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SCHOOL OF GRADUATE STUDIES

USE AND CONSERVATION OF TRADITIONAL MEDICINAL PLANTS BY INDIGENOUS PEOPLE IN GIMBI WOREDA, WESTERN WELLEGA, ETHIOPIA

BY:

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ABSTRACT

The purpose of the study is to document and analyze information on the use, conservation and threat of medicinal plants in Gimbi Woreda, west Wellega Zone. Data collection was accomplished through active participation of healers and knowledgeable elders who practice traditional medicine locally. Various ethnobotanical techniques were used to collect the data: semi-structured interview, field observation, group discussion, market survey, preference ranking and paired comparison, use diversity matrix and priority ranking. A total of 211 plant species (168 from the wild, 52 from home gardens, and 9 species occurring in both the wild and home gardens) distributed in 181 genera and 96 families were collected from the study area and identified. From these, 187 plant species were found in all 24 quadrats (12 for wild vegetations and 12 for home gardens) while 33 were out side the quadrats.

Of the 211 species, a total of 85 medicinal plants were reported as being used for the treatment of 68 different ailments (49 for humans and 19 for livestock) in the study area. The majority of the medicinal plants, 62 (72.94%) were collected from the wild and 23 (27.06%) from home gardens. The major life forms of the medicinal plants were shrubs followed by herbs with a proportion of 40% and 27.1%, respectively. The highest informant consensus was documented to the plants *Plantago lanceolata* and *Warburgia ugandensis* each scoring, 78%. The most frequently harvested plant parts were leaves and roots with a proportion of 48.2% and 28.2%, respectively, followed by stems, 8.74% and bark, 7.5%. Most of the remedies were prepared from single plants with highest proportion of crushing, pounding and mixing in water, 27.13%. The widely used method of application was found to be internal scoring 61.94% in which oral application is the main route of administration, 85.55%. In the Woreda the trend of medicinal plant trade is low and the sources for the majority of the marketed medicinal plants were from other Zones (Jima, Hararge) and Regional States (Benishangul, Addis Ababa and Amhara). Some cultural believes and traditional practices associated with traditional medicines were found to contribute much to the conservation of medicinal plants in the area.

Key words / phrase: - Medicinal plants, local people, ethnobotany, infusion, concoction, Gimbi.

1. INTRODUCTION

1.1 General introduction

Ethnobotany is defined as “local people's interaction with the natural environment: how they classify, manage and use plants available around them” (Martin, 1995). It involves an interdisciplinary approach encompassing the fields of botany, chemistry, pharmacology and anthropology (Cotton, 1996). Some of the steps followed in ethnobotanical research involve documenting how people classify, identify and relate to plants, examining the reciprocal interactions of plants and people, taxonomic identification of selected plants and biological as well as chemical evaluation of their constituents (Balick, 1996). In general, ethnobotany is the scientific investigations of plants as used in indigenous culture for food, medicine, magic, rituals, building, household utensils and implements, musical instruments, firewood, pesticides, clothing, shelter and other purposes (Urga Kelbessa *et al*., 2004).

The use of plants in indigenous societies are multiple and diverse. It is reported that more than 3.5 billion people rely on plants for the treatment of both human and livestock diseases (FAO, 1997). As elsewhere in Africa, indigenous people in Ethiopia, by large employed plant based traditional medicine to get cured from diseases arising from worms, fungi, virus and protozoa (Dawit Abebe, 2001).

Traditional medicine as defined by the Word Health Organization (WHO) can be summarized as the sum total of all the knowledge, beliefs and practices that are used in diagnosis, prevention and elimination of physical, mental or social imbalance and rely exclusively on practical experiences and observation handed down from generation to generation (WHO, 1998).

It is a product of social institutions and cultural traditions that have evolved over many centuries to enhance health.

Ethiopia has a flora that is extremely rich in its diversity. It is therefore not surprising that some of these plants have chemical compounds of therapeutic value that may be used in the treatment of major diseases such as HIV/AIDS, malaria, cancer, etc (Urga Kelbessa *et al*., 2004). The use of traditional medicine is still wide spread in Ethiopia, and its acceptability, availability and popularity is no doubt as about 90% of the populations use it for health care needs (WHO, 2002). According to Sofowora (1982), about 65-85% of the populations in every country of the developing world rely on traditional medicine because of lack of certain infrastructures like hospitals and heath centers. It is also reported by Abbiw (1996) that traditional medicines are safe and with little or no side effects.

The utilization of plants in the healthcare system was established as the principal means of treating various illnesses before the development of western drugs (Dawit Abebe, 1986). In Africa including Ethiopia, using traditional medicinal plants is common and form the backbone of traditional medicine. According to Balick and Cox (1996), the majority of the developing countries depend on traditional medicinal plants for their heathcare. This global utilization of medicinal plants has considerably increased in the last two decades (Dawit Abebe, 2001). In developing countries leaning to and favoring traditional medicinal plants is mainly due to inaccessibility of modern medical system, economic and cultural factors (Abbiw, 1996). According to Konno (2004), easy accessibility, efficacy on treatment and affordable cost in getting health services are main reasons in preferring traditional medicine to modern medication.

Developing countries like China, Pakistan, India and Vietnam have identified potential usage of plant medicine and incorporated them into their overall health care system (Mirgisa Kaba, 1996). Among African countries, Ethiopia is one of the countries where about 60% of the plants are said to be indigenous with their healing potential (Bannerman *et al*., 1983). These plants vary in their distribution over the country due to the varied geographic and climatic conditions (Amare Getahun, 1976**).** Only few studies were geared towards indigenous medicine with an objective to improve their usage. Consequently, the overall use of these plants remained within the domain of local healers as they resort to them for the treatment of different health problems (Konno, 2004).

Maintaining health through traditional medicine in general and utilization of medicinal plants in particular is almost as old as the history of humankind. This is true in Ethiopia where nearly 80% of the population still relies on plants to prevent and cure various health problems (Dawit Abebe and Ahadu Ayehu, 1993).

In Ethiopia, traditional medicine is faced with a problem of sustainability and continuity mainly due to the loss of taxa of medicinal plants (Ensermu Kelbessa *et al.*, 1992; Zemede Asfaw, 2001). According to Abebe Demissie (2001), the diversity of plants in Ethiopia is on the process of being eroded mainly due to human induced pressures. The same paper states that habitat destruction and deforestation for commercial timber, encroachment by agriculture and other land uses have resulted in the loss of some thousand hectares of forest that harbor useful medicinal plants, annually over the past several decades. With the present ecological and socio-economical changes, the medicinal plants together with ethnobotanical knowledge, may disappear and thus may be lost from humanity forever (Tesfaye Awas, 2003).

These days, both human and natural factors heavily contribute to the loss of medicinal plants, which links with the gradual displacement of indigenous knowledge associated with these plants (Sofowora, 1982). Population pressure, agricultural expansion and deforestation are the major human induced sources. Natural sources include recurrent drought, bush fires, diseases and pest out breaks. On a global scale, the combination of these factors has resulted in loss of forest resources. As a remedy, there are some conservation measures that have been under taken around the world aimed at protecting threatened medicinal plants from further destruction (Cunninghum, 1996). These include both on site (*in-situ*) and *ex-situ* conservations.

Both *in-situ* and *ex-situ* conservation efforts must be implemented to capture medicinal plant genetic resources and the traditional practices associated with them. Nowadays two *ex-situ* conservation techniques are being practiced: seed storage in cold room gene bank and field gene bank. The *in-situ* conservation is easily practiced with the support of farmer-based conservation (Conservator farmers) (Akerel *et al***.,** 1991).

Although these measures could be taken, the extent of the knowledge of traditional medicine practice based on medicinal plants should be documented through botanical surveys. Botanical collection and documentation of the associated ethnobotanical knowledge should be carried out before such rich heritages are lost due to various anthropogenic and other natural causes.

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 very little effort has so far been made to record and document the medicinal plants used and the associated knowledges. Some of the works

that have been carried out include: Amare Getahun (1976); Jansen (1981); Dawit Abebe (1986); Dawit Abebe and Estifanose Hagos (1991); Dawit Abebe and Ahadu Ayehu (1993); Mirutse Giday (1999); Kebu Balemie *et al*. (2004); Debela Hundie *et al.* (2004); Ermias Lulekal (2005) and Haile Yineger (2005).

Among rural Oromo communities of Gimbi, as would be the case elsewhere, traditional medication is believed to be an important healthcare system, which mainly involve the use of locally available medicinal plants. However, such knowledge and practices are currently under threat mainly because of the depletion of the locally available medicinal plant as the result of the large-scale environmental degradation that has been taking place in its worst form in this area. The available literature has no information about the use, threat and conservation of traditional medicinal plants in the study area. The present study is then initiated with intention to add one more new document concerning indigenous knowledge on use, threat and conservation of medicinal plants by people of Gimbi Woreda, west Wellega, in western Ethiopia.

1.2 **Objectives**

1.2.1 **General objectives**

The general objectives of the study were to:

- Document plants of medicinal value to humans and livestock in Gimbi Woreda; and
- Compile and document the indigenous knowledge of people on the use, threat and conservation of medicinal plants.

1.2.2 Specific objectives

The specific objectives of the study were to:

- Identify plant species used for medicinal purposes in treating human and livestock ailments in the study area;
- Document plant parts used for medicinal purposes and methods of preparation in the study area;
- Identify important habitats where medicinal plants occur;
- Assess conservation status of medicinal plants and indigenous knowledge of people of the study area; and
- Document plants of medicinal value and describe conservation measures being taken by the community in the study area.

2. LITERATURE REVIEW

2.1 Ethnobotanical Study: History, Development and Methods

There has been an ever-increasing interest by anthropologists, botanists and explorers of the world to document the potential use or economic potential of plants used by indigenous people (Cotton, 1996). Christopher Columbus initiated this in 1442 when he discovered the use of tobacco plant (*Nicotiana spp*) by local people of Cuba. Around 1858, British explorer, R. Spuce noted for the first time the psychoactive properties of the vine plant *(Banisteriopsis cappi*) (Cotton, 1996). Such works gradually yielded a firm base for the study of direct interactions between human and otherorganisms through documenting, analysis and use of indigenous knowledge of biological entity. Eventually, the work on ethnobotany promoted this subject to be an independent field of study in biological sciences. Since then, different authors used various ways of defining ethnobotany.

Even to day, no definitive agreement in its interpretation has been reached (Yan, 1993; Cited in Cotton, 1996). This stemmed from the fact that the term has been given different interpretation and definition depending on the interest of the workers involved in the study (Cotton, 1996).

Harsherbarger in 1895 brought up the term ethnobotany for the first time (Harsh-berger 1896; cited in Cotton, 1996). He defined ethnobotany as “the use of plants by aboriginal people". Martin (1995) broadly defined ethnobotany as the subject dealing with the study of direct interactions between humans and plants. Balick and Cox (1996) included the use of plants as food, medicinal, forage and for any other economic purpose within field of ethnobotany. According to Cotton (1996), ethnobotany encompasses all studies that concern the mutual relationships between plants and traditional people.

Research concerned with ethnobotany involves recording the knowledge on the cultural interaction of people with plants, finding out how local people have traditionally used plants for various purposes, and how they incorporate plants into their cultural tradition and religion (Balick and Cox, 1996). To get more detailed and reliable information, ethnobotanical investigation needs to involve scholars from various streams such as plant taxonomy, plant ecology, anthropology, linguistic, economic botany, pharmacology and the like (Martin, 1995).

There are several techniques of inquiry tools based on the aims and objectives of the ethno botanical study at hand (Martin, 1995; Alexiades, 1996). These inquiry techniques include participant observation, simulation, field interviews, and group discussion, checklist interview and market survey. According to Zemede Asfaw (1989), Martin (1995) and Grenier (1998), useful information on ethnobotany could also be obtained from collection and analysis of beliefs, rituals, songs, saying, verse, local names, and dances.

2.2 Traditional medicinal plants

2.2.1. Historical account and Description

Since ancient times, human being used plants for the purpose of disease control and prevention. Physical evidence gathered from burial sites of Neanderthal man discovered in Iraq revealed that the use of medicinal plants in the area goes back to some 6000 years (Solace, 1975, cited in Sofowora, 1982).

It was believed to be through trial and error that early man acquired the knowledge on the utilization of plants for disease prevention and curative purposes (Sofowora, 1982). It is not absolutely clear how the knowledge was first started, but it is assumed that the early attempts were based on speculations and superstitions." Evil eye" for instance, causes the individual to be ill. Thus, it was necessary to find substance that would make the body resistant (Hill, 1972). Among early men, medicinal practitioners were considered as knowledgeable groups than the others for the source and use of various medicinal plants (Pankhurst, 1990).

According to Hill (1972), starting from 5000-4000 B.C several drugs were in use in most parts of China. Traditional plant medicines were well popular as early as 1600 B.C among Syrians, Babylonians and ancient Hebrews.

The antiquity of the traditional use of medicinal plants in Ethiopia could never be disregarded (Pankhurst, 1990; Mirutse Giday, 1999). Reviews of medical textbooks that have been written in Geez or Arabic between 17^{th} and 18^{th} centuries indicated that the majority of Ethiopians, with the exception of few privileged groups, starting from the time of the Italian occupation, have been depending almost entirely on the traditional medicine (Pankhurst, 1990).

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

Many practitioners of traditional medicine widely use a large number of plants well known to them (Mesfin Tadesse and Sebsebe Demissew, 1992). Nevertheless, many are less cooperative to show their knowledge and skill on traditional to others. According to Pankhurst (1990), the knowledge on medicinal plants and method of use circulated mainly among practitioners and the beneficiaries of such practice. This has made the knowledge and skill on traditional medicinal plants and traditional medicine more hidden but less available to the public (Abbink, 1995).

2.2.2 **Ethnomedicine research in Ethiopia**

Although, only small fractions of the world's plants have been investigated scientifically so far, humankind has already reaped enormous benefits from it (Farnsworth *et al*., 1985). More than ever, plant diversity remains vital for human well-being and still provides a significant number of the remedies required in healthcare. Forests, particularly tropical forests, represent vast resources of medicinal plants most of which are unexploited. Considering, therefore, 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 thousand years but only found its legitimate place in the WHO program only about 35 years ago (WHO, 1978). Furthermore, pharmaceutical industries and western researchers on plant-based drugs have now rediscovered that

plants have much to contribute to the discovery of new, effective, safe and profitable therapeutic agents (Pistorius and Van Wiik, 1993). Most pharmaceutical companies recently have developed mechanisms to involve indigenous people collect plant samples on the recommendation of traditional practitioners. This approach is reported to be more successful than random collection of sample of medicinal plants (Balick and Cox, 1996; Alexiades, 1996; Asfaw 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 systems of this population when compared to modern medicine, ethno medicine activities need special consideration and back-up (Abbiw, 1996). This is partly because modern medicinal services are either unaffordable or unavailable to the vast majority of local people due to their skyrocketing 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, 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. This was linked to the establishment to record medicinal plants to improve accessibility and dissemination of information on medicinal plants (Tsige Gebre Mariham and Kaleab Asres, 2001).

To preserve indigenous knowledge of plants use in general and of traditional medicine in particular, an ethnobotanical survey of lesser-studied socio-cultural groups is very crucial. However, in Ethiopia research and documentation on medicinal plants have been started only very recently (Mesfin Tadesse and Sebsebe Demissew, 1992). Limited number of these papers dealt with specific socio- cultural

groups in specific areas. When compared to the country's varied flora and the socio-cultural diversity, these studies are incomplete as medicinal plant healing systems differed from culture to culture.

Hence, attention should be given to the field of ethnomedicine of the country with all necessary endeavors to have a full picture of the country’s medicinal plants potentials.

2.2.3 Traditional therapy by medicinal plants

Since time immemorial, traditional medicine has played crucial role in combating multiple and complex health conditions affecting the Ethiopian people. It was the only system available for healthcare prior to the introduction of modern medicine for prevention, diagnosis and treatment of social, mental and physical illness (Dawit Abebe, 1986).

Herbal remedies are part and parcel of the entire system of traditional medicine. The use of plant extracts or active substances is generally believed to constitute the major part of the therapy in this system. Study made by Dawit Abebe and Ahadu Ayehu (1993) in northern Ethiopia showed that major portion (87%) of the parts used in traditional medicine come from plant sources, while animal parts and minerals contribute only a small supply.

Apart from their use in the traditional system of medical care at the local level, medicinal plants are currently used in the production of modern drugs as a source of direct therapeutic agents, as raw materials for the manufacture of complex semi synthetic compounds and as taxonomic markers in the search for new compounds (WHO, 1998).Reports indicate that more than 35,000 plant species are being used around the world for medicinal purposes (Lewington, 1993) and, in Ethiopia an estimate of 800 or so plant species are employed as medicinal agents (Tesema Tanto *et al.*, 2002). In agreement

with this, WHO estimates that majority of he population in developing countries (80% of the population in Africa) primarily rely on traditional medicinal plant for their healthcare (WHO, 2002).

In spite of this, natural products/drugs isolated from only 40 plant species have been incorporated in to modern medicine (WHO, 1998). These products include important therapeutic categories such as antiseptics, steroids, quinine and artemisinin. These few examples are adequate to indicate not only how modern drug delivery depends on the continuing availability of plant resources but also to explain why the international pharmaceutical industry has rediscovered the crucial role that medicinal plants could play in the development of safe and effective therapeutic agents (Farnsworth, 1985).

2. 2. 4 **Preparation Methods, Dosage and Route of application**

Medicinal preparations of plants contain many things such as powdered plant materials, extracts and purified active substances isolated from plant materials. In certain cases, materials of animal or mineral origin may also be included in such preparations.

The medicinal plant preparation and application are accomplished in various forms. However, according to most literature sources have shown that simple crushing and pounding a particular plant part(s) and homogenizing it in water are the commonly used form of herbal preparation for both human and livestock health problems. An ethnobotanical study of medicinal plants in Fentale area, in Ethiopia (Kebu Balemie *et al.,* 2004), revealed that various routes of applications are available: oral 51.7%, dermal 31%, nasal and other 0.1% each.

In the same study, Kebu Balemie *et al.* (2004) found that there are variations in amount, unit of measurement of medicinal plants used by healers for the same kind of health problems. This finding

relates to the discussion given by Amare Getahun (1976), Sofowora (1982) and Dawit Abebe (1986) that showed the lack of precision and standardization as a draw back for the recognition of the traditional healthcare system.

2.3 Threat and conservation status of Ethiopian medicinal plants

2.3.1 Threat to medicinal plants and associated knowledge

Some studies have shown that most of the medicinal plants used in Ethiopia are harvested from the wild (Mirutse Giday, 1999; Tesfaye Awas and Zemede Asfaw, 1999). The mosaic environment of the country accounts for the presence of about 6000 higher plant species (NBSAP, 2005). Among the 6000 plant species, about 800 species are employed in traditional health care system of the country, and 600 of them have been collected and identified (Department of Drug Research, 1997).

Recent evidence from Ethiopia as well as other countries indicates that the existence of this indigenous resource is threatened. Evidence also shows that many plant species globally are threatened with extinction if deforestation, urbanization and drought are to continue (IUCN and WWF, 1985). The situation is even far worse in Ethiopia where there are more environmental problems than any other country in the Sahel belt (Ensermu Kelbessa *et al.*, 1992).

When the plants that have been serving as the raw material for the preparation of different remedies are being destroyed, the traditional practices associated with them would also diminish. During an ethnobotanical study to document medicinal plants used by Zay people in Ethiopia by Mirutse Giday (1999), it was found out that the practice of using plant remedies by the community to treat different ailments has been declining from time to time mainly as the result of continued deforestation in the area. Traditional herbal practitioners are important custodian of indigenous knowledge on the utilization of medicinal plants. Because of the impact of modern education, increase in health coverage

and urbanization, indigenous knowledge and usage of medicinal plants are being lost globally at a fast rate (WHO, 2002).

The issue is being even more serious in developing countries where such important information is not recorded in writing but passed on from one generation to the other by word of mouth.

2.3.2 Conservation of medicinal plants and associated knowledge

Considering the role-played by plant-derived products in human and livestock health, the effective conservation of these resources (i.e. medicinal plants and associated indigenous knowledge), needs to be initiated as a matter of urgency.

Plant diversity remains indispensable for human well being in providing a significant number of traditional and modern remedies required in healthcare. However, it is a matter of great concern to realize that the annual extinction rate of plant species is estimated to be about 3,000 (Cunninghum, 1992).

