicinal plants.

The first and most important sources of medicinal plants of the study area are natural (wild) vegetation(woodland vegetation type dominated by Acacia) this is observed on both sides of street extending in to some parts of farm fields.The second major sources of medicinal plants in the area are cultivated plants including crops, edible fruits and vegetable. The other medicinal plants' source of the area is the market, to getting different products of plant species and other traded medicinal plants that are not growing in the study area, which are thus brought from other parts of the country. Generally, the cultivation of medicinal plants is not properly experienced in the study area as well as in other areas of the country. According to Zemede Asfaw (1997), only 6% of the plants maintained in home gardens in Ethiopia are primarily cultivated for their medicinal value even if many other plants grown for non-medicinal purposes turn out to be important medicines when some health problems are encountered, Haile Yineger *et al*. (2008).

5.5.2. Marketability of medicinal plants.

In the present study area, the results obtained from market assessment of two local markets Arerti and Balich town markets, showed that most of the medicinal plants are not widely traded for medicinal purposes, but mostly for other different uses. Since the local people prefer either collecting these plants by themselves from the available areas (vegetations) in the wereda to prepare the medicines or they prefer to go directly to the local healers to get treatments instead of buying the medicinal plants from market. However, some of the medicinal plants (*Alliium sativium*, *Foeniculum vulgare, Artemisia absinthium)* are widely traded and used for spices and (*Eucalyptus globulus*,*Olea europaea)*are used for fire wood,constraction,house hold toolsand farming tools other than their medicinal

uses (Table 7).This result is agree with the study reports of Mirutse Giday (2007); Etana Tolessa (2007) and Tena Regassa (2008).

Table 7 Some of the cultivated and wild grown medicinal plants widely traded in the market for different uses other than medicinal values **key**; Fw ; Fuel wood, F= Food, Sp= spice, Sr= spiritual /ritual. Lf= live fence, St= stimulant, Co= construction, Ht= house hold tools, B= beverage, Tb= tooth brush, Ft= farming tools.

No	Scientific Name of the medicinal plant	Local name	Used for
1	*Alliium sativium*	Nich shinkurt	Sp,F
2	*Foeniculum vulgare*	Ensilal	Sp
3	*Artemisia absinthium*	Ariti	Sp
4	*Brassica carinata*	Gomenzer	F
5	*Catha edulis*	Chat	St
6	*Cicer arietinum*	Shimbera	F
7	*Coffea arabica*	Buna	St
8	*Croton macrostachyus*	Bisana	Fw
9	*Echinops kebericho*	Kebercho	Smell
10	*Eucalyptus globulus*	Nech Baherzafe	Co,Fw,Lf
11	*Lepidium sativum*	Fetoo	F
12	*Linum usitatissimum*	Telba	F
13	*Nicotiana tobacum*	Tembaho	St
14	*Ocimum basilicum*	Besobla	Sp
15	*Olea europaea*	Weyra	Fw,Co,Ft
16	*Rhamnus prinoides*	Gesho	B
17	*Ruta chalepensis*	Tenadame	Sp
18	*Vicia faba*	Bakela	F
19	*Cymbopogon citratus*	Tejesare	Smell
20	*Capsicum annuum*	Karia	Sp
21	*Lycopersicone esculentum*	Timatime	F

22	*Citrus limon*	Lomye	F
23	*Citrus sinensis*	Birtukan	F
24	*Ziziphus mucronata*	Qurqura	F
25	*Brassica nigra.*	Senafich	F

5.6. Comparison of Medicinal Plants Knowledge Among Different Age Groups.

In this study, the informants (80 in number) from whom the basic ethnobotanical data have been gathered were grouped in to three age group **(**Table 8).

Table 8 The use knowledge of medicinal plants as compared by age groups.

Age Group	Age category	Number/ % of informants		No of plant species cited by the informants
		Number	%	
1st	18-32	12	15%	50
2nd	33-47	51	63.75%	130
3 rd	48-62	17	21.25%	90

As observed during the data collection and interviews made in the study sites the 2nd and the 3rd age categories had the highest contribution for the identification and associated knowledge of most of the medicinal plants used in the study area. These observations showed similar pattern to the study results reported by Debela Hunde (2001); Tigist Wondumu (2003) and Hussen Adale (2004).

5.7. Informant Consensus /Medicinal Plants use report.

Plants which are popular in their wide range of disease that they treat in the study area have local name and well known by the local people/healer of the area generally, based on the informants' consensus conducted in the study area, certain species which were independently cited by many of the informants for their medicinal uses against human and live stock ailments are listed in Table 9.

Table 9 List of medicinal plants and the corresponding informants' citations

	Scientific Name	Local name	No of informants who cited the plant	% of informants
1	*Achyranthes aspera*	Telenge	38	47.5
2	*Acokanthera schimperi*	Merenze	24	30
3	*Allium sativum*	Nech shinkurte	32	40
4	*Asparagus africanus*	Yeset keste	31	38.75
5	*Brassica nigra*	Senafich	20	25
6	*Calotropis procera*	Kinbo/Tobiaw	39	48.75
7	*Calpurnia aurea*	Digeta	48	60
8	*Catha edulis*	Chat	19	23.75
9	*Clerodendrum myricoides*	Misirch	50	62.5
10	*Croton macrostachyus*	Bisana	45	53.75
11	*Cucumis ficifolius*	Yemeder embwaye	49	61.25
12	*Datura stramonium*	Astenager	28	35
13	*Eucalyptus globulus*	Nechbaher zafe	29	36.25
14	*Lippia adoensis*	kessie	22	27.5
15	*Ocimium lamifolium*	Damakessie	40	50
16	*Phytolacca dodecandra*	Endode	27	37.75
17	*Ruta chalepensis*	Tenadame	26	32.5
18	*Salvia nilotica*	*Hulgeb*	33	41.25
19	*Solanecio gigas*	Shekoko gomen	54	67.5
20	*Dodonaea angustifolia*	Kitkita	25	31.25
21	*Solanium incanum*	Zerech emboye	42	52.5
22	*Vernonia amygdalina*	Girawa	52	65
23	*Verbascum sinaiticum*	Ketetina	23	28.75
24	*Zanitum spinocium*	Dehanekaye	21	26.25

Accordingly, *Solanecio gigas* with citation of (54 informants, 67.5%) stood first followed by *Vernonia amygdalina* (52 informants, 65%) citation. *Clerodendrum myricoides* scored the third rank, with (50 informants 62.5%) citation. *Cucumis ficifolius* (49 informants, 61.25%), *Calpurnia aurea* (48 informants, 60%), *Croton macrostachyus* (45 informants, 53.75%) *Solanium incanum,* (42informants, 52.5%), *Ocimium lamifolium* (40 informants, 50%), *Calotropis procera* (39 informants, 48.75 %).

5.8. Ranking of Medicinal Plant

When there are more than one plant species which are used to treat the same ailments, people prefer the better one. In this study, seven key informants were selected to conduct pair wise ranking exercise of seven medicinal plants used to treat sudden sickness and to conduct preference ranking six key informants(A-G) were selected to compare six medicinal plants used to treat Skin rash (Table10and 11respectively).

Table 10 Paired comparison of selected seven medicinal plants used to treat sudden sickness based on the informants perceptions (Values given 0 to 5;0=not used,1=least used, 2 less used,3=good,4=very good, and 5=excellent.

Plant species	**Respondents leveled A to G**							**Total**	**Rank**
	A	B	C	D	E	F	G		
Vernonia amygdalina	2	3	4	5	0	5	1	20	2nd
Verbena officinalis	3	3	5	1	2	0	5	19	3 rd
Cucumis ficifolius	4	5	1	2	2	0	4	17	6th
Solanecio gigas	3	5	1	3	0	2	5	19	3rd
Sesamum orientale	3	5	5	1	0	1	3	18	5th
Calotropis procera	1	2	1	3	4	5	5	21	1st
Achyranthes aspera	1	0	0	2	3	3	5	14	7th

According to the result of pair wise ranking *Calotropies procera* stood first whereas *Verbena officinalis* ranked 2nd and *Vernonia amygdolina* and *Solanecio gigas ranked 3*rd,and *Sesamum orientale ranked* 5th and are less preferred and believed to be less efficacious when to compared to the first and second ranked plants for treating Sudden sickness(Table 10)

However, according to the preference ranking five medicinal plants that were reported as effective for treating skin rash was conducted after selecting 6 key informants (A-F). The informants were asked to compare the given medicinal plants based on their efficacy, and to give the highest number (5) for the medicinal plant which they thought most effective in treating skin rash and the lowest number (1) for the least effective plant in treating skin rash. As shown in table 11, *Vernonia amygdalina, Rhamnus perinoidea, Clerodndrium myrisoides and Brassica integrifolia* thus both are believe to be the most effective and most preferred medicinal plants to treat skin rash.

Table 11 Preference ranking of five selected medicinal plants used to treat Skin rash according to perceptions of informants.

	Respondents labeled A to F							
Plant species	A	B	C	D	E	F	**Total**	**Rank**
Brassica integrifolia	2	1	3	1	3	1	11	3rd
Clerodendrium myricoides	1	2	2	3	1	2	11	3rd
Vernonia amygdolina	4	3	1	2	1	3	14	1st
Citrus limon	1	1	3	1	2	2	10	4th
Rhamnus prinoides	3	3	2	2	3	1	13	2nd

5.9. Use Diversity of the Medicinal Plants

A number of medicinal plants were reported that they have multiple uses other than their medicinal use. According to the result of the study, of the total 118 medicinal plant species documented in the study area,(57 species,48.30%) are used mainly as medicinal plants while (61 species,51.69%) have multiple uses in addition to medicinal purposes include; fuel wood (charcoal plus fire wood) contains (27species,44.26%),construction (17species,27.86%),food edible types contain (15species,24.59%),spices and fodder each of them contains (3species,4.91%), live fence (2 species,3.27%) and others/ house hold tools, stimulants, tooth brush, ornamental; etc/ contains (10 species,16.39%).Accordingly, each key informant gave use values for the eight multipurpose medicinal plants and average values of each use-diversity for species was taken and the values of each species were summed up and ranked (Table 12).

Table12 Average score for direct matrix ranking of eight medicinal plant species based on their use diversity /use value given from 0 to 5; 0 = not used, 1 = least used, 2 = less used, 3 = good, 4 = very good, and 5 = excellent.

Main use	**plant species**							
	Clerodendrum myricoides	*Ziziphus abyssinica*	*Croton macrostachyus*	*Eucalyptus Globulus*	*Olea europaea*	*Haginia abyssinica*	*Pterolobium stellatum*	*Phytolacca dodeccandera*
Medicinal	4	4	4	4	3	1	1	4
Fencing	3	1	1	3	2	2	0	0
Fire wood	5	4	4	5	3	3	4	2
Construction	5	0	2	5	5	4	4	3
Live shade	2	2	4	2	4	3	2	1
House hold tools	0	0	4	4	5	5	0	0
Charcoal	4	3	2	5	4	1	3	5
Fodder	0	0	0	0	5	0	0	0
Total	23	14	21	28	31	19	14	15
Rank	**3** rd	**7** th	**4** th	**2** nd	**1** st	**5** th	**7** th	**6** th

Accordingly, *Olea europaea* was ranked 1st where as *Eucalyptus Globulus* ranked 2nd, and *Clerodendrum myricoides* ranked (3rd) hence, these three species are the most preferred medicinal plants used for various uses and thus are the most threatened species as reported by the informants. On the other hand, the result (Table 14) shows that the local people use the multipurpose species mainly for fire wood (1st) and construction (2nd), charcoal (3rd), medicinal (4th), house hold tools, (5th), for fencing (7th), and fodder (8th) purposes. This over uses of medicinal plants for other purposes such as fire wood and others could be a good indication that these invaluable resources are of conservation risk. Thus the long term survival of the top ranked species is under question if the exploitation of these plants continues with the existing rate.

5.10. Threats and Conservation of Medicinal Plants

5.10.1. Threats to medicinal plants

The cause of threats to medicinal plants can be generally grouped in to natural and human induced factors. However, as reported in this study most of the causes for the threats to medicinal plants and associated knowledge are the anthropogenic factors such as deforestation due to over exploitation of plants for different uses/charcoal, fire woods, construction woods, overgrazing, cutting and burning of plants to create new agricultural lands ,medicinal plants trade for different uses and others. The results of the present study showed that agricultural expansion, fuel woods (charcoal and fire woods) collection were ranked as 1st and 2nd factors respectively and followed by harvesting for construction and urbanization ranked as the 3rd and 4th factors respectively for the threats to medicinal plants and associated knowledge in the study area (Table 13) .In addition, over grazing and medicinal plants trade ranked as 5th and 6th factors respectively.

Table 13 Priority ranking on perceived factors of threats to medicinal plants used on their degree of destructive effects/ value 1-5 were given 1= the least destructive threat and 5= the most destructive /threat/

Factors	**Respondents labeled A to H**								**Total**	**%**	**Rank**
	A	B	C	D	E	F	G	H			
Medicinal plant trade	2	1	1	1	3	4	2	2	16	13.67	6th
Over grazing/browsing by domestic animals	1	2	1	1	2	2	1	1	11	9.40	5th
Urbanization	4	3	1	2	1	3	1	2	17	14.53	4th
Agricultural expansion	4	2	3	5	3	2	2	4	27	23.04	1st
Charcoal fire wood collection	3	1	4	2	5	4	4	3	24	20.51	2nd

Harvesting for construction	1	3	3	4	3	2	2	3	21	17.94	3rd
Total	15	12	13	15	17	17	12	15	116	100%	

The main medicinal plants traded//exploited for different purposes other than the medicinal values are shown on Table13, Generally in connection to population growth the demand of woods, Agricultural expansion and urbanization are increased and thus have also significant effects for the threats to medicinal plants and associated knowledge of the study area. The threats (losses) of medicinal plant and/ or tax are one of the causes for the losses of the associated knowledge of the plants. The other reason for the losses (threats) of the knowledge of medicinal plant is modernization and refusal to practice/ inherit the knowledge by new generation. As reported by the informants, the expansion of modern health institutions, schools some environmental and cultural modifications reason for the losses (threats) of the knowledge of medicinal plant.