It is now being widely reported that herbal practitioners have to walk increasingly greater distances for herbs that once grew next door to their homes. The problem is further compounded by the fact that traditional knowledge on traditional medicine is also being lost at an alarming rate (Tewolde Berhan Gebre Egziabher, 1991). Traditional herbal practitioners are skilled 'botanists' and have a great talent for locating the correct plant from among the many plants species found around them. To make matters worse, the younger generations of today, unfortunately, often have different ambitions and priorities. As a result, this traditional skill is doomed to be lost even faster than the plants themselves (Sofowora, 1982). Ethnobotanists compare the death of an experienced herbal practitioner to the loss of a whole library and they invest a tremendous effort in documenting these precious sources as a written account.

Availability of plants in general and medicinal plants in particular has been affected by a dramatic decrease in areas of native vegetation due to agricultural expansion, deforestation and development of urban centers (Cunninghum, 1996). If these and other precious plant species constituting the flora of the country continue to succumb to man made and natural calamities, we would be loosing potential lifesavers and their environs within short period. Hence, there is an urgent need for conservation and sustainable utilization of these resources.

As a solution, there are some conservation actions that have been undertaken around the world designed to protect threatened medicinal plants from further damage (Cunninghum, 1996). This includes *in-situ* and *ex-situ* conservation measures. Both *in-situ* and *ex-situ* conservation efforts are implemented to capture medicinal plant genetic resources and the traditional practice associated with them. In the study at hand, some cultural believes and traditional practices that associated with traditional medicines were found to contribute much to the conservation of medicinal plants in their natural habitat.

3. MATERIALS AND METHODS

3.1 Study area description

3.1.1 Geography, Population, Climate and Vegetation

Gimbi Woreda is situated in the Oromia Regional State in west Wellega Zone, Western Ethiopia (Fig.1). The main city of this Woreda, Gimbi, is found at 441 km west of Addis Ababa. The total area of the Woreda is about 127,000 hectares. The altitude of the study area ranges from 1310-2100 m asl.

According to the 1997 national census, the rural and urban population of Gimbi Woreda was 112,309 (3892 in urban and 103,631 in rural). 82% of the rural inhabitants are farmers, while 18% are engaged

in local and small scale economic activities such as small scale trade, wood work, building, construction and the like.

Three agro-ecological zones characterize the study area: Dega (highland), 20%; Weyena Dega (middle land), 70% and Kola (low land), 10%. Agriculture is characterized by mixed cropping practices mainly coffee, maize, tef, sorghum, barely, wheat and noug (GWSPMFRDA, 2004).

The people in this area practice mixed farming, which accounts to 95% of the economic activities of the area. The oxen are integral part of farming systems through out the woreda and cows produce milk for home consumption and cash income. The people are practicing rain-fed agriculture with small-scale irrigation system.

Climatic data that shows temperature and rain fall of the study area for the last 8 (1998-2000) years is given in Fig. 2. The annual mean minimum and maximum temperatures are 14 ºC and 26ºC, respectively. The highest mean minimum and maximum temperatures were recorded in December and February, respectively for the last eight years (Fig. 2). The total mean annual rainfall is 600 to 1200 mm and the highest rainfall was recorded in June in 2002. The longest wet period extends from late May to early September with small ' Belg-rain' in March and April months (Fig. 2).

The vegetation of the study area falls in moist evergreen montane rainforest (Friis, 1992; Sebsebe Demissew *et al*., 2004; NBSAP, 2005). The main plant species that predominate the relic forest patches are *Albizia schimperiana, Bersama abyssinica, Cordia africana, Croton macrostachyus, Syzygium guineense* and *Sapium ellipticum.*

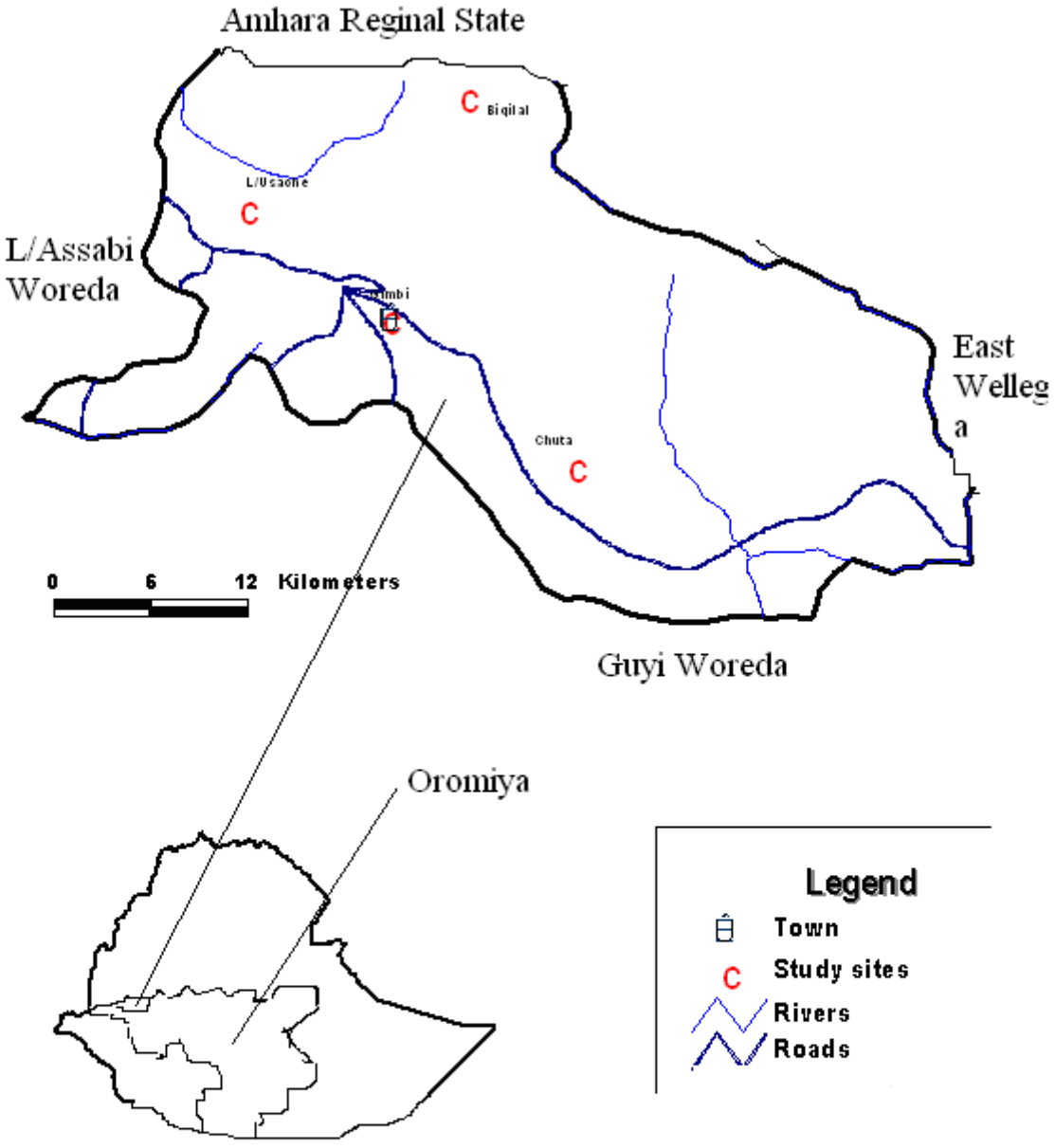

Fig. 1 Map of Gimbi Woreda

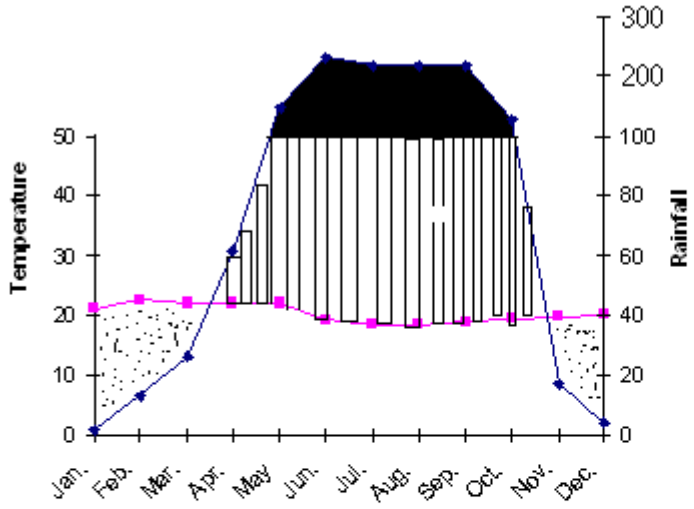

Fig. 2 Klimadiagramm of Gimbi Woreda (based on the data between 1998 and 2005 obtained from National Meteorology Service Agency) dry periods are dotted, wet periods are blacked or hatched.

3.1.2 Healthcare status

In the study Woreda, the healthcare coverage is 60.4% and the widely reported diseases were communicable diseases. In the years 2005-2006 the reported ten top human diseases were - Pneumonia, Intestinal parasite, Acute Respiratory Tract Infection (ARTI), Skin infection, Gastritis, Urinary Tract Infection (UTI), Diarrhea, Acute flaccid Infection (AFI), other helminthes and Conjunctivitis (GWHCAR, 2005).

Similarly, the major reported livestock diseases were- Anthrax (**Abasanga**), Black-leg (**abagorba**), Trypanosomaisis (**Gand**i), Bloating, Glandular-swell (**Dhiitessa**) coughing and seasonal intestinal diseases (GWAOAR, 2005).

In the study area, there is organizational structure neither at Zone nor at Woreda level to identify and encourage the local herbal medicinal practitioners to enhance the uses of traditional medicine and licensing the work of the practitioners.

3.2 Site Selection

A feasibility study was made from April 6, 2006 to April 8, 2006. Data collection was accomplished from April 15 /2006 to April 30/2006 and July 2006 to August 2006. Four sites (each with 5-7 kebeles) were selected for data collection (Fig. 1):

A. Gimbi town - at $9^0$12'N, $35^0$50'E with altitude varying between 1800-2000 m asl.

B. Chuta - found at 8 km south of Gimbi at $9^0$06'N, $35^0$52'E with altitude varying between 1800-2100 m asl and covering a total area of 7751 hectares.

C. Lalo Usache - found at 11 km north west of Gimbi at $9^0$13'N, $35^0$47'E with altitude varying between 1500-1800 m asl and covering a total area of 7793 hectares.

D. Biqilal - found at 18 km north of Gimbi at $9^0$15'N, $35^0$53'E with altitude varying between 1900-2200 m asl and covering a total area of 8189 hectares.

3.3 Selection of informants

Fifty informants with ages between 15 and 78 (of which 46 are male and 4 female) were involved in the study (Appendix 1). Out of this, 20 (16 males & 4 females) key informants

were systematically selected based on recommendations from elders and local authorities (Development Agents workers and kebele administration leaders). The choice of key informants is following the suggestion made by Martin (1995). Accordingly, in this study the systematic choice of 3-7 key informants from each site was done. The other 30 informants were selected randomly from the local people of the study area. This was done by tossing a coin and using him/her as informant whenever head of the coin was up if he/she volunteered to participate.

3.4 Ethnobotanical information

The methods employed in the data collection were group discussion, semi-structured interviews, field observation, market survey, preference ranking and paired comparison.

3.4.1 Group discussion

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 same time the revelation of their knowledge of medicinal plants will not in any way interfere with the continued practice 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.

3.4.2 Semi-structured interviews

A semi-structured checklist consisting 26 questions or issues (Appendix 2) were prepared in advance. The interviews were based on and around this checklist and some issues were raised promptly depending on responses of an informant. All of the interviews were held in Afan Oromo, the language of the people by the researchers. The place and time for discussion were set based on the interest of the informants.

3.4.3 Field observation

A number of field observations were made during the feasibility study and later with informants. In the latter method, all relevant data including the vernacular name of plants, the parts used, the preparation methods and modes of administration, and disease condition treated as well as the strategies they use for the conservation of medicinal plants and the preservation of the indigenous knowledge on medicinal plants were collected. As most informants disliked moving in the field with other third person, the researcher and an informant made the field observation. This practice is exercised by the local healers in order to keep their knowledge on medicinal plants a top secret.

3.4.4 Informant consensus

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 they were considered as unreliable information.

3.4.5 Paired Comparison and preference ranking

By selecting the five most effective plants based on their use value as suggested by most informants, paired comparisons were done following Martin (1995). The paired comparisons of the five most effective plants in treating wounds were made using random number table and

flipping coins. Random selection of ten healers was made to give their responses independently for pair of medicinal plants in treating wound. An overall rank for the species was given by adding up these values for all respondents.

In addition, preference ranking was made following Martin (1995) for six medicinal plants in treating snakebite. Accordingly, eight informants were identified to rank the six selected medicinal plants according to their efficacy in treating snakebite. Each rank is stated by integer values 1, 2, 3, 4, 5 and 6. The most effective plant is stated by highest value 6 while the least important is stated by a value of one. An overall rank for the species was given by adding up these valves for all respondents.

3.4.6 Botanical method

At the end of the interview, sample specimens of the plants cited for their medicinal use were collected, dried, identified and described. Voucher specimens of plants claimed to have medicinal value were stored at the National Herbarium (ETH), Addis Ababa University. For the identification of the collected specimens, published volumes of Ethiopian Flora were used (Friis, 1995; Gilbert, 1995; Tewolde Brehan Gebre Egziaber and Edwards, 1997; Hedberg, 2000; Polhill, 2000; Leewenberg, 2003; Friis, 2006). .

3.4.7 Market survey

During the study market, survey was also made to record the varieties and amount of herbal drugs sold in the market, and to record information on market values of medicinal plants. Two local markets in the study area (Gimbi and Gaba-senbeta markets) were visited. Semi-structured interviews (Appendix 2) were conducted with drug sellers to assess the varieties and amounts of plant materials, and to determine the value (income) generated from such practice.

3.4.8 Use diversity ranking

To see the relative importance of those plants in multipurpose role and the dominant use sought, a use diversity ranking was made using seven medicinal plants and seven uses. Eleven informants were chosen to conduct the exercise by giving use values to each plant species.

3.5 Description of medicinal plants

All plants that have medicinal value and that received about 45% or more of the informants' consensus were described (section 4.10). In the descriptions, the plant habitats, the medicinal value, method of preparation and applications were included.

3.6 Plant sampling method

In order to assess the distribution of the reported medicinal plants in the area, both vegetation and home garden surveys were carried out. A total of 24 quadrats were established in such a way that 12 quadrats were from the wild (each quadrat with the size of 20 x 20 m) plants and other 12 were from home gardens (each quadrat with the size of 5 x 3 m). Among 12 quadrats in the wild plants, 10 quadrats were in patches of forest in the valleys and reveirine vegetation.

These sites were with high human interference. The other two quadrats were in plantations (with 20% natural forest) that have little or no human influence. Twelve home gardens were selected by random identification of 3 home gardens from each study site and use categories of all the plants were described. To the vegetation, the data that helps to show the pattern of distribution of the plants (presence or absence of plant species in each plot) was collected following Martin (1995), Peter (1996) and Jha (1997).

3.7 Data analysis

- A descriptive statistical method such as percentage and frequency were employed to analyse and summarize the ethnobotanical data obtained from the interviews on reported medicinal plants and associated knowledge.
- Relative frequency was calculated for the most frequent tree species in the study area following Martin (1995) and Jha (1997).

$$\text{Frequency (\%)} = \frac{\text{Number of plots with individual species}}{\text{Total number of plots studied}} \times 100$$

$$\text{Relative frequency} = \frac{\text{Frequency of any species}}{\text{Total frequency of all species}} \times 100$$

- Preference ranking and paired comparison was computed to assess the degree of effectiveness of certain medicinal plants against some human ailments (snakebite and wounds, respectively).

4. RESULTS AND DISCUSSION

4.1 Indigenous knowledge on health concept

In the study area, health (“Fayya" in Oromiffa) is perceived as special asset provided by God ("Waaqayyo"). From discussion made with elders several poems, proverbs and songs were recorded reflecting the values of health to the local people. To cite few of these:

- **“Fayyan muka nyaata**” meaning “healthy man does everything”.
- **“Dhibbi abbaan hin beekne fayyaadha**" meaning “a great wealth and gift is Health”.
- "**Fayya xaba seete qayyaan laga ceete**” meaning “health needs special care”.

From these local sayings, it is clear that health is considered as a great asset, and a life engine for any aspect of life activities in the area.

4.2 Indigenous knowledge on treatment strategies

In the study communities, the result obtained showed that treatment strategies could be classified as home remedies, indigenous medicine and modern medicine. Despite their distinct features and procedures of treatment, these healthcare strategies often over lap, as patients appear to utilize one strategy after another without taking time to see the effect of each medication. As gathered from group discussion and interviews made during field observation and market survey, the local people always exploit their shared wisdom in order to manage health problems at home before looking for other options regardless of the type of health problem and its intensity. Accordingly, the sick person is given either traditional medicine (prepared from plant and /or animal sources

that in rare cases mixed with soil or ash) or treated spiritually through prayer, consulting spiritual men, locally **'Qaallu'** or curse-removal spit (locally,'**aagi**'). In most cases, all these are employed in combination for the treatment of specific health problems. Seeking modern health service often comes after the above are exhausted or rarely simultaneously. In the study area, local patterns of seeking health care are explained in terms of three different but overlapping factors:

Easy access: Usually, unlike modern health care institutions, local healers are found within accessible distance. This was found to affect the decision of the individuals to look for healthcare options. That is, preferring either modern medication to traditional healers or vice versa.

Efficacy on treatment: According to local wisdom, those problems which the society claims to have lived with, such as those caused by devil **('Seexana'**), spirit of dead **('Ekera'),** evil eye **('Buda'**), man made poison **('Tolcha'**), hook worm (**Sabata Waqayo'),** urine of bat (**Simbira),** infectious eczema **('Sariti'**) and rabies ("**Sare maratu'**) are easily treated at local level by healers. On the other hand, gastritis, cardiovascular problems, mental problems and gastro- intestinal problems are often taken to modern health institutions.

Cost of treatment: The problems involved in readily getting health service with affordable cost are factors that determine healthcare choice of individuals or their relatives. According to most informants, local healers provide health care with relatively manageable and negotiable charges. In the study area there is traditional rule among healer and his client which says " pay once and be treated many times", i.e. once the payment is made for the treatment of a particular health problem, no more pay is asked for repeated medications that runs up to the curing. Even, if the client is not in a position to pay any amount of cash at all, he/she may then give the healer a few blades of fresh grass called 'irressaa'. This is simply made for moral satisfaction of both healer and his client. According to information obtained from elders, this 'irressa' has dual purposes: Thanks/respect to the healer and maintenance of curative properties to the drugs.

According to their cultural belief, it is also generally accepted that an herbal drug given free or without any 'irressa', in cash or in kind, will lose its curative properties.

According to Young (1970), home remedy is the most popular but is an overlooked sector of health care strategy among all societies in Ethiopia and elsewhere. Indeed, the study at hand indicates that the local people of the study area have appreciable thought on home remedy and indigenous medicine.

4.3 Indigenous knowledge on landform classification and use of landforms

The result of the present study indicated that traditionally the local people of the study area classify the landforms in to seven categories namely: **Hededa/Tabba, Dacha, Gaara/Tulluu, Qilee/Bowwaa, Dirree/lafa ciisaa, Harawwa** and **Kattaa**

1. **Hededa/Tabba -** refers to small and medium hill. It is used to grow various crops such as coffee, barely, ancote and yam.
2. **Dacha** - refers to land that is drained by a river and its tributaries. This land category is mainly used to cultivate maize, potato, garlic, kororima and sugarcane.
3. **Gaara/Tullu** - refers to relatively high hill that is rarely visited by humans and animals due to its topography. This landform is covered by grasses with trees and shrubs.
4. **Qilee/Bowwa** - refers to gorges. This landform is mostly covered , shrubs and herbs, and rarely trees and climbers. It is used neither for agriculture nor for grazing.
5. **Dirree/Lafa ciisaa** - refers to levelled plain land that is suitable for both agriculture and grazing.
6. **Harawwa**- refers to plain areas surrounded by hills of various elevations. It is used mostly for agriculture.

7. **Katta** - refers to land forms that are dominated by different size of rocks. It is mostly used for grazing.

As it was reported by the local people and further confirmed during field observation practically, this landform classification using indigenous knowledge is based on various criteria. Their classification is mainly based on; Land steepness (e.g., land forms described at 1, 2, 5), water/ moisture availability throughout the year (e.g., land form described at 2), deepness (e.g., land forms described at 4 and 6) and type of materials dominating a particular landform (e.g., land form described at 7). During field observation also it was seen that **Dirree/Lafa ciisaa** landform is the most concentrated settlement area while **Gaara/Tullu** is with the least number of settlement. In **Qilee/Bowwa** and **Katta** there is no settlement at all.

4.4 Local vegetation classification /emic categorization/

The local people of the study area categorize the vegetation in their area in to 5 based on plant density, distribution and associated landforms. These are-

Ejja hori - this category is used to describe the vegetation type in which only few individuals of big trees and shrubs are found at various intervals with insignificant herbs and grasses in it. It is in such vegetation type that cattle usually pass strong hot periods of a day during a dry season. In the area, most of such vegetations are dominated by tree species like *Ficus vasta*, *Eucalyptus tereticornis* and *Croton macrostachyus*.

Qoddii - refers to a bare or poorly vegetated land with some types of herbs and grasses appearing only during rainy season. The soils of such vegetation types are culturally believed infertile (**borqi)** and dominated by termite mounds.

Tuuta - refers to dense vegetation cover over very small land size that usually found in patch along roadsides, within farm fields and coffee plantations (Fig. 3a). It is a main source for local hunting of wild animals.

Cicita - refers to very extensive area dominated by herbs such as *Eragrostis paniciformis*, *Hyparrhenia rufa, Achyranthes aspera* and *Pennisetum schimperi* (Fig. 3b). It is usually used for grazing of cattle.

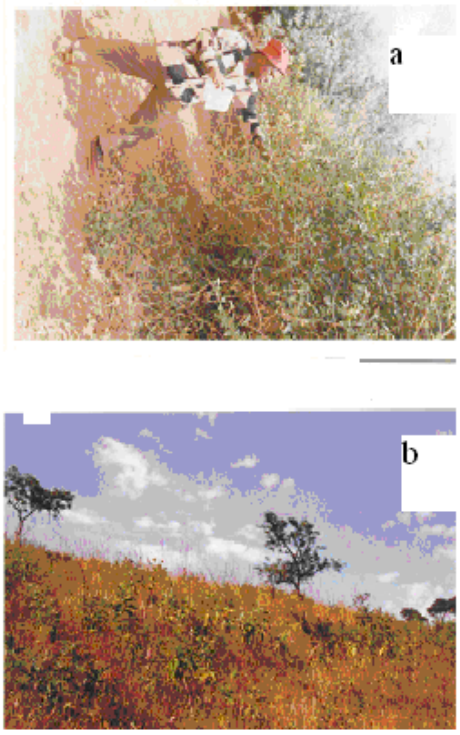

Fig. 3: a.Tuuta vegetation b.Cicita vegetation

Bosona - refers to densely forested land that comprises tall standing trees forming a dense growth. According to some elders, before 2 or 3 decades most part of the study sites were with large number of forest lands and particularly called as **'bosona kombo, bosona ciracha, bosona kombolcha, bosona Jogir'** and the like. Due to high population density, combined with highly extensive cropping activities and grazing pressure, very little and patchy climax vegetation observed in the area**.**

4.5 Vegetation of study area as examined visually (etic categorization)

Based on visual observation, the natural vegetation of the study area can be crudely categorized as follows.

A. **Vegetation type dominated by *Albizia schimperiana***: This vegetation type is normally found covering about 1-2 km patches of land in all study sites (Fig. 5). At all sites, the vegetation is associated with coffee plantation. The wild shrubby layer includes *Senna petersiana, piper capense, Senna didymobotrya, Vernonia amygdalina and Maesa lanceolata* thickets. The major tree species include *Croton macrostachyus, Schefflera abyssinica, Ficus vasta, Millettia ferruginea, Ficus sur, Syzygium guineense and Acacia spp*. The dominating herbs include *Rumex nepalensis, Verbena officinalis, Otostegia tomentosa, Bidens biternata, Urtica simensis* and *Cyathula uncinulata.* As they are associated with coffee plantation, using these tall standing trees for different uses like firewood, construction and beehive hanging is rarely practiced. As a result, it is possible to observe long aged trees and large number of medicinal plants in this vegetation type.

B. Vegetation type where *Combretum molle* and *Terminalia macroptera* are dominating: This vegetation type is characterized by open woodland with scattered species of trees and shrubs. It is recognized in east of Gimbi (starting from 15 km up to Dedessa gorge of east Wellega) and in some

parts of Lalo Usache study site. Few shrubs and trees species observed in this vegetation type comprise *Albizia schimperiana, Bersama abyssinica, Cordia africana, Dracaena steudneri, Euphorbia candelabrum, Gardenia ternifolia, Grewia ferruginea,* and *Brucea antidysenterica*. The ground cover is a tall layer of grasses and herbs such as *Hyparrhenia rufa, Achyranthes aspera* and *Pennisetum schimperi*. This vegetation type is fired annually so that herbs and grasses are rehabilitated every year. The main threats to this vegetation are clearing the vegetation for agriculture and charcoal production.

C. Woodland Vegetation type dominated by *Rytigynia neglecta, Millettia ferruginea and Acacia abyssinica*: This is observed on both sides of street extending in to some parts of farm fields as one keeps on going to north of Gimbi to Biqilal and south of Gimbi to Chuta. The shrubby and herbaceous layers include *Psidium guajava,* S*ida spp, Senna petersiana, Caesalpinia decapetala, Carduus leptacanthus, Solanum spp,* C*ombretum paniculatum, Datura stramonium, Vernonia rueppellii, Kotschya africana, Echinops longisetus* and *Guizotia scabra.*

D. Plantation Vegetation where *Eucalyptus sp, Juniperus procera* and *Podocarpus fulcatas* are co-dominant: This vegetation is mainly found in two study sites - Chuta and Biqilal. The other major tree plants include *Prunus africana, Ficus vasta, Euphorbia candelabrum, Gardenia ternifolia, Acacia tortilis, Acacia brevispica, Dombeya quinqueseta* and *Croton macrostachyus.*

E. Riverine vegetation type - The floristic composition of this vegetation includes trees such as *Salix subserrata, phoenix reclinata, Ensset ventricosum, Sapium ellipticum, Syzygium guineense* and *Musa paradisiaca.* The major shrubs and herbs include *Aframomum corrorima, Vangueria apiculata, Clausena anisata, Diplolophium africanum Dioscorea schimperiana, Thalictrum rhynchocarpum, Colocasia esculenta, Keetia gueinzii, Rothmannia urceliiformiis* and *Hibiscus spp.* This vegetation is mostly seen along the length of major rivers systems in the Woreda such as Gafare, Joogir, Meexi, Galel and kombolcha (Fig. 6).

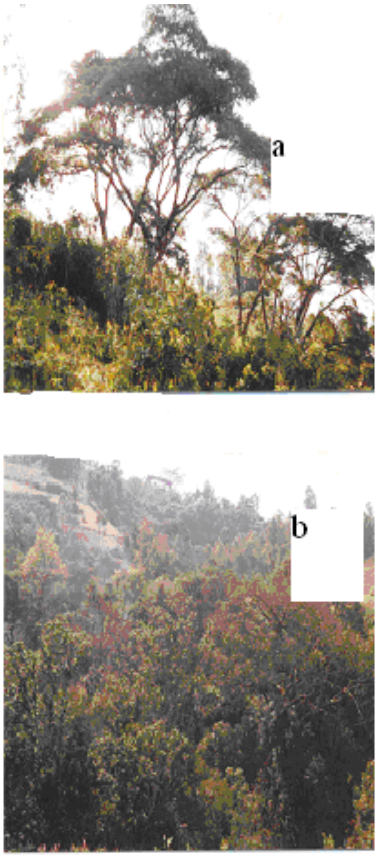

Fig. 4: a. Albizia schimperiana vegetation
b. Reverine vegetation

At this junction, it is important to realize the disparity between the vegetation classifications based on indigenous knowledge and visual classification. The local people perform the classification based on plant density in the area, regardless of type of plant species dominating the area that used as a criterion in visual vegetation classifications.

4.6 Plant diversity in home gardens ('boro') of the study area

The people of the study area cultivate diverse plant species in their home gardens. Most home gardens are rectangle in profile while few of them are spherical.. In almost all cases the garden sections away the home (next to the fence) were used to plant perennial plants such as *Catha edulis, Capsicum annuum, Persea americana, Cofea arabica* and *Mangifera indica* while those closer to the house were reserved for annual plant such as *Phaseolus lunatus, Zingiber officinale, Phaseolus vulgaris Brassica carinata and Brassica oleracea. A*t the middle, varities of plant species such as *Colocasia esculenta*, *Daucus carota, Coccinia abyssinica, Zea mays* and *Ipomoea batatas* were cultivated.

There is a great difference between home gardens practiced by rural and urban people both in size of the land used as home garden and diversity of the crops cultivated. In towns an average area of (not more than 3 x 5 m) used as home gardens compared to rural home gardens, which comparatively has larger size (about 10 x 15 m). In this survey, 52 useful plant species were encountered in 12 home gardens (3 from town and 9 from rural) (Appendix 3). Out of these 52 plant species, 23 (44.2%) were used as traditional medicinal plants. The plants are distributed among 31 families and 45 genera. The foremost families in terms of species composition are Lamiaceae, Fabaceae and Solanaceae with 4 species each and followed by Asteraceae, Poaceae and Cucurbitaceae with 3 species each, Euphorbiaceae and Musaceae 2 species each and all the others with one species each.

Regarding life form, out of the 52-"boro" plant species, 26 (50%) are herbs; 13 (25%) are shrubs; 6 (11.54%) are trailers, 4 (7.7%) are vines and 3 (5.8%) are trees (Table 1).

Further more, the study showed that the local people gain various uses from the crops in the home gardens. As shown in Table 2 below, about 30 species (57.7%) are associated with food service, followed by 23 species (44.2%) used as medicine. In addition, the analysis of the same Table shows that majority of the home garden plants, 27 species (51.9%) provide at least two uses to the owner of the home garden ("boro"). This finding agrees with home garden definition given by Christanty (1990) and Godbole (1998) that emphasized that the chief function of home garden is for quick and easy access to foodstuffs.

Table 1: Life form diversity of plant species in home gardens (“Boros”)

Habit	Total number of species	% of the total
Herb	26	48.07
Shrub	13	30.77
Tree	3	9.62
Trailing	6	11.54
Vine	4	11.54
TOTAL	52	100.00

The study also indicated that the local people show preference to some plants of the home garden. Accordingly, *Persea americana* and *Mangifera indica* had high relative frequence of occurence in the area each 3.76%, followed by *Artemisia abyssinica*, *Phaseolus lunatus*, *Phaseolus vulgaris* and *Zingiber officinale* each 3.38% (Table 3).

According to Browning (1985), biological diversity is a fundamental trait of traditional home gardens. The occurrence of 52 plant species in the 12 'boros' carried out in study confirms this fact. According to the response from most informants, the highest relative frequency attributed to *Persea americana* and *Mangifera indica* is assocated with their diversified uses (shade, cash income and food value).

Table 2: Service categories of home gardens (“Boros”) plants.

Service categories	**NO. of plant species**	**% of the total species**
Food	22	42.31
Spice	1	1.9
Livefence	1	1.9
Medicine	1	1.9
Clothing & cash income	1	1.9
House hold material & medicine	1	1.9
Livefence & ornamental	1	1.9
Spice & medicine	6	11.54
Medicine & cash income	3	5.8
Food & medicine	6	11.54
Utensil wash & medicine	1	1.9
Shade & roofing	1	1.9
Livefence & medicine	2	3.85
Alchol preparation & medicine	1	1.9
Cash income, stimulant & medicine	1	1.9
Food, clothing & shade	2	3.85
Roofing, medicine & spiritual role	1	1.9
TOTAL	52	100

In the area, the indigenous people are very alert to their home garden crops. Most “boros” owners suggested that throughout the year they have something to be eaten in their “boro”. According to them “boro” is more helpful and productive than their bulky farm fields. As suggested by Zemede Asfaw and Ayele Nigatu (1995), it is speculated that home garden in Ethiopia is as old as agriculture.

Table 3: Plant species with highest relative frequency of occurrence in home gardens

S.No.	Plan species	Frequency	Relative frequency
1	*Persea americana*	10 (83%)	3.76
2	*Mangifera indica*	10 (83%)	3.76
3	*Artemisia abyssinica*	9 (75%)	3.38
4	*Phaseolus lunatus*	9 (75%)	3.38
5	*Zingiber officinale*	9 (75%)	3.38
6	*Phaseolus vulgaris*	9(75%)	3.38
7	*Colocasia esculentum*	8 (66.7%)	3.00
8	*Occimum basilicum*	8 (66.7%)	3.00
9	*Rhamnus prinoides*	7 (58%)	2.63
10	*Prunus persica*	7 (58%)	2.63
11	*Dracaena steudneri*	7 (58%)	2.63
12	*Musa paradisiaca*	7 (58%)	2.63
13	*Vigna unguiculata*	7 (58%)	2.63
14	*Catha edulis*	7 (58%)	2.63

4.7 Plant resources in the vegetation of the study area

A total of 168 species of plants were collected from the wild vegetation of the study area. Out of these, 62 species (37%) were used as traditional medicinal plants. These plants are distributed among 136 genera and 62 families (Appendix 4). The family Fabaceae was represented by 22 species, followed by Asteraceae 18 species; Poaceae 11 species; Rubiaceae 8 species; Malvaceae and Euphorbiaceae 6 species each and Lamiaceae and Moraceae 5 species each. From the remaining families, 4 families each containsing 4 species; 6 families each containing 3 species; 9 families each containing 2 species and 33 families each containing 1 species. Regarding habit diversity, herbs stood first with 88 species being followed by trees with 38 species, shrub 35 species, climber 4 species, hemi-parasites 2 species and trailing 1 species (Appendix 4).

Analysis of vegetation data, based on frequency and relative frequency of the plant species recorded in 12 quadrats revealed the pattern of distribution of tree species of the study area (Table 4). In the table the most frequent trees, with frequency value of greater than 30% are given. The result showes that *Syzygium guineense, Schefflera abyssinica, Eucalyptus tereticornis, Albizia schimperiana, Croton macrostachyus and Ficus vasta are* the most frequent species occurring in 9 (75%) of the quadrats surveyed, followed by *Ekebergia capensis & Ficus exasperata* each occurring in 8 (66.7%) of the quadrats.

According to Martin (1995) & Jha (1997), there is a chance of finding a plant species either clumped together in one spot or evenly distributed in a given area. Similarly, this study enables us to understand the patterns of distribution of plant species in general and medicinal plants in particular in study sites. As shown in Table 4, the majority (66%) of the most frequent plants of the study area are medicinal plants. Nevertheless, a medicinal plant that received the highest informant consensus, *Warburgia ugandensis*, is not frequently distributed in the study sites. This could be due to the fact that it is over used and disappeared in some parts or the destruction of its habitat due to deforestation resulting in its occurrence in some sites only.

Table 4: List of most frequently occurring trees in the study area

Plant species	**No. of quadrats in which the species found**	**Total No. of quadrats**	**Frequency (%)**	**Relative frequency**
Albizia schimperiana	**9**	**12**	**75**	**2.14**
Croton macrostachyus	**9**	**12**	**75**	**2.14**
Eucalyptus tereticornis	9	12	75	2.14
Ficus vasta	**9**	**12**	**75**	**2.14**
Schefflera abyssinica	9	12	75	2.14
Syzygium guineense	9	12	75	2.14
Acacia brevispica	**8**	**12**	**66.7**	**2.00**
Ekebergia capensis	**8**	**12**	**66.7**	**2.00**
Ficus exasperata	**8**	**12**	**66.7**	**2.00**
Celtis africana	7	12	58.3	1.7
Dracaena studneri	**7**	**12**	**58.3**	**1.7**
Maesa lanceolata	**7**	**12**	**58.3**	**1.7**
Entada abyssinica	**6**	**12**	**50**	**1.4**
Millettia ferruginea	**6**	**12**	**50**	**1.4**
Prunus africana	**6**	**12**	**50**	**1.4**
Stereospermum kunthianum	**6**	**12**	**50**	**1.4**
Cordia africana.	**5**	**12**	**41.7**	**1.2**
Sapium ellipticum	5	12	41.7	1.2
Brucea antidysenterica	**5**	**12**	**41.7**	**1.2**
Euphorbia candelabrum	**4**	**12**	**33.3**	**1.00**
Ficus sur	4	12	33.3	1.00
Phoenix reclinata	4	12	33.3	1.00
Salix subserrata	4	12	33.3	1.00
Bersama abyssinica	**4**	**12**	**33.3**	**1.00**

*All plant species in bold face are medicinal plants recorded in the area.

4.8 Medicinal plants in the study area

4.8.1 Distribution of medicinal plants in vegetation type and study sites

In this ethnobotanical study, totally 85 medicinal plants were collected. The most useful information gathered on the medicinal plants as reported by the people include: local names (Appendices 3-5), medicinal value/ application, route of application, diseases treated, dosage used (Appendix 5), uses other than medicine, method of preparation destructive threatening factors and indigenous conservation methods.

Out of the 85 medicinal plants collected in 4 sites, the highest number recorded in Lalo Usache and the least in Gimbi (Table 5).

Table 5: Number and percentage of medicinal plants in each study site

Study site	**No. of medicinal plants**	**Percentage of total species**
Lalo Usache	80	94.1
Chuta	76	89.41
Biqilal	62	72.9
Gimbi	57	67.1
TOTAL	85	

The fact that such large number of medicinal plants are recorded in the study area is encouraging, de spite the very fast degradation of natural vegetation due to population pressure and overgrazing. Lalo Usache study site stretches over thee agro-ecological climates and this probably enabled it to have the highest number of medicinal plants.

The documentation of a relatively good number of plants from an area with similar pressures on the vegetation is also observed in different parts of Ethiopia as pointed out in the works of Bayafers Tamene (2000); Debela Hundie (2001); Kebu Balemie *et al.* (2004).

The result of the study revealed that the medicinal plants are unevenly distributed in the different vegetation types (Table 6). Most medicinal plants were harvested from vegetation type dominated by *Albizia schimperiana* and the least from vegetation type dominated by *Combretum molle-Terminalia macropetera*. The main reason for this could be that the vegetation type dominated by *Albizia schimperiana* is associated with coffee plantations, which is cautiously protected by farmers. On the other hand, vegetation type dominated by *Combretum molle-Terminalia macropetera* is annually burned and this could be a factor for recording less number of plants in this vegetation type.

Table 6: Distribution of medicinal plants in vegetation type

Vegetation type	**Number of medicinal plants identified**
Vegetation type dominated by *Albizia schimperiana*	67 (78.8%)
Vegetation type dominated by *Combretum molle-Terminalia macropetera*	19(22.4%)
Woodland Vegetation type dominated by *Rytigynia neglecta-Millettia ferruginea-Acacia abyssinica*	21(34.7%)
Plantation vegetation dominated by *Eucalyptus sp-Juniperus procera-Podocarpus falcatus*	23 (27.06%)
Riverine vegetation	49 (57.6%)

4.8.2 Distribution of medicinal plants among plant taxa: Families & Genera

Medicinal plants collected during this study were distributed among 50 different plant families and 77 genera (Appendix 5). The over all analysis of the data revealed that the family Fabaceae has the highest number of species, 9 (11.76%); followed by Asteraceae 6 species (7.06%); Lamiaceae 5 species (5.9%); Euphorbiaceae and Solanaceae each with 4 species (4.71%); Rosaceae 3 species (3.5%) and Verbenaceae, Boraginaceae, Polygonaceae, Myrtaceae, Meliaceae, Araceae, Moraceae, Acanthaceae, Ranunculaceae, and Malvaceae each with 2 species (2.35%). The remaining families have only one species each (1.18%).

This finding is a good indicator for the presence of a considerable diversity of plant species in the area. Furthermore, the existence and utilization of such a large number of medicinal plants by people in the study area may indicate that majority of the people continue to employ indigenous medicinal practices even after the advent of modern medicines. Certainly, these medicinal plants are not unique to the study area. In crosschecking with previous works carried out in different parts of the country, of the 85 medicinal plant species, 79 species (92.94%) were also found in other parts (Table 7).

From this finding, we can see that the local people over a wide area in Ethiopia show the tendency to use same medicinal plants and this can be an indicator for the genuine therapeutic value of these medicinal plants as well as indigenous knowledge on medicinal plants.

Table 7: Number of species in the area that are also recorded in other works

Sources	Number of species
Dawit Abebe and Ahadu Ayehu (1993)	20 (23.53%)
Dawit Abebe *et al.* (2003)	10 (11.76%)
Mirutse Giday (1999)	9 (10.59%)
Debela Hundie (2001)	9 (10.59%)
Jansen (1981)	7 (8.24%)
Bayafers Tamane (2000)	7 (8.24%)
Abbink (1995)	6 (7.06%)
Balcha Abara (2003).	5 (5.88%)
Mesfine Tadesse and Sebsebe Demissew (1992)	3 (3.53%)
B and M Development (2001)	3 (3.53%)
	TOTAL = 79 (92.94%)

4.8.3 Sources of medicinal plants

Among the 85 medicinal plants collected, 37 species (43.52%) were from **Bosona**, 18 (21.18%) from **Tuuta,** 7 (8.2%) from **Cicita**, 2 (8.2%) and 23 (27.1%) from home gardens (Fig. 5).