5.10.2. Conservation of medicinal plants and associated knowledge.

The above causes and other similar reasons are the problems for the conservation of medicinal plants and associated knowledge. Even though, there are many problems plus 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 ex-situ and in-situ conservation methods.For instance, some people and/ or office have 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 so on.

6. CONCULUSION AND RECOMMENDATIONS

6.1. Conclusion

The number of reported medicinal plants (118 species) as being used by Minjar Shenkora Wereda people is not quite small taking in to account the small human population size. The traditional medicinal plants are central to the rural cultures and materials needs. People are knowledgeable about the plants their distribution, use, and conservation .Indigenous practices somehow contributed to the sustained use, management and conservation of medicinal and multiple use of indigenous trees.Traditional medicinal plants harvested mostly from wild vegetations followed by home gardens. They are also obtained from road side and farm lands .Shrubs were found the dominant growth forms used for the preparations of traditional remedies followed by roots for preparation of human remedies. Moreover they employ medicinal plants for different purposes besides their medicinal value such as charcoal and firewood, construction and household tools. These important medicinal plants are under threat and the indigenous knowledge is also eroding .The major threats to medicinal plants and the associated knowledge in this particular study area: agricultural expansions, fire wood collections grazing and drought in that order to overcome these problems traditional healers have turned towards home gardens.In spite of this fact ,traditional healers still depend to a greater extent on naturally growing species ,as they believe those species in the wild vegetation are more powerfull in the treatment of different ailements and health problems.As regard to the knowledge of medicinal plants among Minjar Shenkora Wereda two families of plants Asteraceae and Lamiaceae are leading for being used as remedies against a Varity of complaints for both humans and veterinary disease in the area. They are also the most cited species for their medical value as compared to other medicinal plants, which is again an indication of their relative abundance.

6.2. Recommendations

- Identifing effective medicinal plants and promoting theire prodaction and cultivation .this is atask to be accompalished through genuine collaboration between local administrators and healers.
- Resources, especially plant resources are integral to the life of all biota, as they are the primery food producers.Life of world biota is directly or indirectly dependent on plant resources .Thuse indigenous people of the study area should be involved in conservation and management plans of plant resources or their indigenous knowledge in their locality.
- As the local people harvest vegetations for business or for house hold use with little awareness of its threate or future sustenance, awareness should be created either, by development agents or agricultural workers through which sustainable harvesting be practiced.
- Encouraging people to grow medicinal plants in the home gardens, mixing with crops in farmlands and livefences.
- The indigenous knowledge and skill of traditional medicine practitioners must be encouraged and protacted .this could be the way through which such people could exercise their knowledge boldly.
- Special consideration and all possible endeavours must be made to use the traditional medicine and traditional medicinal plants in the study area.
- Training the local people, on resource use value, management and conservation at kebele or wereda level by agricultural experts or development agents, as it facilitates an integration of resource conservation with sustainable use.

REFERENCES

Abbink, J (1995). Medicinal and ritual Plants of South West Ethiopian. An account of recent research *Indigenous knowledge and Development Monitor* **3(2):** 6-8.

Abbiw, D.K. (1996). Misuses and abuses in Self-medication with medicinal plants.The case of *Erythrophelum* in Ghana.In**:** *Biodiversity of African Plants*, pp.714-718 (Masen, L.J.G. Burget, X.M. and Rooys, J.M., eds).Kluwer academic publishers, Netherlands.

Abebe Demissie (2001).Biodiversity conservation of medicinal plants problems and prospects. **In**: *conservation and sustainable use of Medical plants in Ethiopia* proceeding of the sustainable use of medicinal plants in Ethiopia, 28 April-01 May 1998, pp. 56-64 (Medhin Zewdu and Abebe Demissie eds.). IBCR, Addis Ababa.

Abiyot Birhanu (2002).Use and Conservation of Human Traditional Medicinal Plants in Jabitehaa Wereda West Gojam M.sc.Thesis (unpublished).

Abudul hamid Bedri, Sebseb Belay, Workineh Nigatu and Addisu Asmare (2004). Survey Results: Socio economic study of medicinal plants. *Institute of Development Research,* Addis Ababa University, Ethiopia.

Alcorn.B.J. (1984). *Mayan Huastec Ethnobotany*; University of Texas Press, Austin.USA.

Alexiades, M. (1996).Collecting ethnobotaincal data, an introduction to basic concepts and Techniques. **In:** *selected Guide line for ethnobotanical research:* A Field Manual, PP. 53-94 (Alexiades, M. and Sheldon, J. W.eds.).The New York Botanical Garden, U.S.A.

Allen, J.C. and Barnes, D.F. (1985).The causes of Deforestation in Developing countries. In: *Annals the Ass. of Amer*. Geog. **5:**163-184.

Asfawe Debela, Dawit abebe and Kelbessa Urga (1999).An over view of traditional medicine in Ethiopia Prospective and development efforts, In (Tamirat Ejigu, ed.), Ethiopia.

Balick, M.J. (1996).Transforming ethnobotany for the new millennium. *Annals of the Missouri Botanical Garden* **83**:58-66.

Balick, M.J and Cox, P.A. (1996). Plants, people and culture; *Science of Ethnobotany*.New York, USA.

Bayafers Tamene (2000). A Floristic Analysis and Ethnobotanical Study of the Semi-Wet land of Cheffa area, South Wello, Ethiopia; M.Sc.Thesis, Addis Ababa University.

Belachew Wassihun, Zemede Asfaw and Sebsebe Demissew (2003). Ethnobotanical study of Useful plants in DANIIO GADE (home garden) in Southern Ethiopia.*Ethiopian Journal of Bilogical Science* **2:**119-141.

Bell, E.A. (1993).Mankind and plants. *The need to conserve biodiversity. Parasitological* **106:**4753.

Bownder.B. (1987).Environmental problems in developing countries, **In**: *Progress in physical Geography,* **11:**246-259.

Bringham, T.Chihongo, A and Chidumayo, E. (1996). Tradition wood/ land products from The Miombo Region. **In**: *the'Mimobo'inTransition, woodland and Welare in Africa.Center for International Forest Research*, pp. 137-173 (Campbell eds). Bogor, Indonesia,.*Science* **2:**119-141.

Brown, K (1994). Approach to valuing plant medicines.The Economic Culture or the cultural of the Economics. *Biodiversity and conservation* **3:**734-750.

Central Statistical Agency (CSA) (2007).Ethiopian population Pyramid; Addis Ababa.

Cotton C.M. (1996).*Ethnobatony*: Principles and applications. John Wiley and Sons, New York.

Cunningham, A.B. (1993). African medicinal plants: setting properties at the interface between Conservation and primarily health care.*People and plants working paper*, Paris UNESCO.

Cunningham, A.B. (1994). Management of medicinal plant resources; *An African overview proc. Xiiith plenary meeting of AETFAT, Malawi,* pp. 173-189.

Cunningham, A.B. (1996). People, Park and Plants use recommendation for multiple use ones and development alternatives around Bwidi; Impenetrable National Park, Uganda. **In***: people and Plants working paper*, pp. 18-25 (Sample.A.ed.); UNESCO, Paris.

Cunningham, A.B. (1997).Botanical inventories, Traditional Knowledge and medicinal Plants. **In:** *Conservation and utilization of medicinal plants and wild relatives of food crops* pp. 29-34 UNESCO, Nairobi.

Cunningham, A.B. (2001). Applied Ethnobotany: people and wild plant use and conservation. *Earth scan publication Ltd. Sterling and London.* Pp.300.

Dawit Abebe (1986).Traditional Medicine in Ethiopia: the attempt being made to promote it for effective and better utilization. *SINET: Ethiopiopian Journal of Biological science **9**(supp1.)* 61-69

Dawit Abebe (2001).The roles of Medicinal Plants in health care coverage of Ethiopia, the possible integration. In: *Biodiversity conservation and sustainable use of Medicinal Plants in Ethiopia*. Proceeding of the National Work shop on Biodiversity conservation and Sustainable Medicinal Plants in Ethiopia, 28 April-01 May, 1999, pp. 6-21 (Medhin Zewdu and Abebe Demisse, eds,). IBCR, Addis Ababa.

Dawit Abebe and Istifanos Hagos (1991).Plants as primary source of drugs in the traditional health practices of Ethiopia.**In**: *plant genetic Resources of Ethiopian,* pp.101-113 (Engle, J.M.Hawakes, J.G. and Melaku Worede eds.). Cambridge University press.

Dawit Abebe and Ahadu Ayehu (1993).Medicinal plants and Enigmatic Health practices of northern Ethiopia, Berhanina selam printing Enterprise, Addis Ababa.

Dawit Abebe, Asfawe Debella and Kelbessa urga (2003). Medicinal plants and other useful plants of Ethiopia.Singapore.

Debela Hunde (2001).Use and Management of Traditional Medicinal plants by Indigenous people of Bosat Wereda, Wolenchiti area.An ethnobotanical approach. M.Sc.Thesis, Addis Ababa University, Ethiopia.

Debela Hunde, Zemede Asfaw, and Ensermu Kelbessa (2004).Use and management of Ethno veterinary Medicinal plants by indigenous people in “Boosat”, Welenchit area, *Ethiopiopian Journal of Biological Science* **3:** 113-132.

Duke, J.A. (1992). Tropical Botanical extractives. **In:** *Sustainable Harvest and marketing of rain forest products* pp. 53-62, (Plotking M. and Famolare L, eds). Island Press for conservation International, Covelo, California, USA.

EFAP (1994). Ethiopian Forestry Action Program, EFAP, Addis Ababa, Ethiopia.

Endalew Amenu (2007). Use and Management of Medicinal plants by Indeginious people of Ejaja area (Chalya Wereda) West shoa, Ethiopia: An ethnobotanical approach M.sc.Thesis.Addis Ababa.

Ensermu Kelbessa, Sebsebe Demissew, Zerihun Woldu and Edwards, S. (1992). Some

threatened endemic plants of Ethiopia. **In:** *The status of some plants in Parts of Tropical Africa*.PP.35-55.NAPRECA, No. 2. Botany 2000 (Edwards, S. and Zemede Asfaw eds.), East and central Africa.

Ermias Lulekal (2005).Ethnobotanical Study of Medicinal Plants and Floristic Composition of the Manna Angatu Moist Montana Forest, Bale.M.Sc.Thesis, Addis Ababa, Ethiopia

Farnsworth, N.R (1980).The development of Pharmacological and chemical research for the application to traditional Medicine in developing countries. *Journal of Ethiopian Pharmacological* **2:**175-181.

Farnsworth, N.R. (1988). Screening plants for new medicines. **In:** *National Academy of sciences,* Washington DC. Pp. 212-216.

Farnsworth, N.R. (1994).Ethnopharmacology and Drug Development. **In:** *Ethnobiology and the Search for new drugs,* pp. 42-59, (Wileychichester, Ciba Foundation eds). Chicago, USA.

Farnsworth, N.R. (1996). New drugs from the rain forest. *World Health Organization Bulletin* **49**(2) 30-31.

Farnsworth, N.R., Akerel, O. and Bingel, A.S (1985). Medicinal plants in therapy. *Bulletin of the World Health Organization*.**63** (6):81-965.

Fasil Kibebew (2001). The status and availability of oral and written knowledge on traditional health care in Ethiopia. **In:** *Conservation and sustainable use of medicinal plants in Ethiopia* .Proceeding of the national work shop on biodiversity conservation and sustainable use of medicinal Plants in Ethiopia, 28April-01May1998, PP, 107-119, (Medhin Zewdu and Abebe Demissie eds.). IBCR, Addis Ababa.

Ford, R.I. (1978). The Nature and status of Ethnobontany. **In**: *Anthropological papers*, (Arbor, A. ed.). Museum of Anthropology University of Michigan No. 67, Michigan.

Friis, I. (1905). Solanaceae. **In:** Flora of Ethiopia and Eritrea, Volume5 Gentianaceae to Cyclocheilaceae, pp103-160 (Hedberg I.,Ensermu Kelbessa,Edwards,Sebsbe Demissew and Eva persson). Addis Ababa, Ethiopia and Uppsala, Sweden.

Frunkel, O.H.Brown, A.H., and Burdon, J.J. (1995). The conservation of Plant Biodiversity. Cambridge University Press, Britain.

Gebre Markos Woldesellassie (1998). The forest resources of Ethiopia: Past and Present. *Walia* No.19 Ethiopian wild life and Natural History society Addis Ababa.

Getachew Berhan and Shiferaw Dessie (2002). Medicinal plants in Bonga Forest and their uses. **In:** *Biodiversity News letter.* Vol.No2.PP.9 –10.Institute of Biodiversity conservation and Research, Addis Ababa.

Gilbert, M.G (1995). Euphobiaceae. **In:** Flora of Ethiopia and Eritrea, Volume2 part 2: Canellaceae to Euphorbiaceae, pp. 268-380, (Edwards, Mesfin Tadesse and HedbergI.eds). Addis Ababa, Ethiopia and Uppsala, Sweden.

Glasby, J. (1991). Dictionary of plants containing secondary metabolites.Taylor and Francis; London, New York, Philadelphia.

HaileYineger (2005). A study of Ethnobotany of Medicinal plants and Floristic composition of the Dry Afromontane Forest at Bale Mountain National Park, M.Sc.Thesis., Addis Ababa, Ethiopia.