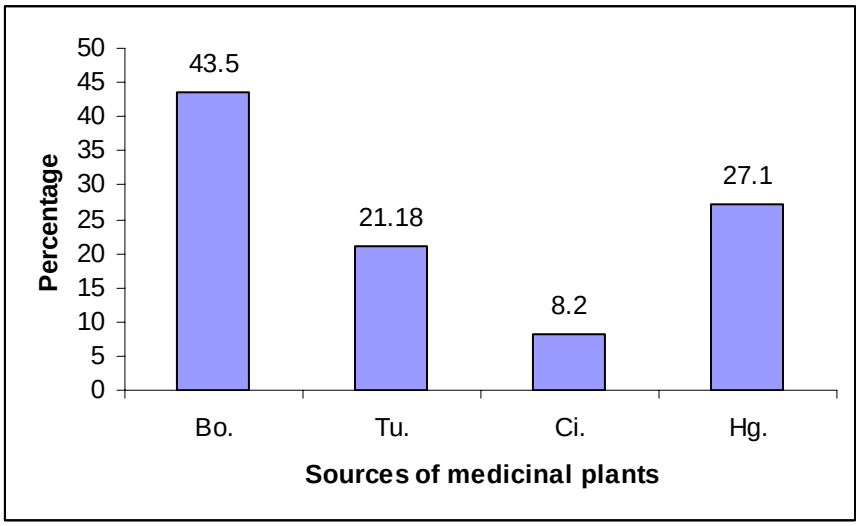

Fig. 5: Sources of medicinal plants in the study area

Key: Bo. = Bosona; Tu. = Tuuta; Ci. = Ciciata; Hg. = Home garden

This finding shows that most plants of medicinal value (about 72.947%) are harvested from the wild, while few of those (about 27.1%) are kept near the home. Although these plants were kept near homes and are used medicinally, they are not deliberately cultivated for medicinal value, but mainly for other purposes like shade, live fence, food, cash income, spice and others. Out of these 23 medicinal plants collected from home gardens, only two species (8.7%) were cultivated for medicinal propose. From this, it can be said that in the study area there is less practice of cultivating medicinal plants in the home garden. This is in line with finding, of Zemede Asfaw (1997), which also indicated that medicinal plants cultivated in home gardens were few, about 6%.

Most informants have argued that in near the past many medicinal plants have been collected from the wild not very far from their villages. In recent times, however, the absence of some medicinal plants was being seen practically. For instance, plants such as *Warburgia ugandensis* and *Securidaca longepedunculata* indicated to be found through a long time searching, but in the earlier times one could collect them within very short distance just next-door in their homes. From the informant response, the in availability of medicinal plants is due to multifaceted problems like deforestation (expansion of agriculture), charcoal production, cutting trees for construction and fire wood collection. Some informant claimed that the scarcity of medicinal plants in their area is one the factors that forced them to visit the expensive health institutions even for those diseases that could have been easily treated by medicinal plants. Some healers also suggested that the scarcity of medicinal plants is now either forcing them to stop the practice or making the cost of the herbal medicine unusually expensive.

From the interview made with informants, it was analysed that very few informants have an interest to cultivate some selected medicinal plants but limited by land scarcity and financial resources. On the other hand, almost all informants prefer the collection of medicinal plants from the wild to cultivating in their own house territory as they easily harvest most of the medicinal plants from their native vegetation. This is also in agreement with the finding of B and M Development (2001), which also found that cultivation of medicinal plants in Ethiopia is unattractive and the main being the low cost of wild material, the need for expertise for management and long maturation time needed to harvest.

4.8.4 Diversity of life forms of medicinal plants

Among the 85 medicinal plants collected, a life form analysis shows that shrubs and herbs stood 1st and 2nd represented by 34 species (40%) and 24 species (27.1%), respectively (Table 8). This finding shows that most widely used medicinal plants in the study area are shrubs followed by herbs.

Similar findings were also reported in the earlier works in Ethiopia (Bayafers Tamane, 2000), (Debela Hundie, 2001), (Mirutse Giday and Gobana Amani, 2003) and (Ermias Luelkal, 2005). A similar finding was also found in Kenya (Matu, 1998) and Tanzania (Njau, 2001).

The presence of more medicinal shrubs in the vegetation of the study area can be an indicator for the fact that there might be shrubs rich forest resources in the area in the past, which inculcate the medicinal value of the shrubs in the indigenous knowledge of the local people in the area.

According to some informant, traditional healers some times follow up the shrub and herb that cattle ignores (due to its taste or smell) to graze in its live time and then tryout these plants to treat different ailments in both human and livestock. Some healers suggested that through trial and error method some times they become successful in finding curative and / or preventive plant species. In line with this Sofowora (1982), suggested that trial and error is one way for the emergence of traditional medicine.

Table 8: Growth forms of medicinal plants

Habit	**Total number of species**	**% of the total**
Shrubs	34	40
Herbs	24	27.1
Trees	21	24.71
Climbers	5	5.91
Trailer	1	0.11
TOTAL	85	100

4.8.5 Parts of plants used for medicine

In this study, different parts of the plants were reported to be used for medicines. The leaves and the roots were the most commonly used plant parts in the preparation of remedies accounting for 48.2% (41 species) and 28.2% (24 species) of the total medicinal plants, respectively (Table 9). Analysis of the data showed that leaf is the most sought plant part in the preparation of remedies. Sets of works

that were carried out previously elsewhere in Ethiopia also revealed that leaves followed by roots were the common plant parts used to treat various health problems (Dawit Abebe and Istifanos Hagos, 1991; Bayafers Tamene, 2000; Mirutse Giday and Gobana Amani, 2003).

According to Dawit Abebe & Ahadu Ayehu (1993), herbal preparation that involves roots, rhizomes, bulbs, barks, stems or whole parts, have effects on the survival of the mother plants. In the study, the fear of destruction of medicinal plants due to plant parts collected for the purpose of medicine is minimal as leaves were the leading plant parts sought in the area. Moreover, the harvest of whole plants is not often practiced in the area.

Table 9: Plant Parts used in preparation of remedies

Parts used	**Number of species**	
	Total	**% of total**
Leaf only	41	48.2
Root only	24	28.2
Stem only	11	12.9
Bark only	9	10.6
Seed only	8	9.4
Latex only	7	8.2
Fruit only	2	2.4
Whole plant	2	2.4
Flower	1	1.2
Two and more parts	22	2.5
TOTAL	126	100

4.8.6 Preparation, dosage and administration of medicine

4.8.6.1 Preparation of medicine

In the collection of data concerning the preparation of medicine, informants have reported various skills associated with herbal preparation. These include plant composition (whether single or combined), condition of plant material used (fresh or dry) and methods of preparation. The result showed that most remedies were prepared from single plant (64.71%) and preparation from combined plant species was about 35.29%. The result is in agreement with the findings of Dawit Abebe (1986) and Debela Hundie (2001) in which the single plant preparation were reported to be high and disagrees with works of Mirutse Giday (1999) and Bayafers Tamene (2000) in which the combined plant materials were reported to have high proportion in herbal preparation.

The result in the conditions of plant part used indicated that most (60%) were used in fresh or dried state (Table 10). As majority of the plants can be used in both forms (fresh or dried), the chance of using the medicinal plants under different seasons of the year is maximized. During group discussion sessions most informants reported that, they preserve the plant material that they could not find in the dry or rainy season by various ways like pounding and saving the powder and / or hanging the intact plant material in the kitchen.

Table 10: Conditions of plants materials used for medicinal purposes

Condition of a plant	**No. of the plants**	**%**
Fresh	31	36.47
Fresh or dried	51	60
Dried	12	14.11

The results of the various forms of preparation are shown in Table 11. The frequently used methods were crushing, pounding and mixing in water through boiling (27.13%) (Table 11).

Table 11: Forms of medicine preparation by people of the study area

Forms of preparation	**Preparations**	**%**
Crushing pounding, homogenizing in water	35	27.13
Concoction	13	10.1
Infusion	16	12.4
Chewing	12	9.3
Powdered	6	4.65
Vegetable drug	5	3.88
Latex collection	5	3.88
Sap collection	4	3.1
Warming before fire	3	2.33
Cooked with bean	3	2.33
Crushed & smoked	3	2.33
Decoction	3	2.33
Baked with bread	2	1.5
Burned to ash & mixed with bread	2	1.5
Boiling and inhaling its smoke	1	0.78
Pasting	1	0.78
Others	15	11.6
TOTAL	129	100

As depicted in Table 11, the local people tend to apply methods such as decoction and concoction. This indicates that the local healers posses indigenous knowledge that partially shares the methods used in modern drug preparation for effective treatment. It was also reported that some medicinal herbs and grass have been mixed with food and drinks in such manner that they not only take care of the health but also give special flavor and taste to it. For instance, *Ruta chalepensis* and *Allium sativum* are added to coffee and cheese to improve the flavor and taste, and when there is discomfort due to cold or cough. Mixing and using some medicinal plants with common foods and drinks might be easy way for effective treatment (Abdu and Hamed, 1982).

4.8.6.2 Dosage of medicinal plants used

People of the study area used various units of measurement and the duration of administration to determine the dosage. Local units such as finger length (e.g., for bark, root, stem,), pinch (e.g., for powdered plant medicine) and numbers (e.g., for leaves, seeds, fruits, bulbs, rhizomes, flowers and latex) were used to estimate and fix the amount of medicine. Recovery from the disease, disappearance of the symptoms of the diseases, fading out of the disease sign and judgment of the healer to stop the treatment were some of the criteria used in determining duration in the administration of the dosage. However, from the interview made during the study, it was found that there was disagreement among the healers concerning the dosage system used. For example, some informants suggested that four or five drops of the latex from *Euphorbia candelabrum* is used to treat ascariasis or gonorrhoea, while some suggested that only one drop is enough for the same problem. Still some others suggested that they apply the latex randomly without such measuring system. Although the full dose determination is varying from healer to healer, the dose given depends on age, physical strength and heath conditions. The healers never administer treatments that are taken internally to pregnant women. This finding indicates us that there is lack of precision in the determination of doses in the area. According to Dawit Abebe and Ahadu Ayehu (1993), the real drawback in traditional medicine system mostly arises from lack of precision in dosage.

4.8.6.3 Administration of herbal preparations

As regard to their route of administration, medicine preparations of the study area were either taken internally (61.94%) of which an oral application is a leading route (85.55%) or applied externally (38.06%) of which rubbing the medicine on dermal is a leading (29.4%) (Table 12). In line with this

finding, Dawit Abebe & Ahadu Ayehu (1993) also showed that the leading route of application of all the reported herbal remedies in Ethiopia were oral, which accounted for 42%.

Table 12: Route of administration and number of applications of herbal medicine in the study area

Route of administration	**Total applications**	**%**
Internal	83	61.94
Oral	71	85.55
Nasal	8	9.64
Ear	1	1.20
Eye	2	2.41
Anal	1	1.20
External	51	38.06
Washing	9	17.64
Putting	11	21.54
Smoking	6	11.76
Rubbing	15	29.4
Brushing	9	17.65
	1	1.96
Total	134	100

Moreover, some healers reported that some medicines could be prepared to be applied in different forms to the single problem. For instance, *Verbena officinalis* when used for muscular pain, can be taken either orally, nasally or dermal; and *Caylusea abyssinica* when used for getting ride of impotency taking it either orally, brushing the teeth by its root or simply carrying the root in the pocket. Such flexible options enable the patient to select the method that she/he prefers. The existence of such diversified methods of application is indicative of the fairly wider knowledge of the people in the area in using medicinal plants.

Some of the application modes have spiritual values in the area. Informants have confirmed that the bark and leaves of *Dracaena steudneri* and *Entada abyssinica* are crushed together and sprayed early in the mornings and evenings around animal cages, in house and on utensils. This act is believed to keep away or remove evil or bad sprits that for example, could make the cows uncontrolled and dislike their young. Moreover, in the area it is widely believed that having one *D.steudneri* near the house or fence is a guaranty to prevent lightning from the house and animal cage. The other spiritual value is associated with *Stereospermum kunthianum.* As suggested by informants having a piece of S. *kunthianum* that is taken either from the root or bark, in pocket or as the tooth brush, is believed to prevent a person from evil eye and man made-poison. Although these spiritual acts are hard to be explained scientifically, they can give psychological confidence to the users.

Some of the informants reported that restrictions are obligatory when patients take certain types of remedies. For example, a patient who takes remedy against tapeworm (made from *Glinus lotoides*) & Ascariasis (made from *Bersama abyssinica*) should not take any food item six hours before and after the administration of the medicine. Similarly, a patient who takes remedy against rabbies and hookworm strictly hide from shadow of humans and other animals particularly cock and male dog for a day after medication. According to local healers, no such restriction is recommended on the medication of livestock.

4.8.7 Marketed medicinal plants

In the study area, finding herbal vendors in the local markets is very seldom. In surveys made in two local markets (Gimbi and Gaba Senbata), out of the 85 medicinal plants recorded in the area, only 3 species: *Thalictrum rhynchocarpum*, *Piper capense* and *Echinops kebericho* were recorded (Fig. 8). Some other medicinal plants were also marketed but only for other use-values like for spices, food and

fumigation. The majority of the medicines were brought from neighbouring regional states and zones by long distance vendors who obtained them by purchase. 51 drug types were recorded in both markets of which three drugs (5.77%) were from the study area while the remaining 48 drugs (94.23%) were from neighboring Regional States and Zones. From 68 health problems recorded in the study area, 53 (77.9%) of them are also found listed by the vendors (Fig. 8).

All vendors complained about the absence of demand to the medicine from the local people. During the interview it was also explained by most informants that the absence of reliable market demand discouraged them from producing the medicine to the market. Some informants reported that although the local people use the medicinal plants, they mostly buy or obtain by “irressa” the medicinal plants from the healers, as marketed herbal medicines are very expensive. In line with this in the work of B and M Development consultant (2001), it was explained that the lack of consistent market was one factor for the reduction of the number of local people that involve in the medicinal plant trade. Indeed, by the study at hand it was indicated that the lcal healers are totally abscent in medicinal plant trade.

According to Marshal (1997) the use medicinal plants for the local people is many folds: accessibility, cheaper cost and less side effects when compared to the modern medicine. Similarly, the country gains merits such as saving the foreign exchange since these medicines can be used as substitute for modern and imported medicine when used on commercial scale (Jansen, 1981). Ofcourse, according to Dawit Ababe and Ahadu Ayehu (1993), the real drawback in traditional medicine system mostly arises from lack of precision in dosage.

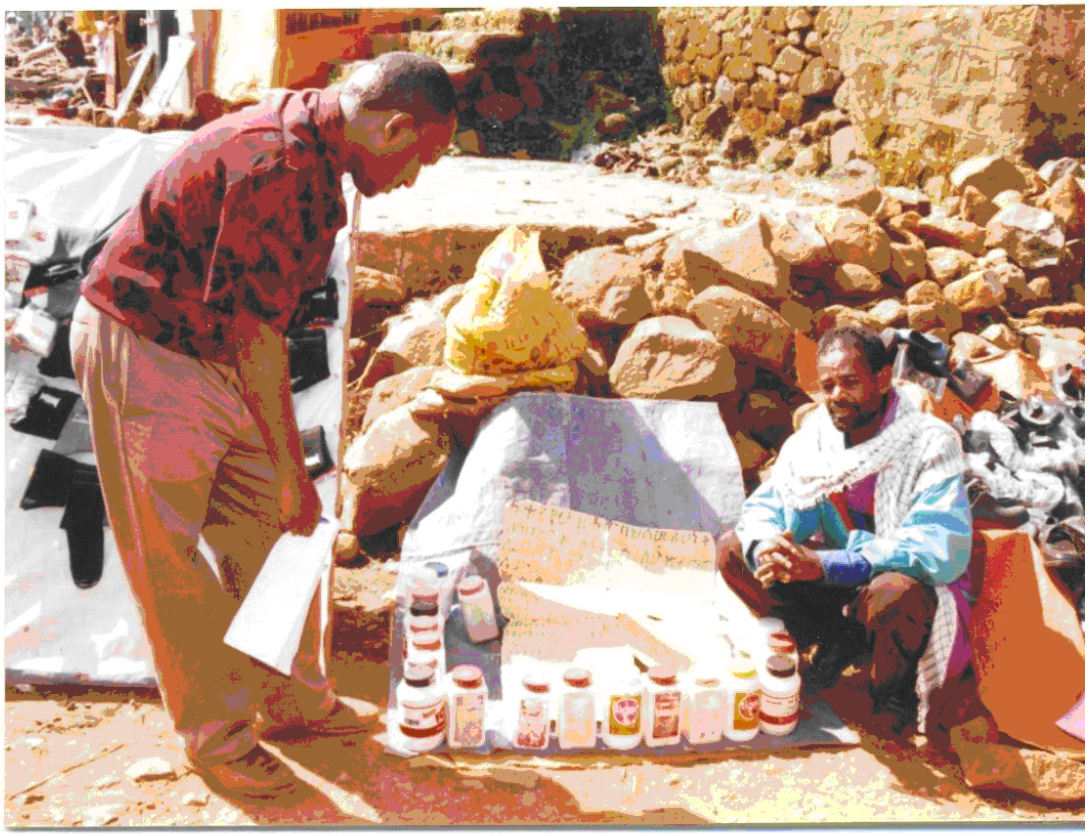

Fig. 6 A vender selling medicinal plants in Gimbi market

4.8.8 Medicinal plants use report/Informant consensus

The present study showed that some medicinal plants and their utilization are more popular than others. It was found that all plants that used as medicine have vernacular names in the area (Appendix 5) while those with no known medicinal use have a considerable proportion without known names locally (Appendix 4). Those medicinal plants cited by seven or more informant (45% or more informant consensus) were given in Table 13 and fully described in section 4.10. Accordingly, plant species *Plantago lanceolata and Warburgia ugandensis,* are indicated relatively by highest number of informants, 39 (78%) each to treat various human health problems. *Rumex nepalensis* indicated to have the second higher number of informants 36 (72%) to be used for various human health problems in the study area.

Table 13: Informants' consensus score

Scientific name	**No. of informants**	**% of informants**
Plantago lanceolata	39	78
Warburgia ugandensis	39	78
Rumex nepalensis	36	72
Allium sativum	32	64
Calpurnia aurea	32	64
Vernonia amygdalina	32	64
Datura stramonium	29	58
Carissa spinarum	29	58
Croton macrostachyus	29	58
Phytolacca dodecandra	28	56
Senna occidentalis	28	56
Solanum anguivi	25	50
Nicotiana tabacum	25	50

In agreement with results of several other ethnobotanical studies carried out elsewhere in Ethiopia (Bayafers Tamene, 2000; Debela Hundie, 2001; Abiyot Birhanu, 2002; Haile Yinger, 2005 & Ermias Luelkal, 2005) informants' consensus values obtained for this study was found to be high. Deep-rooted indigenous knowledge among local people on the practice of traditional medicine that utilizes medicinal plants is one main reason for high informants' consensus obtained in the present study.

In terms of plants families, the family indicated with highest number of species in treating health problem in humans was Fabaceae (seven species), in livestock Araceae was (two species) and common to both groups, Solanaceae (three species) (Table 14).

Table 14: Number of plant species in each family used to treat health problems in the study area

Families	Number of species			Total
	Human	Livestock	In both	
Acanthaceae	1	-	1	2
Alliaceae	-	-	1	1
Aloeaceae	1	-	-	1
Araceae	-	2	-	2
Asteraceae	3	1	2	6
Asparagaceae	1	-	-	1
Apocynaceae	1	-	-	1
Anacardaceae	1	-	-	1
Boraginaceae	1	-	-	1
Bignoniaceae	1	-	-	1
Combretaceae	1	-	-	1
Curcurbitaceae	1	-	1	2
Celastraceae	-	-	-	1
Capparidaceae	-	-	1	1
Canellaceae	-	-	1	1
Caricaceae	-	-	1	1
Dracaenaceae	-	1	-	1
Euphorbiaceae	3	-	1	4
Fabaceae	7	-	2	9
Flacourtiaceae	1	-	-	1
Lamiaceae	3	-	1	4
Loganiaceae	1	-	1	1
Melianthaceae	1	-	-	1
Myrtaceae	1	1	-	2
Meliaceae	1	-	1	2
Myrsinaceae	1	-	-	1
Moraceae	2	-	-	2
Malvaceae	1	-	1	2
Oleaceae	1	-	-	1
Polygalaceae	-	-	1	1
Polygonaceae	2	-	-	2

Table 14 (Continued...)