Haile Yineger, Ensermu Kelbessa, Tamrate Bekele and Ermias Lulekal (2008). Plants used in traditional management of Human ailments at Bale Mountain National park. South Eastern Ethiopian. *Journal of medicinal Plant Research* **2**(6):132-153.

Hamilton, A.C. (1997).Threats to Plants: analysis of centers and plant diversity. **In:** *conservation in to the 21st century.* Proceedings of 4thinternational botanic grains Conservation Progress.PP.309-322 (D.H. Touch ell and K.W. Dixon eds. Perth, Australia.

Hamilton, A.C. (2003). Medicinal plants and Conservation: issues and approaches. International plants Conservation unit, WWF-UK. Panda House, Catte Shall Lane Gondalming, UK.

Hamilton, A.C. (2004). Medicinal Plants, conservation and livelihoods.*Biodiversity and conservation* **13** (8): 1477-1577. Springer Netherlands.

Hamilton, A.C., Peishengii, Kessy, J., Khan, Ashif A., Lagos. Wotte, S. and Shin Wari, Z.K (2003). *The Purposes and teaching of Applied Ethnobotany.People and Plants* Working paper 11WWF Godolming UK.

Harborne.J.B and Baxter H (eds.) (1993). Photochemical dictionary. A hand book of bioactive compounds from plants .Taylor and Francis. Washington, DC.

Hilgert, N.J (2001). Plants used in Zanta River Basin, North west, Argentina, *Journal of Ethno Pharmacology* **76:**11-34.

Husen Adale Mohammed (2004). Traditional use, Management and conservation of useful plants in dry land part of North Shewa Zone of The Amhara National region: An ethnobotanical approach .M.Sc. Thesis, Addis Ababa University.

IUCN (1978).Green, L and Hugh, S. (Eds.).The IUCN plant red data book Gland, Switzerland.

IUCN/UNEP/WWF (1991).Caring for the Earth: A strategy for sustainable living, IUCN (UNEP) WWF Gland, Switzerland.

Jansen, P.C.M. (1981). Spices, condiments and Medicinal plants in Ethiopia, their Taxonomy and Agricultural significance, *center for Agricultural Publishing and Documentation, Wageningen Netherlands*. Pp 327.

Jeffrey, C. (1981). Cucurbitaceae. **In:** Flora of Ethiopia and Eritrea, Volume 2part2**:** Canellaceae to Euphorbiaceae, pp17-59 (Edwards, Mesfin Tadesse and Hedberg I.eds) .Addis Ababa, Ethiopia and Uppsala, Sweden.

Kebu Balemie, Ensermu Kelbessa, and Zemede Asfaw (2004). Indigenous medicinal plant utilization, management threats in Fentalle area, Eastern Shewa, Ethiopia, *Ethiopian Journal of Biological Sci*ence **3**(1): 37-58.

Kelbessa Urga, Assefa Ayele and Guta Merga (2004).Traditional Medicine in Ethiopia Proceedings of a national work shop held in Addis Ababa, Ethiopia, 30 June-2 July 2003.EHNRI, Addis Ababa, Ethiopia.

Kers, E. (1915). Capparidaceae. **In:** Flora of Ethiopia and Eritrea, Volume2 part1 Magnoliaceae to Flacourtiaceae, pp74-120 (Edwards, Mesfin Tadesse, Sebsbe Demissew and Hedberg I.).Addis Ababa, Ethiopia and Uppsala, Sweden.

Kers, E. (1930). Phytolacaceae. **In:** Flora of Ethiopia and Eritrea, Volume2 part1 Magnoliaceae to Flacourtiaceae, pp121-160 (Sue Edwards, Mesfin tadesse, Sebsbe Demissew and Hedberg I.).Addis Ababa, Ethiopia and Uppsala, Sweden.

Kipuri, N. (1983). Pastoral Maasai Grass roots Indicators for sustainable Resource Management grass root Indicators for Desertification. African Literature Bureau, Nairobi.

Kokwaro J.O. (1983). An African knowledge of ethno systematic and its application traditional medicine Bothalia **14** (2): 237-243.

Konno, B. (2004).Integration of traditional medicine with modern medicine. Pp.3-4. EHNRI Addis Ababa

Lange, D. (1998). Europe's medicinal and aromatic plants: their use, trade and conservation TRAFFIC. Europe/International, Cambridge.

Leeunberg, A.J.M. (1990). Apocynaceae. **In:** Flora of Ethiopia and Eritrea, Volume4 part 1: Apiaceae to Dispalaceae, pp87-98 (Hedberg I, Edwards and Sileshi Nemomissa.).Addis Ababa, Ethiopia and Uppsala, Sweden.

Leventin and Mohan (1996).Plants and Society W.C.Brown publishers, London.

Martin, G.J. (1995). Ethnobotany; a method Manual Chap mart and Hall.London, pp. 267.

Mathias, E. and McCorkle, C.M. (1996).Animal health. In: Biotechnology: Building on Farmer's knowledge (J. Bunders, B. Havekort and W. Hiemstra eds.) Macmillan, London.

McCorkle.C.M. (1986). An Introduction to ethnoveterInary Research and Development. *Journal of Ethnobiology* **6(1)**, pp.20-140.

Medhin Zewdu (2002). Sustainable Development in Ethiopia, Report of Assessment of Activities Issues relevant to the review Process of the Earth Summit 2002 in Ethiopia for Heinrich Boell Foundation; Institute of Biodiversity Conservation and Research, Addis Ababa, Ethiopia.

Medhin Zewdu, Tsige Gebremariam and Kalebe Asres (2001).Global perspectives of medicinal Plants. **In:** *Conservation and sustainable use of Medicinal plants in Ethiopia.* Proceeding of the National Workshop on Biodiversity conservation and sustainable use of medicinal plants in Ethiopia.28 April-01 May1998, pp, 198-203 (Medhin Zewdu and Abebe Demissie eds.). Institute of Biodiversity conservation and Research, Addis Ababa.

Mekonnen Bishaw (1990). Attitudes modern and traditional medical practitioners towards Cooperation. *Ethiopian Medical Journal* **28**:63-72.

Mesfin Tadesse (1994). Asteraceae. **In:** Flora of Ethiopia and Eritrea, Volume4 part 2 Asteraceae(Composite), pp1-408 (Hedberg I.,Ib Friis, Edwards and Mesfin tadesse).Addis Ababa, Ethiopia and Uppsala, Sweden.

MesfinTadesse and Sebsebe Demissew (1992). Medicinal Ethiopia plants: Inventory identification and classification. **In***: Plants used in Africa Traditional Medicine as practiced in Ethiopia and Uganda, Botany 2000;* East and central Africa, NAPRECA Monograph series NO 5 (Edwards, s, and Zemede Asfaw eds.) . Published by NAPRECA, Addis Ababa.

Mesfin Tadesse, Debella Hunde, and Yehenew Getachew (2005).Survey of medicinal plants used to treat human diseases in Seka Cherkosa, Jimma Zone, Ethiopia. *Ethiopian Journal of Health Science* **15**:89-106.

Milliken, W. and Albert, B. (1996).The use of medicinal plants of the Yanomani Indians of Brazil, *Economic Botany* **50**;10-25.

MSWARDO (2008). Minjar Shenkora Wereda Agriculture and Rural development office Annual work report (Unpublished).

Mirgissa kaba (1998). Utilization of plant medicine for the treatment of health problems.The case of Oromo of Chora district Illibabor zone, Western Ethiopia. *The Ethiopian Journal of Health development,* **10**(3):161-166.

Mirutse Giday (1999). An Ethobotanical Study of Medicinal plants used by the Zay people in Ethiopia, M.Sc Thesis Uppsala, Sweden.

Mirutse Giday (2007). Medicinal plants of the Bench, Meinit and Sheko socio-cultural groups in Ethiopia with emphasis on use diversity, distribution and abundance. Doctoral thesis (unpublished).Addis Ababa University, Addis Ababa, Ethiopia.

Miruts Giday, Zemede Asfaw, Thomas Elmfquist and Zerrihun Woldu (2003). An Ethnobotanical study of Medicinal plants used by the Zay people in Ethiopia. *Journal of Ethnopharmacology* **85:**43-52.

MSWARDO (2008).Minjar Shenkora Wereda Agriculture and Rural development office Annual report (Unpublished).

MSWHO (2008). Minjar Shenkora Wereda Health Office Annual work report (Unpublished).

Muta, D. (1996). Antibiotics screening of plants traditionally used to manage Infection in Kenya. Kenya forest research Institute, Nairobi, Kenya.

Muthu, C, Ayyanar, M, Raja, N., and Ignacimuthu, S. (2006). Medicinal plants used by traditional healers in Kancheepurama District of Tamil Nadu, India. *Journal of Ethnobiology and Ethnomedicine* **2**:43-49.

Mwam bazi, W.C. (1996). WHO partnership in the development and Utilization of Herbal remedies in Ethiopia; **In:** *Development of herbal remedy in Ethiopia Proceedings of work shop on development of herbal remedies in Ethiopia,* June 4-6, pp. 26-27, (Dawit Abebe, ed.). EWH NRI, Addis Ababa.

Nyamwaya, D. (1992). Africa Indigenous medicine: An anthropological Prospective for policy makers and primary health care managers. AMREF, Nairobi.

Odera, J.A. (1997).Traditional beliefs, sacred groves and home gardens technologies, adapting old practices for conservation of medicinal plants.**In:** *Conservation and utilization of indigenous medicinal plants and wild relatives of food crops,* .pp.43-48, (Kinyua, A, Kofi-Tsekpo, W.and Dagna, L. eds.). UNESCO, Nairobi.

Pankhurst.R. (1990). An introduction to Medicinal History of Ethiopia.pp.250-261.The red sea press Inc, Newjersey.

Parrota, J.A. (2002). Restoration and management of degraded tropical forest landscapes. In: *modern trends in applied terrestrial Ecology,* pp. 135-148, (R.S, Ambashet and N, K, Ambashet eds.).

Pistorius, R and vanwiik, J. (1993).Biodiversity prospecting. Commercializing Genetic Resources, *Biodiversity and Development Monitor* **15**:12-15.

Quanash, N. (1988). Bicultural diversity and integrated health care in Madagascar. *Nature and Resources* **30:**18-22.

Rai L, K., Panka J.P. and Sharma, E. (2000).Conservation threats to some importing medicinal plants of Sikkim Himalaya. *Biological Conservation* **3(1**): 27-34.

Ryding, O. (1962). Lamiaceae. **In:** Flora of Ethiopia and Eritrea, Volume 5 Gentianaceae to Cyclocheilaceae,pp516-604 (Hedberg I.,Ensermu Kelbessa,Edwards,Sebsbe Demissew and Eva persson). Addis Ababa, Ethiopia and Uppsala, Sweden.

Stephen A.H and Justin W.V. (2003).Traditional knowledge and intellectual property: *A Hand book on Issues and option for traditional knowledge holders in protecting their intellectual property and maintaining Biological Diversity*. American Association for the advancement of science (AAAS) and Human Rights program, Washington.

Tafesse Mesfine and Mekonen Lemma (2001). The role of traditional veterinary herbal medicine and its constraints in Animal health care system in Ethiopia. **In:** *Proceeding of the National Work shop on biodiversity conservation and sustainable use of medicinal plants in Ethiopia* April-01; May, 1998.PP.23-33, (*Medhin Zewdu and Abebe Demissie,eds.).* IBCR, Addis Ababa.

Tena Regassa (2008). Ethnobotanical Study on Traditional Medicinal Plants of Limu Wereda, Eastern Welega.M.Sc.Thesis Addis Ababa University; Ethiopia.

Tesema Tanto, Mirutse Giday, Negesu Aklilu, Teshome Hunduma (2003). Medicinal plant Biodiversity, National Biodiversity strategy and Action Plan (NBSAP) project (UN published). Institute of Biodiversity Conservation and Research (IBCR), Addis Ababa, Ethiopia.

Tesfaye Bekele (2000). Plant population Dynamics of *Dodonea angustifolia* and *Olea europea* sub *Cuspidata* in Dry afromontane Forests of Ethiopia. Acta University, upsaliensis.Uppsala, Sweden

Thomas, H. (1995).Indigenous Knowledge, Emancipation and Alienation**. In:** *Journal of knowledge Transfer and utilization* **8** (1): 63-73. University of Washington.

Tigiste Wondmu (2003). Study of useful plants in Dodota, Sire Wereda: An ethnobothanical Approach. M.Sc. Thesis Addis Ababa University., Ethiopia.

Vollesen, K. (1958). Rhaminaceae.**In:** Flora of Ethiopia and Eritrea, Volume3 Pittosporaceae to Araliaceae, pp385-398 (Hedberg I., and Edwards). Addis Ababa and Asmara, Ethiopia and Uppsala, Sweden.

Vollesen, K. (1980). Malvaceae. **In:** Flora of Ethiopia and Eritrea, Volume 2part2**:** Canellaceae to Euphorbiaceae, pp190-256 (Edwards, Mesfin Tadesse and HedbergI.eds). Addis Ababa, Ethiopia and Uppsala, Sweden.

WHO (1978).The promotion and development of Traditional medicine.Technical report Series, pp. 622.WHO and Geneva.

WHO (1986). Guide Lines on the Conservation of medicinal plants, WHO/IUCN, Gland Switzerland, and Geneva, Switzerland.

WHO (1998). Regulatory situation of herbal medicine.A world wide review, Pp.19, WHO 98.1, Geneva.

WHO (2000). *Promoting the Role of Traditional Medicine in Health care system. A strategy for the African Region* 2001-2010. Harare

WHO (2002).Traditional medicine: as strategy 2002-2005.World Health Organization,Geneva.

Zemede Asfaw (1997). Survey of Indigenous food plants, their preparation and home gardens in Ethiopia**. In:** *Indigenous African Food crops and useful plants*; PP 65 (Bede, N.and Okigbo, B.N.eds), ICIPE sciences press, Nairobi.

Zemede Asfaw (2001). The Role of Home Garden in Production and Conservation of Medicinal Plants**. In:** *Conservation and sustainable use of medicinal plants in Ethiopia.* Proceeding of the National workshop in Biodiversity conservation and sustainable use of medicinal plants in Ethiopia, 28 April -01 May 1998, pp. 76-91, (Medhin Zewdu and Abebe eds.) Institute of Biodiversity Conservation and Research, Addis Ababa.

Zemede Asfaw (2006). Towards a dynamic Indigenous Knowledge Practice optimization. **In:** *Dry land Ecosystems Challenges and Opportunities for sustainable Natural resourcesManagement*, Proceeding of the regional work shop held at Hotel Impala,Arusha,Tanzania;June7-9, 2006,PP.64-71.

APPENDICES

Appendix 1 List of Medicinal plants encountered in the study area.

Key;mainusediversityM=onlymedicinal;f=food;Sp=spice;Or=ornamental;Sh=liveshade;Sr=spiritual/ritual;Lf=livefence;St=stimulant;B=beverage;W=washing;Gl=girdelliburication;Co=constraction;Fo=fooder;Fw=fuelwood;Ht=house hold tools; Ir=insect repellent ;Tb=toothbrush==to tie objects;Bh=beehivemaking;Ft=Farmingtools;Habit;T=trees;H=herbs;S=shrubs;C=Climber;Ep=epiphytes;Li=liana;Local name(Ln).No Local name(nl) ;and(*) shows the endemic species;(**)shows both the rare and endemic species in the study area.

S.No	***Scientific name***	**Family name**	**Local name**	**Habit**	**Main uses**	**Coll. No**
1	*Achyranthes aspera* L.	Amaranthace	Telenge	H	M	GA4
2	*Acmella caulirhiz* Del.	Asteraceae	YemiderBerbrie	H	M	GA68
3	*Acokanthera schimperi* (DC) Benth.	Apocynaceae	Merenze	Sh	M,Fw	GA66
4	*Allium sativum* L.	Alliaceae	Nech shinkurte	H	M,F,S	GA131
5	*Aloe deibrana* Christian**	Aloaceae	Eret	Sh	M	GA129
6	*Artemisia absinthium* L.	Asteraceae	Ariti	H	M	GA130
7	*Artemisia abyssinica* Sch.Bip	Asteraceae	Chikugn	H	M	GA14
8	*Asparagus africanus* Lam.	Asparagacea	Yeset kiste	Sh	M,Or	GA6
9	*Balanites aegyptiaca* (L.) Del.	Balanitaceae	Jemo	Sh	M,Fw	GA32
10	*Brassica nigra* Koch.	Brassicaceae	Sinafich	H	M,F	GA137
11	*Brassica carinata* A.Br.	Brassicaceae	Gomenzer	H	M,f	GA48
12	*Calotropis procera (*Ait*)* Ait. f.	Asclepindaceae	Tobiaw	S	M	GA59
13	*Calpurna aurea (*Ait*).* Benth.	Fabaceae	Digeta	Sh	M,Co, Fw,Sh	GA12
14	*Capparis cartilaginea* Decne.	Caparidaceae	Ankorsa	Sh	M	GA76

15	*Capparis tomentosa* Lam.	Capparidaceae	Gumoro	Sh	M,Co, Fw,Lf	GA136
16	*Capsicum annuum* L.	Solanaceae	Karya	H	M,F	GA80
17	*Carica papaya* L.	Caricaceae	Papaya	T	M,F	GA42
18	*Carissa spinarum* L.	Apocynaceae	Agam	Sh	M,Sh	GA13
19	*Catha edulis (Vahl)* Forssk.ex Endl.	Celactraceae	Chat	Sh	M,St	GA45
20	*Chenopodium murale* L.	Chinopodiaceae	Amedmado	H	M	GA118
21	*Cicer arietinum* L.	Fabaceae	Shimbra	H	M,f	GA64
22	*Cissus quadrangularis* (L.)	Vitaceae	Yezehon hareg	Cl	M,T,Bh	GA20
23	*Cissus rotundifolia* (Forssk.)	Vitaceae	nl	Cl	M,T,Bh	GA135
24	*Citrus limon* (Burm.f)	Rutaceae	Lomye	T	M,F	GA19
25	*Citrus sinensis* (L.) osb	Rutaceae	Birtukane	T	M,f	GA73
26	*Clematis hirsute* Perr.	Ranuculaceae	Azo hareg	Cl	M	GA138
27	*Clerodendrum myricoides(*Hochst) R.Br.ex	Lamiaceae	Misrch	Sh	M	GA15
28	*Coffea arabica* L.	Rubiaceae	Buna	Sh	M,St	GA72
29	*Commiphora samharensis* Schweinf	Burseraceae	Anka	T	M,Fw, Sh	GA107
30	*Cordia africana* Lam.	Boraginaceae	wanza	T	M,F	GA46
31	*Croton macrostachyus* Hochst	Euphorbiaceae	Bisana	T	M,Co, Fw,Sh	GA7
32	*Cucumis ficifolius* A.Rich	Cucurbitacea	yemider Emboy	Cl	M	GA17
33	*Cymbopogon citrates* (DC. ex)	Poaceae	Tejesar	H	M	GA104
34	*Cynodon dactylon* (L.)Pers.	Poaceae	Serdo	H	M	GA114
35	*Cynoglossum geometricum* Bak.	Boraginaceae	Chigogote	H	M	GA43
36	*Datura stramonium* L.	Solanaceae	Astengire	H	M	GA1

37	*Dichrostachys cinerea* (L.)	Fabaceae	Ader	T	M,Co, Fw,Sh	GA82
38	*Dodonaea angustifolia* L.f.	Sapindaceae	Kitkita	Sh	M,Co, Fw,Sh	GA53
39	*Dovulis abyssinica* (A.Rich) warb	Flacourtiacea e	Koshime	Sh	M,F,F w	GA78
40	*Echinops kebericho* Mesfin	Asteraceae	Kebercho	H	M	GA101
41	*Echinops macrochetus* Fresen.	Asteraceae	Yesete milase	H	M	GA95
42	*Ehretia cymosa* Thonn.	Boraginaceae	Gamie	Sh	M,Co, Fw,Sh	GA29
43	*Eucalyptus globulus* (Labill.)	Myrtaceae	Nech Bahirzafe	T	M,Co,	GA25
44	*Euclea divonrum* Hiern.	Ebenaceae	Dedeho	Sh	M,Co,	GA61
45	*Euphorbia ampliphylla* Pax	Euphorbiace	Qulquale	T	M	GA84
46	*Euphorbia columnaris* Bally	Euphorbiace ae	Anterfa	Sh	M	GA99
47	*Euphorbia tirucalli* (L.)	Euphorbiace	Kinchibe	Sh	M,Fw,	GA62
48	*Ficus palmata* Forssk.	Moraceae	Belese	Sh	M,F	GA105
49	*Foniculum vulgare* Mill.	Apiaceae	Ensilale	H	M,Sp	GA28
50	*Galium simense* Fresen	Rubiaceae	Ashkit	H	M	GA103
51	*Gamphocarpus* fruticosus (L.)	Asclepindace ae	Arut	Sh	M	GA44
52	*Gladiolus candids* (Rendle)	Iradaceae	Milas goalgule	Cl	M	GA125
53	*Gossypium barbdense* L.	Malvaceae	Tite	H	M,Co,	GA115
54	*Grewia ferruginea* Hochst. ex A.Rich	Tiliaceae	Lenquata	Sh	M,Fw	GA120
55	*Guizotia schimperie* Sch. Bip. ex	Asteraceae	Mechi	H	M	GA100
56	*Hagenia abyssinica* (Bruce) J. F. Gmel	Rosaceae	Kosso	T	M,Sh	GA40
57	*Indigofera amorphoids* Jaub-and spach	Fabaceae	Yaytemisre	H	M	GA87
58	*Inula confertiflora* A. Rich.*	Asteraceae	Woinagift	Sh	M	GA93
59	*Jasminum abyssinicum* Hochst. ex	Oleaceae	Tembelel	Cl	M	GA21

60	*Justicia schiperiana* (Hochst. ex Nees) T. Anders	Acanthaceae	Sensel	Sh	M,Co, Fw,Sh	GA 3
61	*Kalancheo Shimperianna* A.Rich.*	Crassulaceae	Endahahula	H	M	GA36
62	*Kanahia laniflora* (Forssk.)	Asclepiadaceae	Tiferndo	H	M	GA37
63	*Lactuca serriola* L.	Asteraceae	Yemider Kitgn	H	M	GA127
64	*Lagenaria siceraria* (Molina) Standl	Cucurbitaceae	qel	Cl	M	GA83
65	*Leonotis neptiolia* (L.) R. Br.	Lamiaceae	Raskimir	H	M	GA71
66	*Lepidium sativum* L.	Brassicaceae	Fetto	H	M,F	GA31
67	*Leucas abyssinica* (Benth.)	Lamiaceae	Ashale	Sh	M	GA52
68	*Linum usitatissimum* L.	Linaceae	Telba	Sh	M,F	GA106
69	*Lippia adoensis* Hochst .ex.Walp.*	Lamiaceae	Kessie	Sh	M	GA88
70	*Lycopersicone sculentum* Mill.	Solanaceae	Timatime	H	M,F	GA81
71	*Malva verticillata* L.	Malvaceae	Tult	H	M	GA54
72	*Maytenus senegalensis* (Lam.)	Celastraceae	Atat	Sh	M,Lf	GA74
73	*Melia azedarach* L.	Meliaceae	Millia(Neem)	T	M,Co, Fw,Sh	GA41
74	*Millettia ferruginea* (Hoshst.)Bak.**	Fabaceae	Birbira	T	M,Co, Fw	GA98
75	*Myrsine africana* L.	Myrsinaceae	Qechemo	Sh	M,Co, Fw	GA75
76	*Nicotiana tabaccum* L.	Solanaceae	Tinbaho	H	M	GA97
77	*Ocimum basilicium* L.	Lamiaceae	Besobila	H	M,Sp	GA57
78	*Ocimum lamifolium* Hochst. ex *Benth.*	Lamiaceae	Damakessi	Sh	M	GA10
79	*Olea europaea* (Wall. ex DC)	Oleaceae	weyra	T	M,Co,	GA51
80	*Olinia rochetiana* A. Juss.	Oliniaceae	Tfie	Sh	M,Co, Fw,Sh	GA115
81	*Osyris quadripartita* Decn.	Santalaceae	Keret	Sh	M,Co, Fw	GA67
82	*Otostegia integrifolia* Benth.	Lamiaceae	Tunjit	Sh	M	GA50

83	*Phytolacca dodecandra* L.Her	Phytolaccaceae	Endode	Sh	M,W	GA16
84	*Premena shimperi* Engle.	Lamiaceae	Chocho	Sh	M,Co, Fw,Sh	GA94
85	*Psidium guajava* L.	Myrtaceae	Zeytune	T	M,F	GA112
86	*Pterolobium stelatum* (Forssk.)	Fabaceae	Qonter	Cl	M,Co,	GA96
87	*Rhamnus prinoides* L. Her.	Rhamnaceae	Gesho	Sh	M,B	GA11
88	*Rhoicissus tridentata* (L.f.)	Vitaceae	Lalo	Sh	M	GA35
89	*Rhus natalensis* Krauss	Anacardiacea	nl	H	M,	GA86
90	*Rhus retinorrhoea* Oliv.	Anacardiacea	Tlem	Sh	M,Co,	GA34
91	*Rhus vulgaris* Meikle	Ancardiaceae	Kemo	Sh	M,Co, Fw,Sh	GA55
92	*Ricinus communis* L.	Euphorbiace	Gulo	H	M,Fo,	GA86
93	*Rosa abyssinica* Lindly	Rosaceae	Kega	Sh	M,F	GA79
94	*Rumex nepalensis* Spreng.	Polygonacea	Yebera milase	H	M	GA126
95	*Rumex nervasus* Vahl	Polygonacea	Embuacho	Sh	M	GA108
96	*Ruta chalepensis* L.	Rutaceae	Tenadame	Sh	M,Sp	GA27
97	*Salvia nilotica* Jacq.	Lamiaceae	Hulegeb	H	M	GA22
98	*Senna baccarinii* (Chiov.)	Fabaceae	nl	Sh	M,Co,	GA134
99	*Sesamum orentale* L.	Pedaliaceae	Selit	H	M,F	GA89
100	*Sida schimperi* Hochst.ex.A.Rich.	Malvaceae	Chifreg	H	M	GA92
101	*Solanecio gigas* (Vatke) C Jeffery**	Asteraceae	Shkoko gomen	H	M,Or	GA49
102	*Solanium incanum* L.	Solanaceae	Zerech embway	Sh	M	GA8
103	*Solanum villosum* Vahl	Solanaceae	nl	H	M	GA109
104	*Steganotaenia araliaceae* Hochst.	Apiaceae	Yejibe merkuze	Sh	M	GA135
105	*Tephrosia emeroides* A.Rich.	Fabaceae	Grengeri	Sh	M	GA70
106	*Terminalia Schimperiana Hochest.*	Combretacea	Abalo	T	M,Co,	GA67
107	*Thymus schimperi* Ronniger**	Lamiaceae	Tosign	H	M,Sp	GA77
108	*Tragia cinerea* (Fax.)	Euphorbiace	Aleblabite	H	M	GA47

		ae				
109	*Urtica simensis* Steudel**	Urticaceae	Sama	H	M	GA116
110	*Verbascum sinaiticum* Benth.	Scrophularia	Yahia jero	H	M	GA5
111	*Verbena officinalis* L.	Verbenaceae	Atuchi	H	M	GA117
112	*Vernonia amygdalina* Del.	Asteraceae	Girawa	Sh	M,B,Fw,Sh	GA2
113	*Vi cia faba* L.	Fabaceae	Bakela	H	M,F	GA63
114	*Withania somnifera* (L.)	Solanaceae	Gizawa	Sh	M	GA2
115	*Ximenia americana* L.	Olacaceae	Enkoye	T	M,F	GA18
116	*Zanitum spinocium* (L.)	Asteraceae	Deha nekaye	H	M	GA132
117	*Zehneria scabra* (L.f.) sand	Cucurbitacea	Heregresa	Cl	M	GA58
118	*Ziziphus mucronata (Willd)*	Rhamnaceae	Qurqura	Sh	M,Co, Fw,Sh	GA110