P1antaginaceae	1	-	-	1
Phytolaccaceae	1	-	-	1
Poaceae	-	-	1	1
Piperaceae	-	1	-	1
Rubiaceae	1	-	-	1
Rosaceae	2	-	1	3
Rhamnaceae	-	-	1	1
Resedaceae	1	-	-	1
Rutaceae	1	-	-	1
Ranunculaceae	1	1	-	2
Solanaceae	1	-	3	4
Salicaceae	-	1	-	1
Simaroubaceae	1	-	-	1
Tiliacaceae	-	-	1	1
Urticaceae	-	-	1	1
Vitaceae	1	-	-	1
Verbenaceae	1	-	2	3
Aizoaceae	1	-	-	1
Zingiberaceae	-	-	1	1
TOTAL	50	8	27	85

4.8.9 Medicinal plants use knowledge versus age in the study area

The informants (50 men) from whom basic ethnobotanical data have been collected fall into three age groups. Accordingly, 6 (12%) were 18 and below; 31 (62%) between 19-44 and 13 (26%) were 45 and above (Table 15).

Table 15: Medicinal plant use knowledge compared by age groups

Age group	**Age range**	**No. of informant**	**Total plants cited**
1st	18 and below	6	10
2nd	19-44	31	63
3rd	above 45	13	33

The use knowledge analysis showed that it is directly proportional to age increment. This finding agrees with works of Hussien Adal (2004); Debala Hundie (2001) and Tigist Wondimu (2003), but slightly disagrees with that of Abiyot Birhanu (2002) in which elders at higher ages reflect less medicinal plants use knowledge than the lower age groups.

Further more, data collected from field observation and interviews revealed that informants in the1st age group were not conversant enough in providing some ethnobotanical information clearly on the plant part used, method of preparation and mode of application. There might be various probable reasons for the discovery of different medicinal plants use knowledge in the three age groups of the present study. One could be the uneven distribution of key informants (healers and elders) among the three groups. All key informants were found in the second and third age groups. This could have contributed for the identification of more medicinal plants and the associated medicinal plants use knowledge by both second and third age groups, as they are more knowledgeable than the people in the first age group.

4.9 Health problems in the study area

4.9.1 Diseases frequently treated in the study area

In present study, 68 different types of health problems (49 in humans and 19 in livestock) were reported to be treated by medicinal plants (Appendix 5). From 85 medicinal plants recorded, 57 of them were used to treat only human health problems, 8 of them treat only livestock ailments and 20 of them treat health problems common to both humans and livestock (Fig. 7). Among the medicinal plants, 77 species (%) indicated to be used for treating human health problems, 17 species (20.1%) were used for stomach ache, 7 (9.1%) used for wound infection and 6 (7.8%) used for snakebite (Table 16).

Similarly, among medicinal plants (about 28 species) that are reported to treat livestock aliments, the highest proportion, 4 species (11.1%), were used to treat trypanosomaisis (Table 17).

The overall analysis of Tables 16 and 17 reveals that major uses of medicinal plants for treatment of different diseases ranges from simple diseases such as painkiller to fatal diseases such as malaria and cancer. These traditional remedies indeed, need to be confirmed through scientific investigations to identify those that may provide alternatives for modern drugs.

The result of the study also showed the highest proportion medicinal plants were used in treating stomachache in human and trypanosomaisis in livestock respectively. This indicates the prevalence and importance of these ailments in the area as there were reported to rank among some of the ten- top diseases (GWHCAR, 2005).

In this study, fewer numbers of medicinal plants are used to treat livestock diseases than for humans. On the contrary, most informants reported that in most cases they treat livestock problems by indigenous medicine and rarely look for modern medication.

The total number of species used in treating the health problems in the area were far more than the total medicinal plants documented in the area (Tables 16 and 17). This clearly indicates that some plants are used in treating a series of different health problems. For example; *Nicotiana tabacum* is used in snake bite, pain, stress problems; *Aloe macrocarpa* is used in treating fire burn, abdominal pain, hookworm problems and C*arica papaya* used for malaria, contraceptive, gastritis and hepatitis. However, in most plants the preparations are used to treat only one particular problem. The action of plant extracts on different health problems may explain the broad-spectrum nature of the plants while their action on only a particular problem explains the narrow spectrum nature.

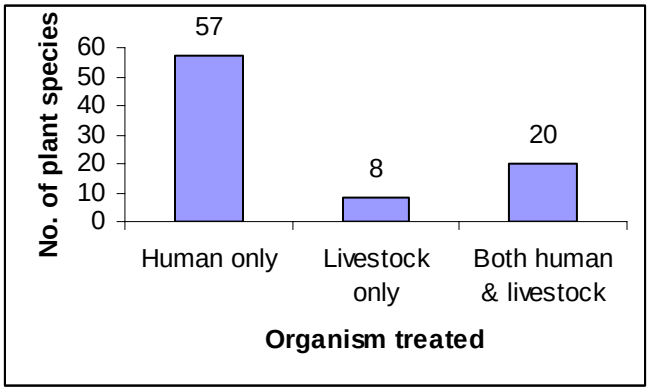

Fig.7: Proportion of medicinal plants used to treat human, livestock, and both human and livestock diseases.

Health problem	**No. plant species**	**% of total medicinal plants**
Stomachache	17	22.1
Haemorrhoid	2	2.6
Snakebite	6	7.8
Tinea versicolor (**Bolale**)	5	6.5
Wounds	7	9.1
Cough	5	6.5
Different skin problems	5	6.5
Fire burn	1	1.3
Hookworm	5	6.5
Male impotency	3	3.9
Rheumatism	3	3.9
Ascariasis	4	5.2
Malaria	4	5.2
Elephantiasis	1	1.3
Hepatitis	2	2.6
Psychoactive	3	3.9
Anti-worm	3	3.9
Evil eye	2	2.6
Headache	2	2.6
Contraceptive	1	1.3
Gastritis	3	3.9
Scabies	3	3.9
Bat urine (**simbira)**	1	1..3
Herpes zoster	2	2.6
Toothache	5	6.5
Gonorrhoea	3	3.9
Amoeba	1	1.3
Influenza	1	1.3
Warts	1	1.3
Red /gray hair	1	1.3
Tetanus	1	1.3
Febrile illness (**xira**)	3	3.9
Bleeding (due to cut)	1	1.3
Tuberculosis	1	1.3
Pain (muscular)	1	1.3
Tonsillitis	2	2.6
Asthma	1	1.3
Tape worm /Taeniasis	1	1.3
Flariasis	1	1.3
Diarrhoea	2	2.6
Giardiasis	1	1.3
Earache	1	1.3
Glandular swelling	3	3.9
Eye infection	3	3.9
Rabies	2	2.6
Ecto-parasite	3	3.9
Vomiting	1	1.3
Physical deterioration	1	1.3
Tinea corporis (**roobi**)	1	1.3

Table 17 Frequently appearing Livestock diseases in the study area and percentage of total plant species used to treat each disease

Health problems	No. of plant species	% of total medicinal plants used by livestock
Bloating	1	2.9
Diarrhoea	1	2.9
Black leg	1	2.9
Leech infestation	3	8.6
Cough	2	5.7
Trypanosomaisis	4	11.1
Anthrax	1	2.9
Antidotes	1	2.9
Promote sterility	1	2.9
Bloody urine	1	2.9
Joint dislocation	1	2.9
Glandular swell	3	8.6
Eye infection	3	8.6
Rabies	2	5.7
Ecto parasite	2	2.9
Actinobacilliosis	1	2.9
Dermatophillosis (Skin problem)	3	8.6
Physical deterioration	1	2.9
Mouse/nose wound	1	2.5

4.9.2 Ranking of medicinal plants based on their efficiency

4.9.2.1 Preference ranking

As shown in Table 18, *Nicotiana tabacum* stood first among the six plant species followed by *Senna didymobotrya* in preference ranking conducted to know rank of medicinal plants used in treating snakebite. This indicates that the indigenous people through life experience have identified the best medicinal plants from any other plant that can be used for same problem.

Table 18: Preference ranking of medicinal plants used to treat snakebite.

Medicinal plants	Respondent A_H								Total	Rank
	A	B	C	D	E	F	G	H		
Acacia brevispica	5	2	3	3	3	3	1	2	22	3rd
Ficus vasta	1	3	2	1	1	4	1	2	15	6th
Senna didymobotrya	3	3	3	6	6	4	5	6	36	2nd
Guizotia scabra	5	1	4	1	2	3	2	1	19	4th
Nicotiana tabacum	6	6	6	4	5	6	6	5	44	1st
Lippia javanica	1	2	4	4	2	3	1	2	19	4th

4.4.2.2 Paired comparison

For medicinal plants that were identified by the informants to be used in treating wounds, a paired comparison was made among five of them using ten informants to know their rank. Accordingly, *Plantago lanceolata* stood first followed by *Rumex nepalensis* (Table 19). This result indicates that *P. lanceolata* is much favored over other plant species cited in treating wound in the area. Moreover, the result could be a testimony for the efficacy of these two plant species to treat wound at least in the study area.

Table 19: Paired comparison of medicinal plants used to treat wounds (1 = Least; 2 = Good; 3 = Very good; 4 = Excellent.

Plants species	Respondents (R_1-R_{10})										Total	Rank
	R_1	R_2	R_3	R_4	R_5	R_6	R_7	R_8	R_9	R_{10}		
Cynodon dactylon	0	1	2	2	0	1	1	1	1	2	11	5th
Rumex nepalensis	4	3	0	2	2	3	4	2	3	2	25	2nd
Sida rhombifolia	2	1	1	0	1	1	1	1	2	2	12	4th
Vernonia auriculifera	1	2	3	3	4	1	1	2	2	2	21	3rd
Plantago lanceolata	3	4	4	3	3	4	3	4	2	2	31	1st

4.10 Description of major medicinal Plants

All medicinal plants (13 species) that had informants' consensus of 45% and above (Table 13) are described below. These include the habit, distribution, medicinal uses, methods of preparation, route of application and other uses of the plants.

1) *Allium sativum* L.**; Alliaceae; Qulubi adi (Or.)**

Brief description: It is a cultivated herb with an ovoid to somewhat globose bulb; covered in a white or purple sheath enclosing more or less equal cloves (bulblets) each enclosed in a tough prophyll; leaves are 4-10 in number in two ranks, often blue green; inflorescence stalk solitary, longer than leaves straight or coiled towards the apex, covered in leaf sheath for more than half of its length (Tewolde Brehan Gebre Egziaber and Edwards, 1997).

Habitat and Distribution: It is cultivated in home gardens and in irrigated fields. It grows best with in altitude ranges of 1800-2800 m asl through out the cooler parts of Ethiopia. Currently, it is being grown in all parts of the world (Tewolde Brehan Gebre Egziaber and Edwards, 997). In the study area mostly found in irrigated lands.

Medicinal uses: It is used to treat abdominalache and itching in humans and bloating in cattle. In treating abdominalache, 2-3 bulbs pounded along with equal amount of *Zingiber officinale* are chewed once a day. Rubbing the affected area by the sap from the bulb is a remedy for body itching. For bloating, the bulbs (10-15 in number) pounded with the bark of *Melia azedarach* and *Dracaena steudneri* are given twice daily for three days. It is used in other parts of Ethiopia to treat jaundice and cutaneous leishmaniasis (Getachew Addis *et al*., 2001); malaria and pneumonia (Abiyot Berhanu, 2002) and acute stomachache (Haile Yinger, 2005).

Other uses: Also used for preparations of variety of food types, more particularly in making dried foods for storage (Tewolde Brehan Gebre Egziaber and Edwards, 1997). In the study area it is also used for preparation of different foods (soup, wat, bread).

2. *Calpurnia aurea* (Ait.) Benth.; **Fabaceae; Ceeka (Or.)**

Brief description: Is a shrub or small tree 1-10 m high; young branches and inflorescences densely pubescent; leaves (4) 6-24 cm long; ovate or oblong to obovate. Pod straw colored or brownish, with a wing along the upper edge, seeds 4-8, brownish (Thulin, 1989).

Habitat and Distribution: Grows in forest margins, bushland or grassland, favored in overgrazed sites, found at altitudes of 1600-3000 m asl. It occurs in Tigray, Gondar, Sidamo, Gamo Gofa, Kefa, Hararge, Arsi, Bale, Shewa, Wellega, Gojam and Welo floristic regions (Thulin, 1989). In the study area, it is common in a grazing land, coffee plantation and roadsides.

Medicinal uses: Used to treat skin diseases in livestock. The leaf is allowed to stay in water and the affected part of body of a livestock is thoroughly washed early in the morning. It is used in other parts of Ethiopia to treat headache and stomach disorders (Mesfin Taddesse and Sebsebe Demissew, 1992); the seed was reported to be used as fish poison or as a cure for dysentery (Jansen, 1981) and (Thulin, 1989).

Other uses: Besides medicinal value, it is used for charcoal production, firewood, construction and live fences.

3. *Carissa spinarum* (Forssk.) Vahl; **Apocynaceae**; **Agamsa (Or.)**

Brief description: A spiny shrub or small tree 5 m high; bark grey, smooth with straight woody spines to 5 cm long, often in pairs, rarely branching; leaves: opposite, leathery, shiny dark green, tip pointed, base rounded, stalk very short; flowers fragrant, in pink-white terminal clusters, lobes overlap

to the right; fruit rounded berries about 1 cm in diameter, purple-black when ripe, sweet and edible, seeds 2-4 seeds (Azene Bekele et al., 1993; Leewenberg, 2003).

Habitat and Distribution: Grows in *Acacia* woodland and shrubland, riverbanks at altitude between 1500-2500 m asl (Azene Bekele *et al*., 1993, Leewenberg, 2003). In the study area, it is commonly found in eroded hillsides, in grazing land with scattered shrubs, in riverbanks and at the roadside mixed with *Combretum- Rubus* species**.**

Medicinal uses: Used to treat ascariasis and evil eye in humans. In treating ascariasis, the seed (20-30 in number) are cooked and eaten in empty stomach. For evil eye, the root is burned in fire and the patient is made to inhale the smoke. Elsewhere in Ethiopia, the roots are used to treat headache (Mesfin Tadesse and Sebsebe Demissew, 1992), toothache and stomachache (Fichtl, and Admasu Adi, 1994) and the leaves pounded and drunk to treat headache, diarrhoea and stomachache (Bayafers Tamane, 2000).

Other uses: In the study area, the seeds are eaten.

4. *Croton macrostachyus* Del.**; Euphorbiaceae; Bakkanisa (Or.)**

Brief description: Is a shrub or a tree (2-) 6-15 (-25) m high, with longitudinally fissured bark; stellate hairs, some with long central rays; leaf ovate with rounded to cordate base; flowers mostly dioecious with male flowers in cluster and female ones usually solitary (Gilbert, 1995).

Habitat and distribution: In Ethiopia it is found at altitudes between 1050-2350 m asl in Tigray, Hararge, Bale, Sidamo, Kefa, Illubabor, Wellega, Arsi, Shewa, Welo, Gojam and Gondar florestic regions (Gilbert, 1995). In the study area, it is very common in coffee plantations.

Medicinal uses: Used to treat hookworm and Tinea corporis ‘Robi’. For hookworm, the shoot tips of the plant are pounded with shoot tips of *Justicia schimperiana* powdered and baked. The 'bread' is eaten once a day for several weeks. For treating Tinea corporis (**robi**), the latex is collected from

shoot tip is applied topically to the affected parts. In other parts of Ethiopia, the sap, leaves, roots and bark of this plant are used as remedy for various ailments (Azene Bekele *et al.,* 1993); barks are pounded and drunk to treat gonorrhoea, crushed leaves rubbed / creamed on eye lashes and eye lids (Bayafess Tamene, 2002). Elsewhere in Africa used to expel tapeworms (Iwu, 1993).

Other uses: In the study area used for firewood, beehive hanging and as live fences.

5. *Datura stramonium* L.**; Solanaceae; Asangira (Or.)**

Brief description: It is a shrubby annual herb up to 2 cm tall but often much smaller, glabrescent or with few, straight, non-glandular hairs; leaves one or several at the nodes; petiole 1-5.5 cm long; blade broadly ovate to rhomboid or angular; flowers erect with pedicel about 0.5 cm long; capsules erect, globose or ovoid, densely spiny or prickly and minutely pubescent between the prickles; seeds black, about 4 cm in diameter (Fichtl and Admasu Adi, 1994; Friis, 2006).

Habitat and Distribution: Found abundantly on fertile soils in fields and besides roads and paths at altitude between 1250-2400 m asl (Fichtl and Admasu Adi, 1994). In the study area, it is found mainly in roadsides and homes, and in waste places.

Medicinal uses: In the study area Used to treat wounds and toothache in humans and cough in livestock. For wound and toothache, the leaf was pounded and applied to (rubbed on) the affected parts of the body. For coughing in cattle, the leaves are collected from the middle region of the stem, pounded along with bread, made into paste and given orally 1-2 times a day for a week. Elsewhere in Ethiopia, leaves used against headache and wound (Fichtl and Admasu Adi, 1994) and roots against toothache (Abbink, 1993). Elsewhere in Africa, leaves are used against coughing (Iwu, 1993).

6. *Nicotiana tabacum* L., **Solanaceae; Tambo (Or.)** Brief description: It is annual or short-lived perennial herb or shrub, glabrous or pubescent with glandular or non-glandular simple hairs; leaves

alternate, simple, and entire to sinuate; inflorescences panicle-like, rarely raceme like; fruit ovoid to globular capsule with smooth surface, surrounded by the persistent calyx, opening with 2-4 apical valves; seeds usually reni from, often angled (Fichtl and Admasu Adi, 1994; Friis, 2006).

Habitat and distribution: It is a cultivated plant in home gardens in some part of the country and some times as weeds in farm. Found at altitudes of 1700-2400 m asl (Fichtl and Admasu Adi, 1994). In the study area, it is commonly found in waste places**.**

Medicinal uses: In the study area used for treating snake bite in humans and leech infestation in livestock. For leech infestation, the leaf is chopped into grains and poured into nose or mouth of the cattle. In treating the snake bite the leaf infusion is drunk or the pieces of its bread is swallowed. Elsewhere in Ethiopia, juice of crushed leaf is poured in to the throat of sheep and oxen against internal parasites (Fichtl and Admasu Adi, 1994) and pounded leaves smeared on wounds (Debela Hundie, 2001).

Other uses: In the study area, the dried crushed leaves and/or the pounded leaf made in to paste (bread) and used as cigarette smoke.

7. Plantago lanceolata L.; **Plantaginaceae; Qorxobi (Or.)**

Brief description: It is a herb, often with several densely tufted shoots; leaves are in rosettes with a more or less petiole like base, narrowly elliptic or narrowly oblanceolate, with 3-5 parallel main veins; spikes are ovate-oblong to cylindrical, dense; bracts ovate, acute or acuminate glabrous; capsule (fruit) is oblong, 2 chambered, 2 seeds (Ryding, 2006).

Habitat and distribution: Grows on roadsides, in crops and abandoned fields as weeds, waste ground and pastures, 1200-3000m asl. It is native in Europe and Asia, now all over the world (Ryding, 2006). In the study area, it is commonly found in tef-farm; grazing land and near roads.

Medicinal use: In the study area, it is used for treating wound and gastritis in humans. In treating wound, the finely crushed leaf is applied topically. For gastritis, the leaf is chewed and swallowed up in empty stomach daily for few weeks. In other parts of Ethiopia used to treat, bleeding and wounds resulting from cut skin (Abiyot Berhanu, 2002)

Other uses: In the study area, it is used as forage to cattle.

8. *Phytolacca dodecandra* L'Herit.; **Phytolaccaceae; Andoode** (Or.)

Brief descriptions: It is scrambling shrub to 10 m high or more, glabrous to pubescent; leaves with 1.5-4 cm petiole; lamina ovate to elliptic, 6-15 x 3-10 cm; flowers dimorphic, scented with long staminate white or cream flowers; seeds lenticular, 2.5-3 mm across, papillate-striate towards hilum, glossy black (Polhill, 2000).

Habitat and Distribution: It grows in evergreen bush land, forest edges and disturbed places in altitudes of 1500-3000 m asl. In Ethiopia it is distributed in Tigray, Bale, Gamo Gofa, Gondar, Welo, Gojam, Wellega, Shewa, Illubabor, Kefa, Arsi, Sidamo and Hararge floristic regions (Polhill, 2000). In the study area found in coffee plantations, along rood sides and at the edges of farm fields.

Medicinal uses: In study area used to treat scabies and Herpes zoster in humans. It is also used to clean water from worms, snails and tadpoles. For scabies, the affected body part is washed daily (2-3 times) with leaf infusion prepared over the night until the sores fade away. In treating Herpes zoster, the leaf powder mixed to gather with the powder of leaf of *Clematis simensis* is smeared on the affected part of the skin. Elsewhere in Ethiopia the root is used to treat nasal and eye infection in horses and for curing gonorrhea (Menassie Gashaw, 1991); to cure rabies (Getachew Addis *et al*., 2001) and for treatment of gonorrhoea (Bayafers Tammmane, 2000).