Appendix 2 The families of the medicinal plants encountered in the study area

S.No	Family Name	Number of the species	Percentage of the species
1	Asteraceae	11	9.40
2	Lamiaceae	10	8.47
3	Fabaceae	9	7,62
4	Solanaceae	7	5.93
5	Euphorbiaceae	6	5.12
6	Asclepindaceae	3	2.56
7	Boraginaceae	3	2.56
8	Brassicaceae	3	2.56
9	Cucurbitaceae	3	2.56
10	Malvaceae	3	2.56
11	Rutaceae	3	2.56
12	Vitaceae	3	2.56
13	Ancardiaceae	3	2’56
14	Celastraceae	2	1.70
15	Apiaceae	2	1.70
16	Apocynaceae	2	1.70
17	Caparidaceae	2	1.70
18	Myrtaceae	2	1.70

19	Oleaceae	2	1.70
20	Poaceae	2	1.70
21	Polygonaceae	2	1.70
22	Ranuculaceae	2	1.70
23	Rhamnaceae	2	1.70
24	Rosaceae	2	1.70
25	Rubiaceae	2	1.70
26	Acanthaceae	1	0.85
27	Alliaceae	1	0.85
28	Aloaceae	1	0.85
29	Amaranthaceae	1	0.85
30	Asparagaceae	1	0.85
31	Balanitaceae	1	0.85
32	Burseraceae	1	0.85
33	Caricaceae	1	0.85
34	Chenopodiaceae	1	0.85
35	Combrataceae	1	0.85
36	Crassulceae	1	0.85
37	Ebenaceae	1	0.85
38	Flacourticeae	1	0.85
39	Iradiaceae	1	0.85
40	Linaceae	1	0.85
41	Meliaceae	1	0.85
42	Moraceae	1	0.85
43	Myrsinaceae	1	0.85
44	Olacaceae	1	0.85
45	Oliniaceae	1	0.85
46	Pedalaceae	1	0.85
47	Phytolacaceae	1	0.85
48	Santalaceae	1	0.85
49	Sapindaceae	1	0.85
50	Scrolophylaceae	1	0.85
51	Tiliaceae	1	0.85
52	Urticaceae	1	0.85
53	Verbenaceae	1	0.85

Appendix 3 List of medicinal plants used for treating only human (Hu)ailments in the study area; with scientific name ,family local name ,habit ,habitat parts used , disease treated , methods of preparations ,application dosage used, and rout of administration.(Key; local name; Amharic(-Am); Habit(Ha); Herb(H); Shrub(S),Tree(T),Climber (Cl),Epiphytes (Ep),Degree of management(DM), Cultivated(Ct), Wild(WD), Wild/Cultivated(WC); Parts used(Pu),Bark(B),Root(R),Root and steam(RS),Leaf(L),Fruit(Fu),Flower(Fw),Seed(Se),Steam (St),Sap (Sa),Bulb(Bu), Root and Leaf(RL), Above ground(Ag), Leaf and Seed(Ls),Seed and Bark(SB),Root and Bark(RB), Bark and Leaf(BL), Leaf and Steam(LS),whole Plant(Wp),Fruit and Leaf(FL),Fruit and Bark(FB),Leaf and Flower(LF),Reproductive parts(RP), Rout of application (Rout); oral(or),nasal(n), Dermal(dr),Ocular(oc),Anal(an),local(l),Topical(t))

Scientific Name	Family	Local	Habit	DM	PU	Use	Disease Treated	Mode of preparation, dosage form, way of	Route
Clerodendrum Myricoides	Lamiaceae	Misrch	Sh	WD	L	Hu	wounds and Fire burn	Its leaf with leaf of *Datura stramonium, Croton macrostachyus* and *Jasminum abyssinicum* are ground, powdered and applied on wound.	dr
					L		Skin rash (chiffe)	Its leaves with the fruit of *Calpurna aurea, Asparagus africanus* and leaves of *Jasminum abyssinicum* are powdered and applied on the	dr
Withania somnifera	Solanaceae	Gizawa	Sh	WD	L	Hu	Evil eye	The leaves of *Withania somnifera* with leaves of *Artemisia abyssinica, Vernonia amygdalina, Ruta chalepensis, Allium sativum bulb* and the seed of *Lepidium sativum with* root of *Carissa spinarum* are finely crushed together and sniffed at the sickness time.	n

Calpurina aurea	Fabaceae	Digta	Sh	WD	Fu	Hu	Diarrhea	Its fruit with fruit of *Clerodendrum myricoides and* leaves of *Asparagus africanus, Justicia Schimperiana* are finely crushed, pounded taking 3times by two fingers from the powder and mixed with cold water 2-3 drop of the solutions is given to baby's less than 12 years and	or
Osyris quadripartita	Santalaceae	Keret	Sh	WD	L	Hu	Intestinal parasite	Its leaves with fruits of *Ziziphus abyssinica* are powdered together, mixed with water ,boiled and drunk every morning for three days	or
Acmella caulirhiz	Asteraceae	YemiderBerbrie	H	WD	LF	Hu	Tonsillitis	The leaf and flower of this plant with the leaves of *Otestegia integrifolia* and *Anetum graveolens are* smashed and rubbed on the tonsil.	dr
Achyranthes Aspera	Amaranthaceae	Telenge	H	WD	LS	Hu,	Sudden sickness	The leaves and immature (soft) stem of *Achyranthes Aspera* pounded and mixed with water, the pure liquid is drunk only once and the body is creamed by the extract	dr
						Hu	Wounds	The dry leaves of this plant are pounded with root of *Withania somnifera* and *Tragia cinerea* and mixed with fresh butter and creamed on wounded part.	dr
Vi cia faba	Fabaceae	Bakela	H	CT	Se	Hu	Body Swelling	Its seed and leaves of *Kalanchoe Shimperiana are* ground together and mixed with the powdered leaves of *Salvia nilotica* and tied on the	dr
Zehneria scabra	Cucurbitaceae	Haregresa	Cl	WD	L	Hu	Mitch	The leaf of *Zehneria scabra* with the leaf of	or

							(Fibril illness)	*Ocimum lamifolium* are ground, powdered mixed with coffee and drunk once during sickness time	
Eucalyptus globulus	Myrtaceae	Nech bahirzaf	Tr	CT	L	Hu	Influenza	The Leaf of *Eucalyptus globulus* is chopped and Boil with water and inhale repeatedly the vapor, while boiling steam bath is taken by human in closed door and window.	n
							Mich (Fibril illness)	The young leaves and immature tip stem are boiled in water the steam inhaled by the patient during the bed time until recovery	n
Maytenus senegalensis	Celactraceae	Atat	Sh	WD	RL	Hu	Liver disease	Its root, leaves with leaves of *Ximenia americana* and root of *Croton macrostachyus* are powdered mixed with water and one coffee cup (sini) is drunk until recovery.	Or
Balanites aegyptiaca	Balanitaceae	Jemo	Sh	WD	R	Hu	Toothache and Fibril illness	The root of this plant is pounded and hold by dressing it on affected part during feeling of ache	oth er
							Mich	The root of this plant is chewed and swallowed during sickness time	or
Thymus schimperi	Lamiaceae	Tosign	H	WC	L	Hu	Cough	Its leaves, root and bark are ground together, powdered and mixed with water one coffee cup (sini) is drunk during pain time.	or

Verbena officinalis	Verbenaceae	Atuchi	H	WD	R	Hu	Sudden disease	The Root of *Verbena officinalis* is dried powdered and preserved; one spoon of powder is mixed with local alcohol (areki) and given to human during sickness time	or
							Stomach ache	Chewing and swallowing the root of this plant during the feeling of ache	or
Rumex nepalensis	Polygonaceae	Yebera milase	H	WD	L	Hu	Wound	Its leaves with root of *Malva verticillata* powdered and put on affected part.	dr
Ehuretia cymosa	Boraginaceae	Gamie	Sh	WD	RL	Hu	Tooth ache and Head ache	The leaf and root of *Ehretia cymosa* with the seed of *Datura stramonium* are ground, powdered together and put on the affected part or use the smoke as cigarette during ache	or
Salvia nilotica	Lamiaceae	Hulegeb	H	WD	L	Hu	Fibril illness(Mich)	The leaf of *Salvia nilotica* with the leaves of *lucas abyssinica* are ground, powdered together mixed with some cold water then coffee cup of the mixture is drunk during sickness time	or
Artemisia absinthium	Asteraceae	Ariti	H	Ct	Ag	Hu	Syphilis	The above ground part of this plant is ground, powdered and mixed with little water one coffee cup (sini) is drunk every morning for three days.	or
Cymbopogon citratus	Poaceae	Tejesar	H	Ct	WP	Hu	Stomachache	The whole part is smashed, mixed with water and cooked with salt then the filtrate is drunk.	or

Vernonia amygdalina	Asteraceae	Girawa (Gizio)	Sh	WD	R L	Hu	Acute Sickness(Dingtegna	The root of *Vernonia amygdalina* with leaf of *Ruta chalepensisis* chewed with salt and swallowed by human during feeling of	or
							Skin infection	The leaf of *Vernonia amygdalina* is pounded and the patient body washed by the plant or the leaf of *Vernonia amygdalina* is used as a soap to wash the infected body.	dr
Aloedebrana	Aloaceae	Eret	H	WD	La (Sa)	Hu	Hemorrhoids	The affected area is covered by the latex of the young leaf and repeating every 2 days until recovery	an
							Ringworms	The latex of the young leaves is collected and creams the affected area by the latex of the young leaf, and repeating every day until recovery.	dr
Foniculum vulgar	Apiaceae	Ensilale	H	CT	WP	Hu	Kidney disease	The whole part of this plant are ground, powdered, mixed with water, boiled, and filtered then 2-3 coffee cup of the illiterate is drunk for 3days.	or
Carica papaya	Caricaceae	Papaya	Tr	CT	L	Hu	Malaria	The leaves of *carica papaya* with the bulbs of *Allium satuvum* are ground, powdered together, boiled and mixed with honey one coffee cup is used every morning for three days.	or
Olinia rochtiana	Oliniaceae	Tfie	Sh	WD	BL	Hu	Tooth ache	The leaf and Bark of this plant is chewed and hold by the affected teeth during the feeling of	or

								ache	
Kalancheo Shimperiana	Crassulaceae	Endahahula	H	WD	L	Hu	Body swelling	The fresh leaf of *Kalancheo Schimperiana* is first heated and then put on the infected part of the body until recovery	dr
Cynoglossum geometricum	Boraginaceae	Chigogote	H	WD	L	Hu	Skin infection (skin rash)	The leaf of *Cynoglossum geometricum* crushed, powdered and mixed with very little water and the solution is applied on affected body part until recovery	dr
Myrsine africana	Myrsinaceae	Qechemo	Sh	WD	L	Hu	Head ache	Its leaves with leaves of *Maytenus arbutifolia are* ground, powdered, mixed with coffee and drunk during feeling of aches	or
Rhus retinorrhoae	Ancardaceae	Tlem	Sh	WD	RL	Hu	Liver disease	The leaf and root of *Rhus retinorrhoea* is ground ,powdered together , mixed with water filtered and then a tea- cup of filtrate is drunk every morning for three days	or
Rosa abyssiica	Rosaceae	Kega	Sh	WD	FU	Hu	Hypertension	Its fruit with the leaves of *Otostegia integrifolia* are ground, powdered, mixed with water and one coffee cup is drunk during the sick time	or
Catha edulis	Celactraceae	Chate	Sh	CT	L	Hu	Intestinal parasite	The leaves of *Catha edulis* is crushed and boiled , mixed with sugar and one tea cup of the solution is taken every morning for three days	or
Kanahia laniflora	Asclepidaceae	Tiferndo	H	WD	Latex (Sa)	Hu	Ring worms	The fresh leaf latex of this plant is applied on the infected part.	dr

Clematis hirsute	Ranunculaceae	Yeazohare g	Cl	WD	L LR	Hu	Swellings	Its leaves is pounded with the leaves of *Cissus rotundifolia* tied on the affected body part with clean bandage	dr
					RL		Wound	The root and leaf of this plant is ground, pounded together and applied (put) on affected body once a day for 3 days.	dr
					LR		Hemorrho id	Root and leaf of this plant is ground, powdered and tied on the external part of affected body with clean bandage repeatedly twice week	an
Ruta chalepensis	Rutaceae	Tenadame	Sh	CT	L	Hu	Evil eye	The leaf of *Ruta chalepensis* with root of *Verbascum sinaiticum, Capparis tomentosa, Ximenia americana, Rhus natalensis* and the bulb of *Allium sativum* are crushed, powdered, mixed with little amount of water and sniffed by holding with clean cloth	n
					Wp	Hu	Tonsillitis	The whole part of *Ruta chalpensis* is smashed, boiled with3-5 drop of *Citrus lemon* and then one coffee cup (sini) is drunk during sickness time	or
					L	Hu	Cough	The leaf of *Ruta chalepensis* and the bulbs of *Allium sativum* are pounded, powdered, mixed with coffee and sugar, and then a tea cup of the infusion is drunk every morning and evening	or
Urtica simensis	Urticaceae	Sma	H	WD	RL	Hu	Gonorrhea	The root and leaves of this plant with the	

								bark of C*roton macrostachyhus*, are grounded, powdered, mixed with little water ,filtered, then a cup of filtrate is drunk for 3-5days in every morning	or
Calotropis procera	Asclepiadaceae	Tobiaw (kinbo)	Sh	WD	Latex (Sap)	Hu	Hemorrhoids	3-5 drop of the milky latex (sap) of *Calotropis procera* are collected and then applied on the infected part until recovery	an
					Sap	HU	Acute stomach ache(Dingetegna)	The milky latex of *Calotropis procera* is collected with clean cotton and squeezed to cup of tea and finally adding sugar 1-3 drop of the latex is drunk. during the sickness time	or
							Body Swelling	The leaf of *Calotropis procera* is heated or warmed by charcoal and the warmed leaf put on the affected part. until recovery	dr
Lippia adoensis	Lamiaceae	kessi	Sh	WD	LS	Hu	Mich(fibril illness) pain, 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	or
Allium sativium	Allicaceae	Nechshinkurt	H	CT	BU	Hu	Malaria	The bulbs of *Allium sativum* is pounded and eaten with injera every morning	or
Jasminum abyssinicum	Oleaceae	Tembelel	Cl		L	Hu	Eye disease	The leaves of *Jusminium abysinicum* and seven pieces of immature stems of *Olea europaea* are ground, powdered. Mixed with water 2-3 drop of	

								mixture is applied on infected part for 3 days.	oc
Zanitum spinocium	Asteraceae	Dehanekay	Sh	WD	R	Hu	Body Swellings	The root of this plant with leaves of *Withania somnifera* ground, powdered, mixed With honey and tied on infected part with clean cloth until disappearance of the swelling.	dr
Ximenia americana	Olacaceae	Enkoye	Tr	WD	L	Hu	Liver disease	Fresh leaf of *Ximenia americana* crushed, powdered and mixed with water and then 2 to 3 cup of filtrate is drunk for 3 days.	or
Gamphocarpus	Asclepidacea	Arut	Sh	WD	R	Hu	Hemorrhoid	The root of *Gamphocarpus fruticosus* is crushed, powdered and placed on the affected part until recovery	an
Solanum villosum	Solanaceae	nl	H	M	FL	Hu	Stomach ache	The leaf and fruit of this plant with root of *Solanum incanum* are ground ,powdered and mixed with water a tea spoon of the mixture is taken with coffee	or
Asparagus africanus	Asparagaceae	Yeset Keste	Sh	WD	FL	Hu	Tetanus	The leaf and fruit of *Asparagus africanus* together with the leaf *of Cucumis ficifolius* ground, powdered, mixed with fresh butter and creamed on affected part.	dr
Capsicum annum	Solanaceae	Karya	H	CT	FU	Hu	Stomach ache	The fruit *Capsicum annuum* with the bulb of *Allium sativum* and leaf of *Ruta chalepensis* crushed, smashed together and eaten by injera. during the feeling of aches	or
Coffea arabica	Rubiaceae	Buna	Sh	CT	FU	Hu	Wound	The roasted fruit of *Coffea arabica* is crushed.	dr

								powdered and applied on the affected part	
Solanum incanum	Solanaceae	Zerech embway	Sh	WD	L	Hu	Bleeding	The leaf of *Solanum incanum* is ground ,powdered and sniffed several times until recovery	n
					R	Hu	Acute sickness (Dingeteg	The root of *Solanium incanum* is chewed and swallowed during pain.	or
Dichrostachys cinerea	Fabaceae	Ader	Tr	WD	R	Hu	Snake bite	The root of *Dichrostachys cinerea* and leaf of *Aloa dbrana christian* smashed together finally tied on the affected area with clean bandage.	dr
Euphorbia tirucalli	Euphorbiaceae	Kinchibe	Sh	WD	Sap	Hu	Ring worm	2-3 drop of milky latex of *Euphorbia tirucalli* is mixed with powdered root of *Gladiolus candidus*,water and applied on the affected part	dr
Carissa spinarum	Apocynaceae	Agam	Sh	WD	RB	Hu	Malaria	Its root and fruit with fruit of *Dodenaea angutifolia* crushed, mixed with water and a tea cup is drunk every morning for 3 days	or
Hagenia abyssinica	Rosaceae	Kosso	T	WD	FU	Hu	Stomach Worms	Its fruit with leaves of *Vernonia amygdalina* are ground, powdered mixed with local alcohol (Tella) and one coffee cup is taken before food for three days.	or
Guizotia shimperie	Asteraceae	Mechi	H	WD	R	Hu	Snake bite	Its root with leaves of *Cissus guadrangularis* is smashed powdered mixed with water, boiled and then 1-2 coffee cups are taken for three days.	or

Cordia africana	Boraginaceae	Wanza	T	WD	FU	Hu	Stomach worms	The Fruit is eaten as food for the case of stomach worms before food for 3days	or
Commiphora Samharensis	Burseraceae	Anka	T	WD	RB	Hu	Tonsillitis	The root and Bark of this plant is chewed with salt and swallowed	or
Datura stramonium	Solanaceae	Astenagire	H	WD	L	Hu	Wounds	The leaves and fruits of this plant is powder, mixed with water and creamed on affected part.	dr
							Malaria and cough	Its leaves with the bulb of *Allium sativum* are dried, finely crushed, Powered, mixed with water and one tea cup is taken every morning for three days.	or
Ocimum lamifolium	Lamiaceae	Damakessie	Sh	WD	L	Hu	Head ache and	The immature tip parts and leaves of this plant are smashed, pounded and mixed with	oc
						Hu	Eye disease	2 to 3 drops of the leaves juice is applied at night time to each eye for 2 to 3 days	oc
Chenopodium murale	Chinopodiacea e	Amedmado	H	WD	L	Hu	Intestinal parasite	The leaf of this plant is ground, powdered and mixed with hot water and one coffee cup is drunk every morning for 3 days	or
							wounds and swelling	Its leaf with the leaf of *verbascum sinaticume and Acidenthera laxiflora* is dried, grounded, powdered, mixed with butter and creamed to the	dr
Euphorbia columnaris	Euphorbiaceae	Anterfa	Sh	WD	Sap(Latx)	Hu	Ring worms	Its sap is creamed on the affected part	dr

Rhamnus prinoides	Rhamnaceae	Gesho	Sh	CT	L	Hu	Skin infections	The leaf of *Rhamnuus perinoides* with the leaf of Asparagus *africanus* is grounded together and rubbed on the affected part daily until recovery.	dr
							Tonsillitis	Its leaves with the leaves of *Ruta chalpens* is ground together, mixed with drop of *Citrus limon* ,boiled and then one coffee cup (sini)is drunk	or
Verbascum sinaiticum	Scrophu lariaceae	Yahiajero/k etetna	H	WD	R	Hu	Snake bite	The root of *Verbascum sinaiticum* is Smashed and 4-5 drop of the sap is drunk to human for	or
Malva vertecelata	Malvaceae	Tult	H	WD	R	Hu	Spider poison	Its root is pounded and mixed with fresh butter and applied on the affected part of the body	dr
Galium simense	Rubiaceae	Ashkit	H	WD	WP	Hu	Ear ache	The whole plant part is smashed and mixed with little water and 3-5 drop of its juice is put into the ear during feeling of ache	oth er
Brassica integrifolia	Brassicaceae	Gomenzer	H	CT	Se	Hu	Skin rash	Its seed is grounded, powdered and mixed with water and then washed the body by the mixture	dr
Dovyalis abyssinica	Flacourtiaceae	Koshime	Sh	WD	FU	Hu	Intestinal parasites	Its fruit is eaten as food for the case of intestinal parasite before breakfast every morning	or
Sida schimperie	Malvaceae	Chifreg	H	WD	L	Hu	Skin rash	The leaf is smashed and rubbed on affected skin	dr
Capparis tomentosa	Capparidaceae	Gumoro	Sh	WD	R	Hu	Evil eye	Its root with leaves of *Withania somnifera* crushed together, powdered, tied with the clean bandage or sniffed during sickness time	n
					R		Skin rash	Its root with leaves of *Vernonia amygdalina,*	dr

								Millettia ferrugeinea pounded together and creamed on the affected part	
Ficus palmata	Moraceae	Belese	Sh	WD	RL	Hu	Cancer	Its root and Leaves with bulb of *Allium sativium*, fruits of *Lagenaria siceraria* crushed together ,backed with powder of Teff then applied on wounds	dr
Terminalia Schimperiana.	Combretaceae	Abalo	T	WD	WP	Hu	Malaria	Its seed and fruit is grounded ,powdered and mixed with powdered *Alliuim sativum* bulb, water and then one coffee cup(sini)is drunk every morning for 3-5days	or
Linum usitatissimum.	Linaceae	Telba	Sh	CT	Se	Hu	Abdomina l pain, Ulcer	The seed of this plant is boiled, filtered and then the filtrate is drunk in empty stomach every morning for 5-7 days.	or
Rhus natalesis	Anacardiaceae	nl	H	M,	R	Hu	Wounds	The root of this plant is powdered mixed with little water, filtered a tea cup of the filtrate is drunk every morning for3-5days.	or
Echinops kebericho	Asteraceae	Kebercho	H	WD	R	Hu	Tetanus	The root of this plant with bark of *Croton macrostachys* is pounded, powdered together, mixed with honey and then one cup of the mixture is taken for 3days.	or
Citrus Sinesis	Rutaceae	Birtukan	Tr	Ct	Fu	Hu	Cough	Chewing and swallowing the solution for 3-5	or
Ziziphus mucronata	Rhamnaceae	Qurqura	Sh	WD	Fu	Hu	Stomach ache	Its fruit is crushed, pounded and mixed with some water and boiled and then drink the worm solution for three days.	or

Lycopersicum esculantum	Solanaceae	Timatime	H	Ct	Fu	HU	Ulcer	Its fresh fruit is cooked and then eaten with injera during sickness time.	or
Psidium guajava	Myrtaceae	Zeytune	T	Ct	L	HU	Skin rash	Fine powder of plant part is mixed with fresh butter and applied on the affected body until	dr
Citrus limon	Rutaceae	Lomye	T	Ct	FU Imm ature stem	HU HU	Skin rash	The fruit of this plant is squeezed and then its drop is creamed on the affected body until recovery.	dr
							Liver disease	The immature stem of this plant is crushed, powdered ,mixed with the solution of *Citrus Limon* and 1-2 cup of tea is drunk early morning for 3 days	or
Euphorbia ampliphylla	Euphorbiaceae	Qulquale	T		Latex (Sap)	Hu	Intestinal parasite	The drop of latex is collected, mixed with water, Teff powder and backed and then eaten before any food for three days.	or

Appendix 4 List of medicinal plants used for treating both human and live stocks(HL)or HU and LS)in the study ailments in the study area; with scientific name ,family local name ,habit ,habitat parts used ,disease treated ,methods of preparations ,application dosage used, and rout of administration.

(Key; local name; Amharic(Am);Habit(Ha);Herb(H);Shrub(S),Tree(T),Climber (Cl),Epiphytes(Ep),Degree of management(DM),Cultivated(Ct),Wild(WD),Wild/Cultivated(WC);Parts used(pu),Bark(B),Root(R),Root and steam(RS),Leaf(L),Fruit(Fu),Flower(Fw),Seed(Se),Steam (St),Sap (Sa),Bulb(Bu),Root and Leaf(RL),Above ground(Ag),Leaf and Seed(Ls),Seed and Bark(SB),Root and Bark(RB),Bark and Leaf(BL),Leaf and Steam(LS),whole Plant(Wp),Fruit and Leaf(FL),Fruit and Bark(FB),Leaf and Flower(LF),Reproductive parts(RP),Rout of application (Rout);Oral(or),Nasal(n),dermal(dr),Ocular(oc),Anal(an),local(l),Topical(t))

Scientific Name	Family	Local name	Habit	DM	PU	Use	Disease treated	Mode of preparation dosages, way of application	Route
Lepidium sativum	Brassicaceae	Fetto	H	CT	Se	HL	Diarrhea and cough	Its dry seed with bulb of *Allium sativium* are ground, powdered ,mixed with water and one coffee cup (sini) is drunk at morning time for 3-5days for human and one litter is given for cattle	or
					FU		Ring worms	Its fruit is crushed and mixed with little water then put (creamed) on surface of the skin	dr
					L		Gonorrhea and syphilis	Its leaves with the leaves of *Justicia shimperiana*,are ground together, powdered, mixed with water, filtered ,one tea cup of the filtrate is drunk once a day for 3days	or

							Wounds	Its leaves with the leaves of *Clerodendrum myricoids* are grounded, mixed with water and creamed on the wounds	dr
Sesamum oriontale	Pedaliaceae	Selit	H	CT	Se	Hu	Asmetic patient	The seed of *Sesamum oriontale* crushed, powdered and mixed with water then 1-2 tea cup of the mixture is drunk every morning for 3 days	or
						LS	Sudden sickness	The leaf of *Sesamum oriontale* is smashed and mixed with water then 1 litter of mixture is given	or
Cicer arietinum	Fabaceae	Shimbra	H	CT	WP	Hu	Malaria	Crushed fresh seeds, leaves, roots, bark, mixed with little water , boiled and then drunk the solution when cold every morning for 2-5days	or
						LS	Leeches	The whole part of this plant with leaves of *Nicotina tabacum* is ground together, mixed with water then one litter is given for cattle once a day	or
Leontis neptitolia	Lamiaceae	Raskimire	H	WD	RL	HL	Body swelling	Its leaves and root is pounded and tied on the affected body parts with clean bandage until recovery this is done 2 times a week	dr
							Mich(fibril illness)	The leaf, root, and immature tip part of this plant is pounded, mixed with little water and one spoon full is used at a time of illness	or
Steganotaenia araliaceae.	Apiaceae	Yejib mirkuze	Sh	Wd	L	HL	Wound	Its leaf with the leaf of *Acokanthera schimperi* is pounded, powdered and then applied on wound until recovery.	dr