Other uses: In study area used to treat water to get ride of worms and snails and for washing clothes.

9. *Rumex nepalensis* Spreng**; Polygonaceae; Temeji (Or.)**

Brief description: A stout, erect, perennial herb, up to 2 m tall, but usually less than 1m tall; Stems green or pale brown; leaves with petiole up to 20 cm long in basal leaves; blade varying in shape from lanceolate to elliptic with length to width ratio varying between 2 and 10; inflorescence a branched, terminal panicle with clusters of flowers hanging down; flowers usually unisexual with varying proportion of male and female ones; nut ovoid 2.5-3 mm long, sharply trigonous, brown and glossy (Hedberg, 2000).

Habitat and Distribution: It is common in disturbed habitats as a weed and in Afroalpine moorlands and grows best in altitudes of 1200-3900 m asl. In Ethiopia found in Tigray, Gonder, Gojam, Welo, Shewa, Arsi, Wellega, Illubabor, Kefa, Gamo Gofa, Bale and Hararge floristic regions. Out side Ethiopia, in Eritrea and through out Africa (Hedberg, 2000).

Medicinal uses: Used to treat stomachache and bleeding due to knife cut or other causes. In treating stomachache, the part of main root (½ the length of the middle finger) is chewed and swallowed. For bleeding, the injured body part is covered with an intact leaf blade. Elsewhere in Ethiopia used to treat colic in livestock (Gemachu Wirtu *et al.,* 1999), as an anti dote for poison (Amare Getahun, 1976) and against liver diseases, Tenea versicolor and evil spirit (Haile Yineger, 2005).

Other uses: In study area it is used as forage to cattle, sheeps and goats.

10. *Senna occidentalis* (L.) Link; **Fabaceae; Atara qamale (Or.)**

Brief description: It is an Erect, some times slightly woody herb, 0.2-2 m high; leaves 10-25 cm long, with a large squat ovoid or globose sessile gland near base of petiole; leaflets (3-) 4-5(-6) pairs, lanceolate to ovote-elliptic, (2.5-) -12x (1.5-) 2-4cm, acute or acuminate, glabrous except for ciliolate margins and inconspicuous scattered glands beneath; flowers with sepals obtuse and petals yellow,

obovate, 0.9-1.5 cm long; seeds many, transversally arranged, grey-brown, ovate circular (Thulin; 1989).

Habitat and distribution: It is found on roadsides and waste places in wooded grassland and near lakes or streams, in altitudes of 500-1700 m asl. In Ethiopia it is found in Afar, Tigray, Welo, Shewa, Hararge, Kefa, Gamo Gofa and Sidamo floristic region (Thulin; 1989). In the study area, it grows in grazing lands, near roadsides, disturbed and eroded areas.

Medicinal uses: Used to treat chest pain in humans. For chest pain, one raw seed is swallowed once a day until the pain ceases. In other parts of Ethiopia, used as painkiller (Thulin, 1989) and against diarrhoea, snake poison, repelling and pain (Mirutse Giday, 1999; Debela Hundie, 2001).

Other uses: It is used as firewood on drying.

11. *Solanum anguivi* Lam.; **Solanaceae; Hiddisare (Or.)**

Brief description: Is herb or shrub up to 2 m high, often less, woody stems up to 1.5 cm in diameter. Most parts armed with straight straw-colour prickles or occasionally unarmed; younger parts with indumentums of stalked stellate hairs; leaves alternate, of comparable size through out the same plant, not clustered; petiole 1-2 cm long; blade ovate or elliptic in out line; corolla stellate, 0.7-1.0 cm in diameter, white some times violet; fruits yellow, orange or red, 0.5-1 cm in diameter (Friis, 2006).

Habitat and Distribution: Common in evergreen bush land and semi-deciduous wood land, along trails in or at edge of lowland and mountain forest, usually a woody plant of waste places, at altitude of 500-2800 m asl. In Ethiopia it is found in Welo, Gondar, Gojam, Wellega, Shewa, Illubabor, Kefa, Hararge and Bale floristic regions (Friis, 2006). In the study area, the plant is found along roadsides, in grazing lands and in coffee plantations.

Medicinal uses: Used to treat tuberculosis in humans. The ground seeds and leaves drunk with tea or coffee once a day for 3-5 weeks. In other parts of Ethiopia reported to be used in treating black leg and external wound infection (Mirutse Giday and Gobana Amani, 2003) and against stomach illness, febrile illness, eczema and cancer (Haile Yineger, 2005).

12. *Vernonia amygdalina* Del.; **Asteraceae; Ebicha (Or.)**

Brief description: It is shrub or small tree usually branched from near the base, 2-10 m high; bark rough, longitudinally fissured; branch stems densely lenticellate; leaves alternate, elliptic, lonceolate or ovate-lanceolate, membranous; florets white to light purple; with corolla densely sessile glandular in lower parts (Mesfin Tadesse, 2004).

Habitat and distribution: - It is found in wide range of bush land, wood land and forest habitat (650-) 1200-3000 m asl in Bale, Welo, Gondar, Gojam, Wellega, Shewa, Illubabor, Kefa, Hararge and Gamo Gofa floristic regions (Mesfin Tadesse, 2004). In the study area, it is common everywhere; near houses, along roadsides, in farm field and in eroded hilly sides.

Medicinal uses: Used to treat flariasis and ascariasis in humans. In treating flariasis, leaves are used as soap to wash the affected skin parts. For ascariasis, extract squeezed from the leaves is drunk (empty stomach) two spoons twice a day for 3 days. Elsewhere in Ethiopia used against menstruation pain, as purgative and vermifuge, in wound dressing and against urinary inflammations (Abbink, 1993; Beentje and Smith, 2000) and against malaria, evil eye and diarrhoea (Debela Hundie, 2001).

Other uses: In the study area, used to wash utensils.

13. *Warburgia ugandensis* Sprague; **Canellaceae; Befti (Or.)**

Brief discription: It is a tree to 30 m tall commonly 10-20 m; bole usually short and straight for 3-5 m; bark brown to blackish, rough, with rectangular scales; inner bark dark pink-red; slash red with fine whitish streaks; sap scanty, sticky; leaves simple, entire, with translucent dots, ovate to oblanceolate, 3-9 x 1.5-3 cm, apex shortly acuminate; petiole narrowly winged, 0.3-0.5 cm long; Flowers green; fruit green; seed compressed yellowish brown (Friis, 1995).

Habitat and Distribution: It grows in transitional montane forest; adjacent woodlands and often-on termite mounds. It grows in altitudinal range of 1400-600 m asl in Bale floristic region (Friis, 1995).

In the study area, it is found in eroded hilly side mixed with *Carissa spinarum, Croton macrostachyus and Kotschya africana.*

Medicinal uses: In the study area it is used to treat malaria, stomachache, and tonsillitis in humans and trypanosomaisis in livestock. For malaria, the bark along with leaf of *Carica papaya* is finely crushed and drunk. In treating stomachache, the bark is chewed and swallowed only at the onset of the problem. In Ethiopia (Bale zone) used to treat malaria (B and D Development 2001) and to cure headache, ear infection and Tinea versicolor (**Kuakucha**) (Ermias Luelkal, 2005).

Other uses: In the study are it is used for live fences, firewood and construction.

4.11 Acquisition and transfer of indigenous knowledge on medicinal plants

Results of this study showed that most of the informants (91%) have acquired the traditional knowledge on medicinal plants and traditional medicine from their parent and/ or close relatives, while 9% have reported that they have gained the knowledge in various ways including trial and error, making certain incentives and favor to the elders (healers) and referring to written materials of traditional medicine. During the discussion, the healers suggested that most of them (77%) have already trained their family and relatives, while 12% of them have a plan to do so in future. Ten percent of the informants suggested that they are volunteer to transfer their knowledge if they get enough incentives from the trainees. Only 1% of the informants were positive to train any member of the community with out compensation. According to most elders and healers, training about medicinal plants and traditional medicine is believed to be effective if done within a family or with a close relative. For them, training any stranger is culturally illegal. The practitioners are not interested to disclose their knowledge on medicinal plants and thus the knowledge and skill concerning these plants are individual secrets and not available to the public (Abbink, 1995). The healers blame beliefs and cultural traditions in which they live not to train strangers. However, the intention to generate an income from the practice could be the big factor taken into consideration.

4.12 Threat to medicinal plants and associated knowledge

4.12.1 Threat to medicinal plants

In the study several factors both human and natural were found to contribute to the threat that affect survival of medicinal plants species in the study area (Table 20). The important factors factors

reported include agricultural expansion, over grazing, extended dry time (season), termite problem, charcoal production and fire wood collection. Agricultural expansion was cited to be the most important factor that threated medicinal plants as seen in the priority ranking (Table 20), scoring 34 of the total scores.

Table 20: Priority ranking factors perceived as threats to medicinal plants based on their level of destructive effects (values 1-7 were given: 1 is the least destructive threat, and 7 is the most destructive threat)

Factors	**Respondents (R_1-R_6)**						**Total**	**Rank**
	R_1	R_2	R_3	R_4	R_5	R_6		
Agriculture	5	7	7	6	5	4	34	1st
Medicinal plant trade	1	5	1	2	2	1	12	6th
Overgrazing	7	1	4	4	3	5	24	2nd
Extended dry time	4	2	4	4	3	5	22	3rd
Termite problem	4	5	3	3	4	3	22	3rd
House hold materials	2	3	2	2	1	2	12	6th
Firewood	6	3	2	2	3	4	20	5th

The rise in coffee and chat price on the market are some of the contributing factors for the expansion of agriculture. Moreover, during the field study it was observed that large number of big trees of *Warburgia ugandensis, Ekebergia capensis Prunus africana and Celtis africana* were removed as the local people prepare the forestlands for agricultural activities.

As shown in Table 20, there is a good agreement among R_4, R_5 & R_6 while there is much disparity between R_1 & R_2. The probable reason for the harmony among R4, R5 & R6 is that they are all elders (60-71 ages) and engaged in similar occupation (all are farmers) in the study area. The fact that R_1 &

R_2 are far different in age (16 & 56, respectively) and education level (Grade 8 & TTI graduate, respectively) could be a factor for much disparity between them.

4.12.2 Threat to indigenous knowledge of medicinal Plants

In the study, several cultural beliefs and traditions were recorded threatening the indigenous knowledge and these are summarized as follows:

- The healers never show the plant or disclose the name of the medicinal plant to their patients. The healers did so because there is a belief that if the patient knows the medicinal plant, the medicine becomes power less in curing the patient.
- In most cases, the elders train their family members about the medicinal plant knowledge and skill in their later ages. At this age, they may be too old to travel to the field to do practical teaching. For example a 76 years old elder, Ato Leta Barkessa, reported "he is now ready to train and transfer to his family members all his knowledge on medicinal plants, but he is too old to walk to the field to train them practically. Maundu (1995), also reported that field walks to older people as a tiring problem.
- A person trained by his family performs a strong oath (Locally, **kaku)** to keep confidentially all the knowledge he obtained on medicinal plants and traditional medicine.
- Although some people know the medicinal plants and the methods to prepare the medicine, they do not exercise the knowledge. This is because they have not received blessing by well-known elder or, as he/she was not from blessed family.

None of these restrictions could be given a scientific justification. However, this appears to be cultural mechanism for restricting the easy emergence of new healer to reduce competition. These restrictions could be dangerous for the sustainability of indigenous knowledge. According to most healers, the intention of making the knowledge and skill about medicinal plants and traditional medicine a secret is to maintain the effectiveness of the medicine. Nevertheless, they know the impact of this tradition on sustainability of indigenous knowledge.

Besides the traditional beliefs, most informants also raised the impact of modernization on indigenous knowledge. They reported that expansion of schools, business works, and health institutions forced the new generation to ignore traditional medicine. In line with this finding, Cunningham (1993) and B and M Development (2001) discussed that religious beliefs, modernization, modification in culture and environmental changes can affect the knowledge of the young generation in using medicinal plants and traditional medicine. The study indicates that there are both indigenous and exotic (modernization) factors to threat the indigenous knowledge.

4.13 Conservation of medicinal plants and indigenous knowledge

In the study area, there are various local beliefs and cultural traditions that contribute to the conservation of medicinal plants and indigenous knowledge. During the field observation, most informants reported that:

- As the part(s) of the medicinal plants is (are) collected, various endeavours are made to save the life of the mother plant. For instance; taking the lateral root without damaging the main root, re soiling and/or transplanting the part (root, stem or leaf) left behind and taking only small portion at a time.

- Some traditional medicines are made only by selected families or tribes in the community. Thus not all healers harvest the medicinal plant. This would reduce the rate of plant exploitation.
- For some ailments such as Tinea versicolor (**Bolale**), once a plant or its part is used as a remedy, there is restriction on a person not to eat and cut the plant any more. However, if a person failed to do so, he/she will develop the disease again. In some cases after the patient is treated for a particular diseases such as hook worm (‘**Sabata Waqayyo’**) and jaundice for example, the patient is made to move around a middle aged *Acacia* tree to get ride off the evil spirits. The patient there after, never cuts the plant (and even never calls up on the name of the plant). This finding shows that the mentioned plant species are being conserved at least by patients treated for these ailments.
- Most plant remedies are only collected on **Cagino** days (Wednesday, Friday and the 5 or 6 Pagume days are locally called **Cagino** days). This is believed to maintain of the efficacy of the remedies. The practice could reduce the rate of harvesting of medicinal plants.
- Traditionally it is illegal to harvest the healthy and reproductive plants in the presence of the deformed and non-fruiting (seeding) plant. Cotton (1996) indicated that beliefs in the local people do have roles in the use and management of plant species. In the present study, although some of the facts presented above lack scientific justifications they contribute a lot to the conservation of medicinal plants.

4.14 Use diversity of medicinal plants

Among the 85 medicinal plants documented in the study area, 67 plant species (78.82%) were reported to have multipurpose roles while 18 of them (21.18%) have a role in medicine (Table 21).

The result of the use diversity (Table 22) indicates that *Acacia brevispica, Albizia schimperiana and Prunus africana* ranked 1st, 2nd and 3rd, respectively for different uses they have in the study area. This finding shows that the local people harvest the medicinal plants of the area mostly for firewood, construction and production of equipment at 1st, 2nd and 3rd, levels, respectively (Table 22).

The utilization of these plants for the top-ranked uses (for fire, construction and equipment) is linked with the daily life activities of the community and the termination of their usage is impossible. In order to have a sustainable utilization of these plants, the best practical solution is to launch conservation measures. This could be done by encouraging the plantation of other trees (non- medicinal plants) using agro forestry practices in degraded areas, in coffee plantations and along roadsides. This would help to reduce the pressure on these medicinal plants considerably. In Cunninghum (1992), it was suggested that natural resources could be utilized best in sustainable way if management practices are complete. In fact such valuable activities requires appropriate action, and changes by the full range of societies and stakeholders involved in the conservation, production and management, marketing processing and use of medicinal plants and their derivatives. Since an action on conservation and sustainable use of medicinal plant need involvement of various sectors and greater public support, it needs a continuous task of creating public awareness (Shankar, 1993).

Table 21: Medicinal role and other main uses of medicinal plants in the study area

Uses	**No. Species**	**%**
Only medicinal role	18	21.18
Medicinal plus other uses (the main uses only)	67	78.82
Edible	11	16.48
Forage	3	4.48
Economic	3	4.48
Life-fence	3	4.48
Spices	4	5.97
Washing 'soap /detergent'	2	2.99
Ritual	2	2.99
Sweat scent	3	4.48
Alcoholic preparation	2	2.99
Girdle lubrication (for baking)	1	1.49
Construction, fuel source,	33	4.48

Table 22: Average score for direct matrix ranking of seven medicinal plants with use diversity. (The use values are from 0-5: 0 = No use, 1 = Least, 2 = Less, 3 = Good, 4 = Very good, 5 = Excellent).

Use	*Olea europaea* subsp. *cuspidata*	*Bersana abyssinica*	*Acacia brevispica*	*Albizia schimperiana*	*Prunus africana*	*Securidaca longepedunclata*	*Entada abyssinica*	TOTAL	RANK
Firewood	3	0	5	5	4	5	5	27	1
Construction	2	5	5	3	3	4	3	25	2
Medicinal	3	2	2	3	5	1	3	19	5
Charcoal	2	0	5	5	3	1	4	20	4
Farm/house fence	2	0	5	4	2	3	2	18	6
Tools	2	5	5	3	5	1	1	22	3
Bee hive hanging	1	2	4	3	2	2	2	16	7
GRAND TOTAL	60	39	180	143	120	68	95		
RANK	6	7	1	2	3	5	4		

5. CONCLUSION

The community level study revealed that health problems caused by evil spirit ('**Seexana**'), spirit of dead ('**Ekera**'), evil eye ('**Buda'**), man made poison ('**Tolcha**'), hook worm (**Sabbata Waaqayyo'**), urine of bat **(Simbira**), infectious eczema ('**Sariiti'**) and rabies ("**Dhibe sare**) can easily be treated locally by indigenous healers.

The area is rich in plant diversity. The overall plant species identified and collected were 211 (52 from home gardens and 168 from the wild, and 9 species were recorded in both areas) of which 85 (40.3%) are medicinal plants. From 52 plant species of the home garden, 30 species (57.7%) are associated with food service, followed by that give medicinal services, 23 species (44.2%) and from 168 plant species of the wild, 62 (37%) are medicinal plants.

In the study area threat comes to medicinal plants due to the utilization of these plants for medicinal purpose is minimal. This is mainly because leaves, which are believed to be less destructive to the mother plant, are the most widely utilized plant parts. The main threat for medicinal plants emanate from agricultural expansion.

Traditional medicine preparation mostly involves single plant; the mode of administration is mainly internal in which oral administration is the common route.

In the study area, 68 ailments were reported (49 for human and 19 for livestock) to be treated by traditional medicinal plants of the area.

As indicated by informants, stomachache, wound and snakebite were the major ailments of humans, and the equivalent problems in livestock were trypanosomaisis, leach infestation and glandular swelling.

Although the area has a good potential for medicinal plants, the marketability and demand of the local people for the traditional medicine is low.

Modernization, modification of culture and increased business work in the area have played a major role in changing the attitude of younger generation to ignore the use of traditional knowledge.

Humans and natural factors are the major threats to plant species in general and to the medicinal plants in particular in the study area. As suggested by most informants, in the area, the human induced threats including agricultural expansion, over grazing and use for construction, and natural factors such as extended dry time and termite problems are cited to be major threats for reduction of medicinal plants.

The existence of diverse cultural traditions and belief system were found to have both useful and harmful impacts on medicinal plants. For instance, some of these beliefs contribute to medicinal plant conservation as they reduce the rate of harvesting of the plants, while others contribute to deterioration of the knowledge on traditional medicine and medicinal plants.

6. RECOMMENDATION

Based on the results of the study, the following recommendations are forwarded:

- Special consideration and all possible endeavours must be made to use the traditional medicine and traditional medicinal plants in the study area.
- The indigenous knowledge and skill of traditional medicine practitioners must be encouraged and protected. This could be the way through which such people could exercise their knowledge boldly.
- Identifying genuinely effective medicinal plants and promoting their production and cultivation. This is a task to be accomplished through genuine collaboration between local administrators and healers.
- Establishing conservation measures strategies to ensure the sustainability of multipurpose and widely used medicinal plants as most medicinal plants are obtained from the wild. This can be achieved by:

  - Encouraging people to grow medicinal plants in the home gardens, mixing with crops in farmlands and live fences.
  - Promoting the establishment of local botanical garden starting at least at the Woreda level.

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8. APPENDICES

Appendix 1: List of key informants in the study area

S. No.	Name	Sex	Age	Kebele	Education
1.	Abara Kamiso	M	39	Colli	4
2.	Abara Mosisa	M	52	Walo	8
3.	Abebaye Bayisa*	F	48	Gimbi 01	5
4.	Adh Buli Fayisa* ++	F	61	Gimbi 01	8
5.	Aga Bokoju	M	31	Garjo	1
6.	Asefa Kebede*	M	41	Gimbi 02	TTI
7.	Bagala Kitessa	M	44	Gombo	10
8.	Basha Takile	M	39	Lalo usache	8
9.	Benti Hundie * ++	M	56	Gimbi 05	TTI
10.	Benti Tolasa	M	57	Biqilal	No
11.	Biru Dinade	M	45	Siba	
12.	Bulcha Daqa	M	54	Biqilal	No
13.	Bulcha Tafara* ++	M	23	L/usache	10
14.	Bultum Bisho* ++	M	78	C/Gorgis	No
15.	Dabala Gose	M	66	Cuta	No
16.	Dafie Dina*	F	43	Cuta	No
17.	Daniel Dabala	M	40	Cuta	5
18.	Daniel Taye* ++	M	16	C/Gorgis	8
19.	Eba Galgal	M	29	Biqilal	No
20.	Fanos Girma	M	18	Lalisa	9
21.	Fantahun Ksa* ++	M	35	Gimbi 01	3
22.	Fola Gabree	M	71	Cuta	No
23.	Fufa Imana	M	48	Dalati	10
24.	Gabayeu Gichile* ++	M	69	Biqilal	No
25.	Geremew Wakene*	M	27	C/Gorgis	12
26.	Girma Efa	M	38	Garjo	No
27.	Hailu Dhaba*	M	68	C/Gorgis	No
28.	Hambisa Irana	M	51	Gimbi 03	No
29.	Irkata Boru	M	54	Lalo usache	3
30.	Irpho Dafa	M	35	Cuta	5
31.	Jije Jirata	F	43	Gombo	No
32.	Kajela Shishi	M	61	Lalo usache	2
33.	Kebeta Lata* ++	M	18	Biqilal	10
34.	Lami Tesgera	M	62	Gimbi 02	10
35.	Leqe Gaja	F	34	Sariti	4
36.	Leta Gelata* ++	M	76	Biqilal	No
37.	Mamo Shifera	M	38	Homa	3
38.	Mengesha Ayana* ++	M	48	L/Usache	12
39.	Mohammed Siraj* ++	M	39	Gimbi 02	4
40.	Shakane Gilo	F	41	Walo	No
41.	Silashi Efrem*	M	38	L/usache	11
42.	Soyya Kajela	M	41	Sariti	6
43.	Tadesse Gudina*	M	69	Sariti yesus	No
44.	Tafari Etana	M	54	Qaki	No
45.	Tafari Kitila*	M	36	Qaki	No
46.	Temesgen Mitiku	M	49	Sariti	12
47.	Ume Raga	F	36	Colli	No
48.	Wakjira Hambisa	M	21	Sibba	8
49.	Wakjira Wolde	M	19	Warrasayyo	7
50.	Yeshimbet Geleta* ++	F	70	C/Micha'el	No

* Key informants; ++ Traditional healers.

Appendix 2: Checklist of Questions or Items used as a Basis for Discussion and Interview

1. Information on respondents: name, age, occupation, - - - -
2. Local name of the medicinal plant
3. Habitat of the plant-where it grows in the study area.
4. Habit of the plant: tree, shrub,
5. Size of the plant.
6. Use of the plant.
7. Part/parts of the medicinal plant collected for medicinal use.
8. Preparation of remedy: detailed account.
9. Amount used (dose)
10. Any noticeable side effect (Adverse effect) caused by the medicine (if any)
11. Does the dose differ among males, females, children, and elders? Is/are there antidotes for adverse effects?
12. Are there conditions that forbid taking the medicine such as pregnancy and others?
13. How is the medicinal plant (s) preserved (if any)?
13. Are there members of the community who frequently use the medicinal plant
14. Are there economic groups who mostly or occasionally use these medicinal plants?
15. Are there regimens in the use of medicinal plants?
16. Is (are) the medicinal plants(s) marketable?
    A) Which age group? B) Which plant species? C) Source? D) Benefits?

17. How is the knowledge passed from elders to younger in the study area?
18. How does modernization interfere with traditional medicinal system?
19. Are there threats to the medicinal plants?
20. Are there traditional medicinal plants conservation methods in the area?
21. Include the management practices by indigenous people.
22. Is the plant currentlycultivated in the study area?
23. Are there taboos in the utilization of some medicinal plants in the locality?
24. Information on edibility and other uses of the plant besides its medicinal uses/value.
25. What are reciprocal impacts of plant-human interactions?
26. Concepts on the health and treating strategies in the area

Appendix 3: List of plant species in home gardens

C. No.	Plant species	Local name (Or.)	Family	Ht	Use
46	*Allium sativum* L.	Qulubi -Adi	Alliaceae	H	Se, M
183	*Annona squamosa* L.	Gishxa	Annonaceae	S	F
50	*Artemisia abyssinica* Sch.Bip. ex A.Rich.	Qoddo	Asteraceae	H	Se, M
184	*Brassica carinata* A. Br.	Raafuu	Brassicaceae	H	F
185	*Brassica oleracea* L.	Raafuu	Brassicaceae		F
186	*Capsicum annuum* L.	Miximixa	Solanaceae	H	Se
43	*Carica papaya* L.	Papayya	Caricaceae	T	F, M
95	*Catha edulis* (Vahl) Forssk. ex Endl.	Jimaa	Celastraceae	S	Ci, M, St
64	*Caylusea abyssinica (*Fresen.) Fisch. & Mey. **	Reenci	Resedaceae	H	F, M
187	*Citrus limon* (L.) Burm.f.	Loomi	Rutaceae	S	F
188	*Citrus medica* L.	Trungo	Rutaceae	S	F
189	*Citrus sinensis* (L.) Osb.	Burtukaana	Rutaceae	S	F
190	*Coccinia abyssinica* (Lam) Cong.	Ancootee	Cucurbitaceae	H	F
82	*Coffea arabica* L. *	Buna	Rubiaceae	S	Ci, M, St
94	*Colocasia esculenta* (L.) Schott	Goodarre	Araceae	H	F, M
190	*Cucurbita pepo* L.	Buqqee	Cucurbitaceae	Tr	F
193	*Daucus carota* L.	Kaaroti	Apiaceae	H	F
191	*Dioscorea praehensilis* Benth.	Qocco	Dioscoreaceae	V	F
192	*Dovyalis abyssinica* (A. Rich.) Warb	Akuku	Flacourtiaceae	S	Fn, O
80	*Dracaena steudneri* Engl. *	Afarfartu	Dracaenaceae	H	R, M, Sr, O
199	*Euphorbia pulcherrima* (R. Grah.) Willd.	Ababa	Euphorbiaceae	S	Or
124	*Ensete ventricosum* (Welw.) Cheesman *	Warqqe	Musaceae	H	Sd, R, O
16	*Glinus lotoides* L. *	Waggarti	Aizoaceae	H	M
198	*Glycine max (*L.) Merr.	Atara	Fabaceae	S	F
197	*Gossypium barbadense* L.	Jirbi	Malvaceae	S	Cl, Ci,
196	*Helianthus annuus* L.	Suufii	Asteraceae	H	F,Ci
194	*Ipomoea batatas* L.	Loloyi	Convolvulaceae	C	F,Ci
13	*Justicia schimperiana* (Hochst.ex Nees) T. Anders *	Dhumuuga	Acanthaceae	S	Fn
73	*Luffa cylindrica* (L.) M.J. Roem.	Hdhoftu	Cucurbitaceae Solanaceae	H	Hm, M
195	*Lycopersicon esculentum* Mill	Timaatimi	Solanaceae	H	F

Appendix 3: (continued---)

04	*Nicotiana tabacum* L.	Tambo	Solanaceae	H	Ci, M
193	*Mangifera indica* L.	Mango	Anacardiaceae	T	F, Sd, Ci
151	*Musa paradisiaca* L. *	Muusi	Musaceae	H	F, Sd
191	*Ocimum basilicum* L.	Bassobila	Lamiaceae	H	Se, M
02	*Ocimum lamiifolium* Benth.	Damakase	Lamiaceae	H	Se, M
37	*Otostegia tomentosa* A.Rich	Tunjuuti	Lamiaceae	S	Fn, M
200	*Persea americana* Mill.	Abokaado	Lauraceae	T	F,Ci, Sd
201	*Phaseolus lunatus* L.	Abba-cooma	Fabaceae	V	F
203	*Phaseolus vulgaris* L.	Lojo	Fabaceae	V	F
67	*Plectranthus edulis* Vatke	Dinnicha-Oromo	Lamiaceae	H	F, M
96	*Prunus persica* (L.) Batsch	Kookii	Rosaceae	S	F, M
202	*Punica granatum* L.	Romanii	Punicaceae	S	F
21	*Rhamnus prinoides* L'Herit. *	Geesho	Rhamnaceae	S	Ap, M
62	*Ricinus communis* L. *	Qobbo	Euphorbiaceae	S	Ci, M
78	*Ruta chalepensis* L.	Ciladami	Rutaceae	H	M, Se
204	*Saccharum officinarum* L.	Shunkoora	Poaceae	H	F, Ci
205	*Sorghum vulgare Pers.*	Agada	Poaceae	H	F
206	*Solanum tuberosum* L.	Dinicha	Solanaceae	H	F
27	*Vernonia amygdalina* Del. *	Eebicha	Asteraceae	S	Uw, M
39	*Vigna unguiculata* L.	Eepho	Fabaceae	V	F, M
207	*Zea mays* L.	Boqqolo	Poaceae	H	F,Ci
25	*Zingiber officinale* Roscoe	Jijibila	Zingiberaceae	H	F, M

Ht = Habit; C= Climber; H = Herb; T= Tree; S = Shrub; Tr =Trail; V= Vine

F= Food; Se =Spice; C1= Cash income; O= other; or = Ornamental; Sd= Shade

M= Medicine; Sr = Spritual role; Fn = fence; Uw = Utensil wash; R = Roofing;

Hm = House hold material; Ap = Alchole preparation; Cl = Clothing; St = Stimulant

* Plant species recorded in both home gardens and wild.

** The only species recorded as a weed in the home gardens.

Appendix 4: List of plant species in the wild

Plant species	**Local name (Or.)**	**Family**	**Habit**	**C.No**
Acacia abyssinica Hochst. ex Benth.	Laafto	Fabaceae	T	ET 028
Acacia brevispica Harms	Laafto	Fabaceae	T	ET 031
Acacia tortilis (Forssk.) Hayne	Laafto	Fabaceae	T	ET 033
Acanthospermum hispidum DC.	*	Asteraceae	H	ET063
Acanthus pubescens (Oliv.) Engl.	Kosorru	Acanthaceae	S	ET 085
Achyranthes aspera Lam.	Dargu	Amaranthaceae	H	ET 066
Aframomum corrorima (Braun) Jansen	Ogiyo	Zingiberaceae	H	ET 069
Albizia schimperiana Oliv.	Muka-arba	Fabaceae	T	ET 076
Aloe macrocarpa Tod.	Arkis	Aloaceae	H	ET 051
Amaranthus caudatus L.	Iyyaaso	Amaranthaceae	H	ET 081
Amaranthus spinosus L.	*	Amaranthaceae	H	ET 084
Amorphophallus abyssinicus (A. Rich.) N.E. Br.	Qicu	Araceae	H	ET 074
Asparagus africanus Lam.	Sariiti	Asparagaceae	H	ET 044
Asplenium monanthes L.	*	Aspleniaceae	H	ET 086
Bersama abyssinica Fresen.	Lolciisa	Melianthaceae	S	ET 092
Bidens biternata (Lour.) Merr.& Sherff	Qamate Keelo	Asteraceae	H	ET 093
Bidens ghedoensis Mesfin	Keelo	Asteraceae	H	ET 097
Bridelia micrantha (Hochst.) Baill.	Galaano	Euphorbiaceae	T	ET 098
Brucea antidysenterica J.F. Mill.	Qomanyo	Simaroubaceae	S	ET 055
Buddleja polystachya Fresen.	Anfaaree	Loganiaceae	S	ET 059
Caesalpinia decapetala (Roth) Alston	Harangama	Fabaceae	C	ET 098
Calpurnia aurea (Ait.) Benth.	Ceeqa	Fabaceae	S	ET 001
Capparis erythrocarpos Isert	Harangama	Capparidaceae	S	ET 042
Cardus leptacanthus Fresen.	Araba Dubarti	Asteraceae	H	ET 022
Carissa spinarum L.	Agamsa	Apocynaceae	S	ET 032
Senna didymobotarya Fresen.	Kishkishi	Fabaceae	S	ET 026
Cassia petersiana Bolle	Raamso	Fabaceae	S	ET 045
Celtis africana Burm.f.	Ce'yi	Ulmaceae	T	ET 099
Centella asiatica (L.) Urban.	*	Apiaceae	H	ET 100
Cirsium vulgare (Savi.) Ten.	Dicho	Asteraceae	H	ET 101
Clausena anisata Willd. Hook.f. ex Benth.	Ulumayi	Rutaceae	S	ET 002
Clematis simensis Fresen.	Fiiti	Ranunculaceae	C	ET 008
Clerodendrum myricoides (Hochst.) Vatke	Marariisa	Lamiaceae	S	ET 103
Coffea arabica L.	Buna	Rubiaceae	S	ET 082
Combretum molle R. Br. ex G. Don	Dhabaqqa	Combretaceae	T	ET 104
Combretum paniculatum Vent.	Baggi	Combretaceae	S	ET 003
Commelina benghalensis L.	*	Commelinaceae	H	ET 105
Cordia africana Lam.	Waddessa	Boraginaceae	T	ET 106
Crotalaria goreensis Guill. & Perr.	*	Fabaceae	H	ET 107
Crotalaria incana L.	*	Fabaceae	H	ET 108
Crotalaria pallida Ait.	Atara Qmalee	Fabaceae	H	ET 109
Crotalaria spinosa Hochst. ex Benth.	*	Fabaceae	H	ET 110
Croton macrostachyus Del.	Bakkanniisa	Euphorbiaceae	T	ET 071

Appendix 4: (Continued---)

Cyathula uncinulata (Schrad.) Schinz	Qamate	Amaranthaceae	H	ET 112
Cynodon dactylon (L.) Pers.	Coqorsa	Poaceae	H	ET 057
Cynoglossum amplifolium Hochst. ex DC.	Qoricha bowu	Boraginaceae	H	ET 113
Cyperus digitatus Roxb.	Caffee	Cyperaceae	H	ET 115
Cyperus longus L.	Qunni	Cyperaceae	H	ET 111
Cyperus richardii Steud.	Qunni	Cyperaceae	H	ET 117
Cyphostemma cyphopetalum (Fresen.) Descoing ex Wild & Drummond.	Hidda reeffa	Vitaceae	C	ET 060
Datura stramonium L.	Asaangira	Solanaceae	H	ET 020
Dioscorea schimperiana Hochst. ex A.Rich.	Qoccine	Dioscoreaceae	V	ET 114
Diplolophium africanum Turcz.	*	Apiaceae	H	ET 116
Dombeya quinqueseta (Del.) Exell.	Adaannisa	Sterculiaceae	T	ET 118
Dracaena steudneri Engler	Afarfartu	Dracaenaceae	T	ET 080
Drymaria cordata (L.) Schltes	Qoricha dhiito	Caryophyllaceae	H	ET 120
Echinochloa pyramidalis (Lam.) Hitchc. & Chase	*	Poaceae	H	ET 119
Echinops kebericho Mesfin	Qabaricho	Asteraceae	H	ET 052
Echinops longisetus A.Rich.	Mata-bokke	Asteraceae	H	ET 122
Ehretia cymosa Thonn.	Ulaaga	Boraginaceae	T	ET 005
Ekebergia capensis Sparm.	Sombo	Meliaceae	T	ET 018
Eleusine jaegeri Pilg.	Coqorsa	Poaceae	H	ET 121
Englerina woodfordioides (Schweinf.) M.Gilbert	Dhertu Bakkaniisa	Loranthaceae	EP	ET 125
Ensete ventricosum (Welw.) Cheesman	Warqe	Musaceae	H	ET 124
Entada abyssinica (Steud. ex A. Rich.) Gilb. and Bout.	Ambalta	Fabaceae	T	ET 0 29
Eragrostis paniciformis (A.Br.) Steud.	Marga	Poaceae	H	ET 123
Eriosema scioanum Avetta	*	Fabaceae	H	ET 126
Erythrina brucei Schweinf.	Waleensu	Fabaceae	T	ET 129
Ethulia gracilis Del.	*	Asteraceae	H	ET 127
Eucalyptus tereticornis Smith.	Bargamo-diima	Myrtaceae	T	ET 130
Eucalyptus citriodora Hook.	Bargamo-adi	Myrtaceae	T	ET 090
Euphorbia tirucalli L.	Caada	Euphorbiaceae	S	ET 083
Euphorbia candelabrum Kostshy	Adaami	Euphorbiaceae	T	ET 056
Ficus exasperata Vahl	Baalan-soofi	Moraceae	T	ET 079
Ficus ovata Vahl	Dambi	Moraceae	T	ET 132
Ficus sur Forssk.	Arbu	Moraceae	T	ET 128
Ficus sycomorus L.	Oda	Moraceae	T	ET 131
Ficus vasta Forssk.	Qilxu	Moraceae	T	ET 088
Flacourtia indica (Burm.f.) Merr.	Akuuku	Flacourtiaceae	T	ET 019
Gardenia ternifolia Schumach & Thonn.	Gambeela	Rubiaceae	T	ET 136
Gastridium phleoides (Nees & Meyen) C.E. Hubb.	Adooye	Poaceae	H	ET 135
Glinus lotoides L.	Waggarti	Aizoaceae	H	ET 016
Gouania longistipitata Engl.	*	Rhamnaceae	S	ET 135
Grewia ferruginea Hochst.ex A.Rich.	Dhoqonu	Tiliaceae	S	ET 011
Guizotia scabra (Vis.) Chiov.	Hada	Asteraceae	H	ET 023
Guizotia schimperi Sch. Bip.ex Walp.	Tuufo	Asteraceae	H	ET 134

Appendix 4: (Continued---)

Heteropogon contortus (L.) Roem. & Schult.	Marga	Poaceae	H	ET 133
Hibiscus flavi folius Ulbar.	Hincinni	Malvaceae	H	ET 139
Hibiscus macranthus Hochst. ex A.Rich.	Hincinni	Malvaceae	H	ET 138
Hygrophila auriculata (Schum.) Heine	Baalan-waraante	Acanthaceae	H	ET 140
Hyparrhenia rufa (Nees) Stapf	Daggala	Poaceae	H	ET 137
Indigofera arrecta Hochst. ex Benth.	*	Fabaceae	H	ET 146
Indigofera emarginella Steud. ex A. Rich.	*	Fabaceae	H	ET 143
Indigofera suaveolens Jaub.& Spach	*	Fabaceae	H	ET 144
Justicia schimperiana (Hochst. ex Nees) T. Anders	Dhumuuga	Acanthaceae	S	ET 013
Keetia gueinzii (Sond.) Bridson	*	Rubiaceae	S	ET 145
Kotschya africana Endl.	Heenna	Fabaceae	S	ET 141
*Laggera alata (*D.Don) Sch. Big. ex Oliv.	*	Asteraceae	S	ET 142
Lantana camara L.	Hamarreessa	Verbenaceae	S	ET 150
Leucas martinicensis (Jacq.) R. Br.	*	Lamiaceae	H	ET 147
Lippia javanica Burm.f.	Kusaaye	Verbenaceae	H	ET 091
Maesa lanceolata Forssk.	Abayi	Myrsinaceae	S	ET 036
Malva verticillata L.	Hincinni	Malvaceae	H	ET 149
Melia azedarach L.	Niimi	Meliaceae	T	ET 075
Millettia ferruginea (Hochst.) Bak.	Sootallo	Fabaceae	T	ET 038
Mimusops laurifolia (Forssk.) Friis	Qawwisa	Sapotaceae	T	ET 148
Momordica foetida Schumach & Thonn.	Umba'o	Cucurbitaceae	C	ET 041
Mukia maderaspalana (L.) M.J.Roem	Siggo	Cucurbitaceae	Tr.	ET 154
Musa paradisiaca L.	Muusi	Musaceae	H	ET 151
Nicandra physaloides (L.) Gaertn.	Manjji	Solanaceae	H	ET 153
Nuxia congesta R.Br. ex Fresen.	Qawwisa	Loganiaceae	T	ET 152
Ocimum gratissimum L.	Anccabi	Lamiaceae	S	ET 072
Olea europaea L. subsp. *cuspidata (* Wall. ex G. Don) Cif.	Ejersa	Oleaceae	T	ET 054
Otostegia tomentosa A. Rich.	Tunjuti	Lamiaceae	S	ET 037
Panicum monticola Hook.f.	Marga-Gogorri	Poaceae	H	ET 157
Pavetta gardeniifolia A. Rich.	*	Rubiaceae	S	ET 155
Pavonia procumbens (Wight & Arn.) Walp.	Doobi	Malvaceae	H	ET 024
Pennisetum schimperi A.Rich.	Migira	Poaceae	H	ET 159
Phoenix reclinata Jacq.	Meexxi	Arecaceae	T	ET 156
Phytolacca dodecandra L'Herit.	Andoode	Phytolaccaceae	S	ET 158
Piper capense L.f.	Tunjjo	Piperaceae	S	ET 006
Plantago lanceolata L.	Qorxobi	Plantaginaceae	H	ET 030
Platostoma rotundifilium Briq.	*	Lamiaceae	H	ET 161
Podocarpus falcatus (Thunb.) Mirb. **	Birbirsa	Podocarpaceae	T	-
Premna schimperi Engl.	Urgeessa	Lamiaceae	T	ET 061
Prunus africana (Hook. f.) Kalkam	Oomi	Rosaceae	T	ET 058
Psidium guajava L.	Roqa	Myrtaceae	S	ET 009
Rhamnus prinordes L'Herit.	Geesho	Rhamnaceae	S	ET 021