Cynodon dactylon	Poaceae	Serdo	H	WD	WP	HL	Wound	The whole plant part is crushed and rubbed to the affected part 3times a day for a week	dr
Rhoicissus tridentate	Vitaceae	Lalo	Sh	WD	RL	HL	Rabies	The root and leaf of this plant is ground together, mixed with water then 1-2 water glasses is drunk for human and 1litter is given to cattle for 3days.	or
Rhus vulgaris	Ancardaceae	Kemo	Sh	WD	RL	HL	Diarrhea	Its leaf and root the bulb of *alliume sativum* are ground ,powdered mixed with water and 2-coffee cup is drunk in morning and evening for 3-5 days (for human)for cattle a litter of infusion is drunk	or
Cissus quadrangularis	Vitaceae	yezehon anjet	Cl	WD	WP	L	Diarrhea	Its root ,bark and leaf of this plant are crushed together mixed with water 1 litter of the solution is given to cattle every morning for three days	or
					Wp	Hu	Hemorrhoid	The Whole part of *Cissus quadrangularis* is crushed and smashed the extract is creamed on	an
					R	HL	Wound	The root of this plant is crushed powdered and then applied on the affected part until recovery.	dr
Croton macrostachyus	Euphorbiaceae	Bisana	Tr	WD	Latix (Sa) L	Hu	Ringworms	The latex of this plant is collected and then applied on the affected part until recovery or the leaf of *Croton macrostachyus* is crushed and smashed the extract is creamed on affected area.	dr
					R	Hu	Gonorrhea	Its root is chewed and swallowed the solution	or

					BA	HL	Rabies	The Bark of *Croton macrostachyus* is dried , powdered and mixed with water one coffee cup is given for human and 1 bottle is given to castles and 6 bottles is given to camel once a day for 3	or
Phytolacca dodecandra	Phytolacaceae	Endode	Sh	WD	R	L	Rabies	Dried root of *Phytolacca dodecandra* is powdered and three - four cup of domestic alcohol (melekia) is used for live stocks.	or
					L	Hu	Malaria	The leaf of *Phytolacca dodecandra is* crushed, pounded and mixed with water and then one cup of domestic alcohol (melekia) is drunk for 3days.	or
Melia azardrach	Maliaceae	Millia(Neem)	Tr	CT	L	Hu	Lashegn	The leaf is crushed. Powdered mixed with water and creamed on the infected part.	dr
							Bleeding	The leaf of this plant is crushed, powdered, hold by a clean bandage and then sniffed Until recovery.	n
							Sudden sickness	The leaf of *Melia azardrach* is pounded and mixed with cold water and then one litter is given to cattle. during the feeling of aches	or
							Avian cholera	The leaf of *Melia azedarach* is pounded and mixed with cold water given to hen during the sickness time	or
						Ls	Ants infestation	The leaf is pounded and mixed with cold water and sprayed over the area when ants and	other

Solanecio gigas	Asteraceae	Shekoko gomen	H	WD	L	HL	Sudden sickness	The leaves of *Solanecio gigas* with *Blyttia fruticulosum* are crushed together and mixed with water 1 litter of the mixture is given to cattle, 1 cup of tea is given to human	or
						Hu	Typhoid and typhus	Its leaves ground mixed with water then a cup of coffee is drunk 3 times a day for a week in addition this part is sprayed on the area of cloth,	oth er
Justicia Schiperiana	Acanthaceae	Sensele	Sh	WD	L	HL	Diarrhea and sudden sickness	The leaf of *Justicia schimperiana* with the leaf of *Calpurna aurea* ground, powdered, mixed with water one litter of infusion is given for cattle and one coffee cup (sini) is given for human being at morning and evening for 3 days.	or
Dodenaea angustifolia	Sapidaceae	kitkita	Sh	WD	RP	Hu	wound	Its Flower and fruit are crushed, dried, powdered and put (applied) on wound until recovery	dr
					L		Skin rash (chiffee)and Fire burn	The leaves of *Dodenaea angustifolia* and root of *Clerodendrum myricoides* is pounded, mixed with fresh butter and creamed on the infected part(skin) until recovery	dr
						LS	Eye disease	The leaf of *Dodonaea angustifolia* with the leaf of *Ocimun lamifolium* ground ,powdered and placed on the eye until recovery	oc

Cucumis ficifolius	Cucurbitaceae	Yemederembway	H	WD	RL	HL	Sudden sickness	The root and leaf of *Cucumis ficifolius* is ground, pounded and mixed with local alcohol (Tella) 1-2 tea cups are given to human and one litter is given to cattle at the sickness time.	or
					R	Hu	Stomach ache	The root of *Cucumis ficifolius* is pounded powdered mixed with water then one coffee cup is given for human during feeling of ache	or
					R	Hu	Rabies	The root of *Cucumis ficifolius* is crushed and mixed with water 1 domestic alcohol cup (Melekia) is given for 12 years old baby and 1 tea cup is given for more than 12 years human early morning for Seven days.	or
					RF	HL	Body swelling	The root and fruit of *Cucumes ficifolius* are pounded, powdered together and applied on the affected part.	dr
Otostegia integrifolia	Lamiaceae	Tunjit	Sh	WD	L	HL	Diarrhea	The leaf of *Otostegia integrifolia*, *Ricinusisinus communis* with root of *Vernonia amygdalina* crushed, Pounded and mixed with water 1 litter is given to cattle every morning for 2-5days.	or
							Acute stomach ache	Its leaves is crushed, powdered, mixed with water, sugar and one coffee cup is drunk for human and one litter is drunk for cattle	or

Tephosia emeroides	Fabaceae	Grengeri	Sh	WD	R	HL	Acute stomach ache	The root of this plant with the root of *Cucumis ficifolius* is pounded, mixed with water and 2-3 tea cup of the filtrate is given to human once and 1 litter is given to cattle during the felling of ache	or
Brassica nigra	Brassicacea e	Senafich	H	CT	Se	HL	Stomach worms	Its seed is crushed,powdered,mixed with water,eaten with injera every morning	or
					Se	LS	Bloating	The seed of this plant with the leaves of *Melia azedarach are* pounded, mixed with water then one litter is given to cattle during pain time	or
Artemisia abyssinica	Asteraceae	Chikugn	H	WC	L	HL	Rabies	Its leaves is crushed and mixed with water one litter is given for cattle and one coffee cup (sini) is given for human every morning for 2-5days	or
							Eye disease	Its leaves is powdered ,mixed with water and 2-3 drop of the filtrate is applied to the eye for 3-	oc
					WP		Evil eye	The whole plant part and the bulbs of *Allium sativum* is Smashed and then smoked during	n
Ocimum basilicium	Lamiaceae	Besobila	H	CT	L	LS	Bloating	Its fresh leaves with the bulb of *Allium sativum*, salt are ground together and then one litter of the solution is given to cattle and one coffee cup is given to human.	or
Ricinus communis	Euphorbiace ae	Chaqma (gulo)	H	WC	FU L	Hu LS	Ear ache	Its fruit is smashed ,squized,2-3drop of its juice is applied on ear	dr

							Diarrhea	Its leaves with the leaves of *Otostegia integrfolia* and root of *Withania somnifera are* ground, powdered, mixed with water and one litter is given to cattle	or
Olea europaea	Oleaceae	Weyra	T	WD	St	HL	Eye disease	Its stem with leaves of *Jusminum abyissinicum*, ground, mixed with water and 2-3drop of the illiterate is applied on eye	oc
Cissus rotundifolia	Vitaceae	nl	Cl	WD	R	LS	Wounds	Its root is crushed, powdered and applied on the affected body	dr
Millettia ferruginea	Fabaceae	Birbira	T	WD	Fu	Hu	Ring worms	Its fruit is crushed and mixed with little water then put (creamed) on surface of the skin	dr
						Hu	Gonorrhea and syphilis	Its leaves with the leaves of *Justicia shimperiana*,are ground together, powdered, mixed with water, filtered ,one tea cup of the filtrate is drunk once a day for 3days	or
					L	Hu	Wounds	Its leaves with the leaves of *Clerodendrum myricoids* are grounded, mixed with water and creamed on the wounds	or

Appendix 5 List of medicinal plants used for treating only livestock (LS) ailments in the study area; with scientific name, family local name, habit, habitat parts used, disease treated, methods of preparations, application dosage used, and rout of administration.
(Key; local name, Amharic(Am),Habit(Ha),Herb(H),Shrub(S),Tree(T),Climber (Cl),Epiphytes(Ep),Degree of management(DM),Cultivated(Ct),Wild(WD),wild/Cultivated(WC);parts used(pu),Bark(B),Root(R),Root and steam(RS),Leaf(L),Fruit(Fu),Flower(Fw),Seed(Se),Steam (St),Sap (Sa),Bulb(Bu),Root and Leaf(RL),Above ground(Ag),Leaf and Seed(Ls),Seed and Bark(SB),Root and Bark(RB),Bark and Leaf(BL),Leaf and Steam(LS),Whole Plant(Wp),Fruit and Leaf(FL),Fruit and Bark(FB),Leaf and Flower(LF),Reproductive parts(RP),Rout of application (Rout);Oral(or),Nasal(n),dermal(dr),Ocular(oc),Anal(an),Local(l),Topical(t))

Scientific Name	Family	Local name	Ha	DM	PU	Use for	Disease treated	Mode of preparation dosages, way of application	R ou
Gossypium barbadense	Malvaceae	Tite	H	CT	L	LS	Diarrhea	The leaf of *Gossypium barbadense* is grounded, powdered and mixed with water then 1 litter of the mixture is given to cattle orally	or
Inula Confertiflora	Asteraceae	Wojnagift	Sh	WD	L	LS	Eye disease	The leaf of *Inula confertiflora* with the leaf of *Leucas abyssinica* and *Olea eurapea* are crushed, dried, powdered, mixed with water 4 to 5 drops of the mixture is applied on each eye for 2 to	oc
Leucas abyssinica	Lamiaceae	Ashale	Sh	WD	L	LS	Eye disease	The leaf of *Leucas abyssinica* is powdered and applied to the affected eye of Cattle once a day for 3 days	oc

Tragia cinerea	Euphorbiaceae	Alleblabit	H	WD	L	LS	Sudden disease	The leaf of *Tragia cinerea* and the root of *Asparagus africanus* is ground, powdered and mixed with water then1 litter of the mixture is given to cattle during sickness time	or
Capparis cartilaginea	Caparidaceae	Ankorsa	Sh	WD	L	LS	Cough of donkey	The leaf of *Capparis cartilaginea* is crushed, powdered mixed with water the 1 litter of the mixture is given to donkey	or
Euclea divonrum.	Ebenaceae	Dedeho	Sh	WD	L	LS	Sudden sickness(acute sickness)	The leaves of *Euclea schimperi*, *Eucalyptus globulus* and *vernonia amygdalina* is pounded, powdered together mixed with water, and then 1 litter of the mixture is given to cattle for 3 to 4 days.	or
Premena shimperi	Lamiaceae	Chocho	Sh	WD	L	LS	Eye disease	The leaf of *Premna schimperi* is crushed powdered and mixed with water then applied on the affected part	oc
Lagenaria siceraria	Cucurbitacea	qel	Cl	Wc	FU	LS	Rabies	The fruit of *Lagenaria siceraria* and *Calpurna aurea* are ground together and backed with powder of Teff given to the cattle as a breakfast for 3 days (given to dogs)	or
Acokanthera schimperi	Apocy naceae	Merenze	Sh	WD	R	LS	Rabies	The root of *Acokanthera schimperi*	or

								with the root of *Cucumis ficifolius* pounded together mixed with water and 1 litter is given to cattle once a day for 3 days.	
Gladiolus candidus	Iradaceae	Milas goalgule	Cl	WD	RL	LS	Anthrax	The smashed leaf and root of *Gladiolus candidus* mixed with water and then one litter is given to cattle for three days	or
Nicotina tabaccum	Solanaceae	Tinbaho	H	WC	L	LS	Cough	The leaf of *Nicotina tabacum* with *Capparis cartilaginea* crushed, pounded and smoked as cigarette by the nose	n
Lactuca serriola.	Asetraceae	yemider kitgn	H	WD	R	LS	Sudden disease	The root of *Lactuca inermis* with *Withania somnifera* crushed, pounded and mixed with water then one litter of the mixture is given to cattle orally during sickness time	or
Rumex nervesus	Polygonaceae	Embuacho	Sh	WD	L	LS	External parasites	The leaf of *Rumex nervosus* is powdered ,mixed with little water and then wash the body of cattle every morning for 3-5days	dr

Grewia ferruginea	Tiliaceae	Lenquata	Sh	WD	L	LS	Bloating	The leaf of this plant with the seed of *Brassica carinata* is powdered mixed with water and then one litter of the mixture is given to cattle.	or
Echinopise Macrochattus	Asteraceae	Yesete milase	H	WD	FL	LS	Retained placenta	Its leaf and fruit with root of *Solanium incanum* is ground, mixed with water and salt, and then a litter of the solution is given to cattle.	or
Indigofera amorphoids	Fabaceae	Yaytemisre	H	WD	WP	LS	Wound	The Whole plant part is dried, powdered and applied on the wound until recovery.	dr
Pterolobium stelatum	Fabaceae	Qonter	Cl	WD	LF	LS	Eye infections	Its leaf and flower is crushed, pounded and mixed with butter and then creamed on the affected part until recovery.	oc
Senna baccarinii	Fabaceae	nl	Sh	WD	LF	LS	wounds	Its leaf and flower is pounded, powdered and then applied on the affected part until recovery.	dr

Appendix 6 List of treated Human health problems and percent of medicinal plants species used treatments in the area.

S.No	Disease treated	Local name	Number of plant species used	Percent of plant species used
1	Acute sickness	Dingetegna	8	6.29
2	Abdominal pain	Yehode eka kuslet	2	1.57
3	Snake bite	Yebabe nekesha	3	2.36
4	Abdominal pain and ulcer	Yehode besheta	1	0.78
5	Ants infestation	-	1	0.78
6	Stomach worm	Yanjet tilatle	1	0.78
7	Bleeding	Neser	1	0.78
8	Body inflammation	Yesewnet ebtet	5	3.93
9	Cancer	Lemte	1	0.78
10	Spider poison	-	1	0.78
11	Cough	Sale	3	2.36
12	Pneumonia	Gunfane	1	0.78
13	Diarrhea	Tekimate	1	0.78
14	Ear ache	Yejero besheta	1	0.78
15	Evil eye	Buda	7	5.51
16	Eye disease	Aynebesheta	2	1.51
17	Febrile illness	Tekusate	8	6.29
18	Rabies	Yewsh besheta	2	1.57
19	Gonorrhea	Chebte	1	0.78
20	Head ache	Yerase mitate	2	1.57
21	Hemorrhoids	Kintarote	4	3.14
22	Tooth ache and fibril illness	Yetres kurtemate ,tekusate	1	0.78
23	Herpes	Almaze balchera	1	0.78
24	Influenza	Gunfane	1	0.78

25	Intestinal parasite	Yeanjet besheta	4	3.14
26	Kidney disease	Kulalite besheta	1	0.78
27	Liver disease	Gubet	5	3.93
28	Lung disease/Lung TB	Samba nekersa	1	0.78
29	Malaria	Weba	7	5.51
30	Hyper tension	Yedemgefite	1	0.78
31	Head ache, cough, cold	-------	1	0.78
32	Ring worms	kukucha	4	3.14
33	Skin disease	Yekoda besheta	12	9.44
34	Stomachache and head ache	Hode kurtet ,yerase mitate	1	0.78
35	Stomachache	Hode kurtet	5	3.93
36	Syphilis	Kitegn	1	0.78
37	Tetanus	Merze	2	1.57
38	Tonsillitis	Tonsil	4	3.14
39	Toothache	Terse kurtemate	3	2.36
40	Lung disease	Yesanba miche	2	1.57
41	Miche		1	0.78
42	Gastritis	Cheguara	1	0.78
43	Wound and Swelling	Kusel,neser	1	0.78
44	Wound and fire burn	Kusel,yesate katelo	1	0.78
45	Wounds	kusel	10	7.87

Appendix7 Parts used of medicinal plants using for treatment of human, livestock or both human and livestock ailments in the study area **Key:** bark(B),Root(R),Root and stem(RS),Leaf),Fruit(Fu),Flower(Fw),Seed(Se),Stem(St),Sap(Sa),Bulb(Bu),Root and Leaf(Rb),Above ground(Ag),Leaf and Stem(Ls),Whole plant(Wp),Fruit and Leaf(FL),Fruit and Bark(FB),Leaf and Flower(LF),Reproductive parts including flower, Fruit and Seed(RP).

No	**Plant parts used**	**Number of times cited**	**Percent of cited**
1	Ag	1	0.71
2	B	1	0.71
3	BL	2	1.43
4	Bu	1	0.71
5	Fb	7	5.03
6	Fl	4	2.87
7	Fu	14	10.07
8	L	56	40.28
9	Lf	2	1.43
10	RL	13	9.35
11	LS	3	2.15
12	Lse	3	2.15
13	R	28	20.14
14	RB	2	1.43
15	RP	1	0.71
16	Sa	1	0.71
17	Wp	11	7.91
18	St	2	1.43
19	Se	7	5.03

Appendix 8 List of the informants contacted/consulted during the ethnobothanical study (**Key**; with* are key Informants; marital status; C=coupled/married, S=single/unmarried; level of education; no=illiterate (could not read and Write), number (1, 2, 3, 4, etc) indicate grade completed

No	**Name of informants**	**Sex**	**Age**	**Marital status**	**Education**	**Locality/Kebele**
1	Abera wedago	M	39	C	No	Cherecha
2	Abyiot Atnafu	M	40	C	Rw	Amiti
3	Addis kebede	F	36	C	Rw	Combolcha
4	Alem Anbese	M	36	C	No	Chelea
5	Alem Bitew	M	37	C	Rw	Combolcha
6	Alemayehu Ashina*	M	40	C	Rw	Debre Tsehay
7	Alemu Mekonen	M	44	C	Rw	Balichi
8	Alemu Taye*	M	24	C	Rw	Combolcha
9	Alemu yeshybelaye*	F	38	C	Rw	Bolo silasse
10	Amarech Birhanu	F	33	C	Rw	Kitecha
11	Asfawe Adale	M	47	C	4	Sama
12	Askale kebede*	F	46	C	9	Bolo giorgise
13	Asnakech Bitewe*	F	51	C	Rw	Akelale
14	Asrate Ayele*	M	38	C	Rw	Adama
15	Atinafu Amare	M	62	C	Rw	Memher Ager
16	Beferdu Asfawe*	M	26	S	11	Bolo giorgise
17	Belachew kebede	M	45	C	Rw	Bechashe
18	Belehu wuibe*	M	64	C	No	Eranbuite
19	Belete Birhan	M	38	C	8	Bolo giorgise
20	Beshewa Tefera	F	38	C	Rw	Chelea
21	Bezu Ayele*	M	54	C	Rw	Bolo silasse
22	Birehan Tegegn	M	32	C	No	Bolo silasse
23	Birehanu kelkaye	M	54	C	Rw	Cherecha
24	Birhanu Zerihun	M	38	C	No	Balichi
25	Bogale Negash	M	42	C	Rw	Deri
26	Dagn Yilma	M	36	C	Rw	korma
27	Delelegn Girsha	M	39	C	Rw	Deri
28	Delelegn yilma*	M	55	C	4	Kitecha

29	Demeke Getachew*	M	51	C	Rw	Deri
30	Demise Mmare*	M	28	C	7	Akelale
31	Etenesh knife	F	38	C	12	Arertikebele 01
32	Feleku Alemu*	F	33	C	3	Adama
33	Gebeyehu Negashe*	M	40	C	Rw	Deri
34	Gedu Getachew*	M	44	C	5	Arerti Zuria
35	Genet Assefa*	F	36	C	Rw	Amiti
36	Getu Deribew*	M	38	C	No	Sama
37	Girma Tekl;e*	M	58	C	No	Arertikebele 01
38	Habtamu Tegegn	M	30	C	No	Bolo silasse
39	Hailu Getaneh	M	43	C	No	Agirate
40	Ketsela Tekle	M	49	C	No	Debre Tsehay
41	Kifle Tadesse*	M	40	C	No	Memher Ager
42	Kiflu Getanhe*	M	43	C	Rw	Chelea
43	Kindu wondale	M	50	C	Rw	Bechashe
44	Kinfe Wolde Meskel*	M	55	C	Rw	Debre Tsehay
45	Melkame sewe Alemu*	F	48	C	6	korma
46	Merha tibeb Atnafe*	M	30	C	No	korma
47	Mezgeb Taye*	M	28	S	Rw	Bechashe
48	Miheret Tamiru	F	35	C	6	Akelale
49	Minase Terefe*	M	52	C	Rw	Sama
50	Mintiwabe Gashawe*	F	45	C	Rw	Cherecha
51	Moges Hilu*	M	52	C	4	Arerti Zuria
52	Moltotal Ashagrie	M	28	C	3	Arerti Zuria
53	Mullu Lemma	F	50	C	No	Amiti
54	Nigussie Degife*	M	48	C	Rw	Amiti
55	Sahele Gebreyse	M	55	C	No	Eranbuite
56	Samuele Getanehe	M	32	C	6	Sama
57	Shiferawe Tekle yohans*	M	44	C	6	Arertikebele 01
58	Tafes Arero*	M	57	C	No	Eranbuite
59	Tafes Mesfine	M	46	C	3	Eranbuite

60	Taye Sey\ife	M	54	C	5	Kitecha
61	Tayeworke Bogale*	M	40	C	9	Balichi
62	Tefera Belaye*	M	49	C	No	Bechashe
63	Temtem Aelachew	M	23	C	8	Arerti Zuria
64	Tigiste Zewdu	F	38	C	8	korma
65	Tignhe Ayele	M	32	C	No	Adama
66	Tila shewa Akena*	M	48	C	8	Agirate
67	Tilahun Alemu*	M	54	C	No	Agirate
68	Tilaye Amare	M	29	C	7	Akelale
69	Tiru worke Mogesse	F	42	C	9	Adama
70	Tsegaye woundemagegn*	M	52	C	Rw	Balichi
71	Ttsegaye Tilaye*	M	44	C	Rw	Chelea
72	Weder yelesh Astatke	F	45	C	Rw	Agirate
73	Wonde wesen Asfawe*	M	36	C	Rw	Combolcha
74	Wondewosen Taye	M	40	C	No	Bolo giorgise
75	Workie Tamiru*	F	40	C	No	Kitecha
76	Yegebashale Birhanu	F	30	C	Rw	Memher Ager
77	Yeshum Ashine	M	30	C	No	Debre Tsehay
78	Yeshworke Tessema*	F	52	C	No	Memher Ager
79	Yeshye worke Alemu*	F	41	C	Rw	Cherecha
80	Zebene Addissu	M	28	C	6	Arertikebele 01

Appendix 9 Checklist of semi-structured in interviews for collected ethno botanical data

General Information

Date ----------Residence Area (village) _____ Kebele code----------

Name of Respondent ----------sex-------Age---------serial No ----------

Marital status ----------occupation (Main job) ----------

Religion; orthodox ----------protestant ---------- Muslim ----------other

For how long have you lived in the Area?

A /since birth b/for the last 20 years c/ for the last 10 years d/ for less than 10 years

2.4 Educational back ground (what is the last grade you attended?)----------

2.5 List the traditional way of classifying forest [vegetation] and landscapes in your Area;

Vegetation----------

Landscapes----------

What is the most common disease of humans in your area?

What are the most common diseases of animals in your area?

List the sign and symptoms of a given disease your area

How do people prevent and control a given disease in the area?

II.Ethnobotanical Data

3. Mention plant types used to a given disease in the area (give local names)

Plants used to treat human diseases

Plants used to treat animal diseases

Plants used to treat both human and animal disease

S.N	Local name	disease treated	plant collected	From
1				
2				
3				

4. Where do the plants grow?(From where they can be obtained?

In the wild. In home gardens, both in the wild and home gardens

5. What is the habit of the plant? Tree (T), shrubs (S), Herb (H),

Hemi-parasite (HP), Grass (G), climber (U), Liana (Li).

What are the most common habitats of a given medicinal plants?

What part of the medicinal plant is used?

Leaf (L), Root (R), Bark (B), stem (St), Flower (Fr), Fruit (Ft), seed (Se), sap (Sp) or Latex (Lt), Whole plant (WP).

8. What is the method of preparation of the medicinal plant Fresh (F), Dried (D), crushed (C). powdered.(p), used alone (Va). Mixed with Ethers or Water (Mw), exudation (Ex), concoction (Cn)

9. Dosage; Does it vary among age groups, sex? If yes, state for each.

10. Is there any side effect of the medicine? If yes, is there any antidote for the side effect?

11. Which member of the community uses the medicinal plant frequently and why?

12. Is the medicinal plant marketable?

13. Is the medicinal plant easily accessible? If not, Why?

14. What do the trend of their accessibility look like as compared to the past ten years?

Why?

15. How is the knowledge of medicinal plant use transferred from elders to young generation?

16. Is there any interference between modernization and traditional plant use in the area?

17. Are there community members who frequently depend more on traditional medicinal plants as compared to modern medicine? Why?

18. Which plant species are the most preferred in Q 17 and why?

19. Are there any taboos associated with medicinal plant use and utilization of medicinal plants? (Time of collection, method of collection, Sex ,Age, storage etc).What do the taboos imply? (If any)

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

21. How are the medicinal plants conserved in the area?

22. Is there any effort made to conserve the medicinal plant in the area?

23. Any information on the edibility and any other use of the medicinal plant under question practiced in the area. The following appendices will also be attached up on the completion of the thesis.

Appendix 10 Approval Format

Name---------- signature---------- date----------

Student----------, ----------

Advisors; ----------, ----------

----------, ----------

Chairman; ----------, ----------

(Dept's Graduate committee)

Chairman; ----------, ----------

(Faculty's Graduate committee)

Dean: ---------- (Graduate school)

DECLARATION

I, Getu Alemayehu Legesse, here by declare that this thesis is my original work and has never been submitted in any other university for the same purpose. All sources of materials for this work have duly been acknowledged. The author and the University of Addis Ababa reserve all rights to this work. No any material in any how can be reproduced what so ever with out the permission of the forestated right bearers.

Getu Alemayehu _____ _____
(Signature) (Date)

Approved by

Research Advisor:

Dr. Zemede Asfaw _____ _____
(Signature) (Date)

Prof. Ensermu Kelbessa _____ _____
(Signature) (Date)