Appendix 4: (Continued---)

Rhus ruspolii Engl.	*	Anacardiaceae	S	ET 169
Rhus vulgaris Meikle	*	Anacardiaceae	S	ET 168
Ricinus communis L.	Qobo	Euphorbiaceae	S	ET 062
*Rothmannia urceliiformiis (*Hiern.) Robyns	Bururi	Rubiaceae	S	ET 162
Rubus apetalus Poir.	Gora	Rosaceae	S	ET 010
Rubus steudneri Shweinf.	Gora	Rosaceae	S	ET 167
Rumex abyssinicus Jacq.	Dhangago	Polygonaceae	H	ET 077
Rumex nepalensis Spreng	Timiji	Polygonaceae	H	ET 015
Rytigynia neglecta (Hiern.) Robyns	Mixo	Rubiaceae	S	ET 165
Salix subserrata Willd.	Alaltu	Salicaceae	T	ET 035
Sapium ellipticum (Krauss) Pax	Bosoqa	Euphorbiaceae	T	ET 166
Schefflera abyssinica (Hochst. ex A.Rich.) Harms	Gatamaa	Araliaceae	T	ET 163
Schinus molle L.	Qunda-barbare	Anacardiaceae	T	ET 034
Securidaca longepedunclata Fresen.	Ameera	Polygalaceae	T	ET 068
Senna occidentalis (L.) Link	Atara-Qamale	Fabaceae	S	ET 053
Sida rhombifolia L.	Karaabi	Malvaceae	H	ET 087
Sida schimperiana Hochst.ex A.Rich.	Karaabi	Malvaceae	H	ET 164
Snowdenia polystachya (Fresen.) Pilg.	Muuja	Poaceae	H	ET 170
Solanum anguivi Lam.	Hiddi-Sare	Solanaceae	H	ET 048
Solanum marginatum L.f.	Hiddi-Warabessa	Solanaceae	S	ET 007
Sonchus bipontini Asch.	*	Asteraceae	H	ET 171
*Spermacoce sphaerostigma (*A.Rich.) vatke	*	Rubiaceae	H	ET 172
Sporobulos pyramidalis P.Beauv.	Muri	Poaceae	H	ET 173
Stereospermum kunthianum Cham.	Botoro	Bignoniaceae	H	ET 047
Syzygium guineense (Willd.) DC.	Baddeessa	Myrtaceae	T	ET 173
Terminalia macroptera Guill &Perr.	Diimo	Combretaceae	T	ET 174
Thalictrum rhynchocarpum Dill. & A. Rich	Faca'a	Ranunculaceae	H	ET 049
Trifolium multinerve A.Rich.	Siddisa	Fabaceae	H	ET 175
Triumfetta rhomboidea Jacq.	*	Tiliaceae	H	ET 176
Urtica simensis Steud.	Gurgubbe	Urticaceae	H	ET 014
Vangueria apiculata K.Schum.	Bururi	Rubiaceae	S	ET 177
Verbena officinalis L.	Atuchi	Verbenaceae	H	ET 017
Vernonia adoensis Sch. bip. ex Walp.	Sooyyama	Asteraceae	S	ET 178
Vernonia amygdalina Del.	Eebicha	Asteraceae	S	ET 027
Vernonia auriculifera Hiern.	Reeji	Asteraceae	S	ET 070
Vernonia brachycalyx O.Hoffm.	Sooyyama	Asteraceae	S	ET 179
Vernonia filigera Oliv.& Hiern.	Sooyyama	Asteraceae	S	ET 180
Vernonia ruppellii Sch. Bip. ex Walp.	Sooyyama	Asteraceae	S	ET 181
Viscum tuberculatum A.Rich.	Dheertu-Bosoqa	Viscaceae	EP	ET 182
Warburgia ugandensis Sprague	Biifti	Canellaceae	T	ET 065

C= Climber; H = Herb; T= Tree; S = Shrub; Tr =Trailing; V= Vine; ET= Etana Tolasa

*No local name used in the area **Specimen not collected for identification

C. No. = Collection number

S. No.	Scientific name	Family	Local name	Ht	Plant Part used	Used for	Ailment type	System of Preparation, Application and Dosage
1	*Acacia brevispica* Harms	Fabaceae	Lafto	T	Root Bark	 Hu	Stomachache Snakebite	One teaspoon of powdered bark is taken with tea every day for 3days. The root ground together with root of *Guizotia scabra* and *Ficus vasta*. Then mixed with finely crushed leaf of *Nicotiana tabacum* and taken orally; 2-3 spoons once a day for 2 days.
2	*Acanthus pubescens* (Oliv.) Engl.	Acanthaceae	Kosorru	S	Sap	Hu	Tinea corporis (Balale)	The affected area is massaged by mixture of the sap from shoot tip with latex of *Croton macrostachyus* daily until the sign of the problem disappears.
3	*Albizia schimperiana* Oliv.	Fabaceae	Mukrba	T	Bark	Hu	Stomach ache	1-2 inch of inner bark is chewed only at the time of illness.
4	*Allium sativum* L.	Alliaceae	Qulubi adi	H	Stem /Sap	Hu LS	Body itching Bloat	2-3 bulbs grind up along with equal amount *of Zingiber officinale* and chewed once a day or Rubbing the affected area by the mixture. The bulb (10-15 in number) pounded together with bark of *Melia azendarach* and *Dracaena steudneri* and given twice a day for 3 -5 days.
5	*Aloe macrocarpa* Tod.	Aloaceae	Arkis	H	Latex	Hu	Fire burn Abdominal pain, Hook worm	Covering the burned area by the latex of the young leaf, and repeating every 2 days until it dries. The latex mixed with pounded bulbs of *Allium sativum* and taken in to empty stomach for 7 days; every other day.

6	*Amorphophallus abyssinicus* (A. Rich.) N.E. Br.	Araceae	Qicu	H	Root	LS LS	Diarrhoea Swelled gland	Crushed root mixed in the boiled water and given daily in a big water cup for few days. Warming the root before fire and holding in close contact with affected area every night for several weeks.
7	*Artemisia abyssinica* Sch., Bip. ex A.Rich.	Asteraceae	Qoddo	H	Leaf	HL	Tracoma Rabies	The leaf is pounded and sieved to rinse the inner eye by the filtrate trice a day. Leaf is ground in small water and given to the victim every morning for 3 days in small 'areqe' glass (**Kenneeraa)**
8	*Asparagus africanus* Lam.	Asparagaceae	Sariti	H	Root	Hu	Impotency	The root together with roots of *Premna schimperi* and *Olea europaea* pounded and given to the victim with one cup of tella 2-3 hrs before sexual works.
9	*Bersama abyssinica* Fresen.	Melianthaceae	Lolchisa	S	Stem Leaf	Hu	Rheumatic Ascariasis	Warming the leaf before fire and holding on affected area. Stem tips chopped in to 4-5 pieces (each 1 inch), cooked with bean seed and eaten in empty stomach every morning for 2 consecutive days.
10	*Brucea antidysenterica* J.F. Mill.	Simaroubaceae	Qomoyno	S	Root Leaf	Hu	Malaria Rheumatic	Taking one raw seed every month for prevention. The leaf warmed on fire and applied to the affected area every night.
11	*Buddleja polystachya* Fresen.	Loganiaceae	Anfare	S	Leaf	HL	Eye infection	The leaf is ground in to fine; the Juice is extracted and applied to the eye in drops, at night times.
12	*Calpurnia aurea* (Ait.) Benth.	Fabaceae	Ceeqa	S	Leaf	HL HL	Skin rash Ecto-parasite	The leaf infusion is used to wash the affected body daily for a week. The leaf is ground along with barks of *Millettia ferruginea* and sprayed on the area of problem (body, cloth. room, bed).

13	*Capparis erythrocarpus* Isert	Cappridaceae	Arengama	S	Root	LS Hu	Leach Headache	The leaf infusion is given in to nose or mouth of the cattle. The root (1-2 inch) ground finely, enclosed in to thin cloth and smelled vigorously only once as the ache starts.
14	Senna didymobotrya (Fresen.) Irwin & Barneby	Fabaceae	Kishkishi	S	Leaf Root	Hu Hu	Snake bite Elephantiasis	The root (1-inch) is crushed, homogenized in water and drunk immediately after infection. The leaf is soaked in to hot water and used to wash the swell, or simply massaging the swell every night.
15	*Senna petersiana* (Bolle) Lock	Fabaceae	Ramso	S	Leaf	Hu	Hepatitis	The healer lightly touched or flogged the patient 5-7 times by the leaves. Then, the same leaves are steeped in water over night and used to wash the body for 3 days.
16	*Carissa spinarum* L.	Apocynaceae	Agamsa	S	Seed Root	Hu	Ascaris Evil eye	The seed (20-30 in number) cooked and eaten early in the morning to the empty stomach; only once. The patient inhales the root burned in fire and the smoke.
17	*Carduus leptacanthus* Fresen.	Asteraceae	Araba dubarti	H	Root	Ls	Black leg	The root is ground along with tip shoots of *Cordia africana and Thalictrum rhynchocarpum* in water, & given to the cattle in problem, for 5-7 days.
18	*Carica papaya* L.	Caricaceae	Papaya	T	Seed Leaf Root	Hu	Malaria Contraceptive Hepatitis	The leaf is crushed, rolled in paper and smoked by patient. Eating over dose of seeds only once. The seed crushed and taken with tea trice a week.
19	*Catha edulis (Vahl)* Forssk. ex Endl.	Celastraceae	Cati	S	Leaf Bark	Hu	Anti-worm	The leaf crushed together with bark, eventually chewed and swallowed-up.
20	*Caylusea abyssinica (*Fresen.) Fisch. & Mey.	Resedaceae	Reenci	H	Leaf Root	Hu Hu	Scabies (cito) Impotency	The leaf/root infusion is used to wash the affected area and all the clothes that have been used by the patient. Drinking the powdered root with water and /or using it for toothbrush daily.

22	*Colocasia esculenta* (L.) Schott	Araceae	Godarre	H	Leaf	LS	Leech infestation	The leaf or root infusion is added in to the affected cavity (oral, nasal) until the leech expelled.
23	*Combretum paniculatum* Vent.	Combretaceae	Baggi	C	Sap	HL	Eye infection	Adding 2-3 drops of stem sap in to the affected eye once a day.
24	*Coffea arabica* L.	Rubiaceae	Buna	S	Seed	Hu	Diarrhea	The roasted, powdered seed is eaten or drunk in to empty stomach for 2-3 days.
25	*Croton macrostachyus* Del.	Euphorbiaceae	Bakkanisa	T	Leaf	Hu	Hook worm Tinea corporis (robi)	The tips shoot with tip shoot of *Justicia schimperiana* powdered and baked with bread and eaten as a break fast for a week. The latex from young tip is collected and applied in thick to the affected area every Wednesday and Friday.
26	*Cyphostemma cyphopetalum* Fresen.	Vitaceae	Hida-reffa	C	Root	Hu LS	Tinea versicolor (Balale)	The root is ground along with root of *Rumex abyssinicus* and rubbed over the affected area in strong sunlight.
27	*Datura stramonium* L.	Solanaceae	Manji	H	Leaf	Hu	Wound Cough	The leaf is pounded and applied (put) on affected area once a day for 2-5 days. The leaves (near the middle) pounded along with bread, made in to paste and eaten once a day for a week.
28	*Dracaena steudneri* Engl.	Dracaenaceae	Afanfartu	T	Bark	LS	Trypsis (Gandi)	The root and bark ground in small water, homogenized in it, and given orally with bread once a day for few weeks.
29	*Echinops kebericho* Mesfin	Asteraceae	Qabaricho	H	Root	Hu Hu	Scabies Stomach ache	The root is powdered and painted on the affected area at bedtime. The roots is chewed and swallowed up.

30	*Ekebergia capensis* Sparm.	Meliaceae	Sombo	T	Bark	Ls	Trypsis (Gandi)	The bark is crushed along with roots of *Phytolacca dedocandra* and latex of *Euphorbia candelabrum* and homogenized in water. The preparation is given in water cup once a day for 3 weeks.
31	*Eleusine jagaeri* Pilg.	Poaceae	Coqorsa	H	Whole pant	Hu	Fresh wound	The whole plant is crushed finely and sprayed over the fresh wound every night for some days.
32	*Entada abyssinica* (Steud. ex A. Rich.) Gilb. and Bout.	Fabaceae	Ambalta	T	Bark	Hu	Malaria	The bark ground along with rhizome of *Z. offiicinale* and bulb of *Allium sativum* and chewed once a day for few months.
33	*Euphorbia condelabrum* Kostshy	Euphorbiaceae	Adami	T	Latex	Hu	Gonorrhea & Ascariasis	Five-seven drops collected, baked with one cup of wheat powder and eaten to the empty stomach for 5 days.
34	*Euphorbia tirucalli* L.	Euphorbiaceae	Cada	S	Latex	Hu	Tinea versicolor (Balale)	The latex is uniformly (in thin) painted on affected area for few days in strong sunlight or near the hot fire.
35	*Ehretia cymosa* Thonn.	Boraginaceae	Ulaga	T	Root Stem	Hu	Stomach ache	The root pounded with young stem tip of *Bersama abyssinica* and taken with tea or both cooked with bean and eaten.
36	*Eucalyptus citriodora* Hook.	Myrtacae	Bargamo adi	T	Leaf Stem	Hu	Influenza	The leaf and immature branches are steeped in boiled water, the smoke inhaled by the patient nasally, during the bed times.
37	*Ficus exasperata* Vahl	Moraceae	Balansofi	T	Leaf, sap	Hu	Warts / eczema	The leaf infusion /sap are used to rub/wash the affected area 2-3 times a day until the wart die (removed).
38	*Ficus vasta* Forssk.	Moraceae	Qilxu	T	Latex	Hu	Snakebite	The root along with roots of *Acacia brevispica* & *Ficus vasta* and bread (block) of *Nicotiana tabacum* ground and served to the victim. One teacup only once.
39	*Flacourtia indica* (Burm.f.) Merr.	Flacourtiaceae	Akuku	S	Bark	Hu	Gonorrhea, Amoeba and Hook worm	The bark ground along with bulb of *Allium sativum*; and tip shoot of *Croton macrostachyus*. Then 3 spoons are taken once a day for 7-10 days.

40	*Glinus lotoides* L.	Aizoaceae	Wagarti	H	Seed	Hu	Tape worm infestation	The seed is pounded together with little salt, made in to paste and eaten early in the morning. The food and water are banned for 6- hours before as well as after medication.
41	*Grewia ferruginea* Hochst. ex A. Rich.	Tiliaceae	Dhoqonu	S	Bark	Hu LS	Red hair Placenta retention	**The leaf or bark is used as soap to wash the hair thoroughly.** The bark is soaked in boiled water and given to the cattle.
42	**Guizotia scabra** (Vis.) Chiov.	Asteraceae	Hada	S	Root	Hu	Snake bite	The root along with root of *Acacia brevispica* and *Ficus vasta* ground in water, boiled and given to the victim. One teacup only once.
43	*Justicia schimperiana* (Hochst.ex Nees) T. Anders	Acanthaceae	Dhumuga	S	Leaf	Hu	Hepatitis. Rabies	The leaf pounded in dry and taken with tea twice a day for 7 days. The leaf together with the root ground in water and given in coffee cup to the patient at last for 4 weeks.
44	*Lipia javanica* Burm.f.	Verbenaceae	Kusye	S	Leaf	HL	Mosquito control	The leaf and stem burned, the smoke keeps away the mosquitoes.
45	*Luffa cylindrical* (L.) M.J. Roem.	Cucurbitaceae	Hadhoftu	V	Fruit	Hu	Rabies	The infusion of inner fruit is taken in small amount.
46	*Maesa lanceolata* Forssk.	Myrsinaceae	Abayi	S	Leaf	Hu	Worms Head ache	The root and bark ground together and taken with boiled coffee/tea twice a day for 5 days. The root (1-2 inch length) chewed at the on set of illness.
47	*Melia azedarach* L.	Meliaceae	Neemi	T	Leaf	Hu LS	Toothache Anthrax	The pounded bark is hold by dressing on affected tooth for a while. The leaf and bark crushed together and given to the cattle in problem for few days; one water cup at a time.
48	*Millettia ferruginea* (Hochst.) Bak.	Fabaceae	Sotallo	T	Leaf	Hu	Tetanus Ants problem	The bark is taken off and rolled on/tied on the affected area. Taking off the bark & putting the bare stick in the camp of the ants.

50	*Nicotiana tabacum* L.	Solanaceae	Tambo	H	Leaf	LS Hu	Leech Snake bite	The leaf is chopped and poured in to nose/mouth of the cattle. The leaf /bark infusion is drunk or swallowing pieces of its bread.
51	*Ocimum gratissimum* L.	Lamiaceae	Ancabi	S	Leaf	Hu	Febrile illness	The leaf in fusion is smelled or the affected body part is massaged by the infusion during the bed times.
52	*Ocimum lamiifolim* Benth.	Lamiaceae	Damakase	H	Leaf	Hu	Pain, head ache	The leaf and immature (soft) stem pounded in water, sifted and the pure liquid is drunk only once.
53	*Olea europaea* L. subsp. *cuspidata* Wall. ex G. Don	Oleaceae	Ejersa	T	Leaf	Hu	Male-impotency	The root together with roots of *Aloe macrocarpa* and *Premna schimperi* pounded in water and given to the victim with tella before bed for few days.
54	*Otostegia tomentosa* A.Rich.	Lamiaceae	Tunjuti	S	Leaf Root	Hu	Febrile illness (**xira**)	The leaf /root infusion is smelled or the leaf is crushed along with root and rubbed over the affected body part once a day.
55	*Pavonia procumbens* (Wight &Arn.) Walp.	Malvaceae	Dobi	H	Root	Hu	Hook worm & Abdominal pain	The root ground along with roots of *Rumex abyssinicus*, *Z. officinale*, and *Allium sativvm*, homogenized in water and taking one teacup every morning for 3 days (Monday, Wednesday & Friday) and eating food is banned for 5 hours.
56	*Phytolacca dodecandra* L'Herit	Phytolaccaceae	Andode	S	Leaf Root	Hu	Scabies, Herpes zoster	The affected body part is washed by the leaf infusion 2-3 times daily.
57	*Piper capense* L.f.	Piperaceae	Tinjo	S	Root	LS	Physically weaken	The roots, seed and leaf pounded together mixed with salt and water. Finally, the preparation is given to the cattle in problem every day for several months.
58	*Plectranthus edulis* Vatke	Lamiaceae	Dinicha Oromo	H	Leaf Root	HL	Antidotes and epilepsy	The leaf and flower ground together, and given to the victim, 2-3 teaspoon twice a day for 2 days.

60	*Psidium gujava* L.	Myrtaceae	Roqa	S	Leaf	Hu	Hemorrhoid	Holding the warmed leaves on affected body part.
61	*Prunus africana* (Hook. f.) Kalkam	Rosaceae	Omi	T	Bark	Hu HL	Giardiasis Wound	The bark (half-length of small finger) is chewed and swallowed; alcoholic drink is banned. The bark is milled and applied to the wound by pinch.
62	*Prunus persica* (L.) Batsch	Rosaceae	Koki	S	Stem Bark	Hu	Tooth ache	The tip shoot bark is warmed before fire and hold on affected tooth for a while.
63	*Premna schimperi Engl.*	Lamiaceae	Urgessa	S	Leaf	HL	Ecto parasite	The stem and leaf burned to fumigate the room or animal cage, so as to disinfect mosquito & flies.
64	*Ricinus communis* L.	Euphorbiaceae	Qobo	S	Leaf Stem	Hu	Swelling, pain in ear	The leaf and stem infusion is made and drunk or dropped in to the ear The leaf is also warmed before fire and put on the swelled gland for a while.
65	*Rhamnus Prinoides* L'Herit.	Rhamnaceae	Gesho	S	Leaf Seed	LS Hu	Bloody urine Tinea versicolor	The leaf ground along with leaf of *Solanum anguivi* and given to the cattle in problem. The seed pounded and applied to the affected area.
66	*Rubus apetalus* Poir.	Rosaceae	Gora	S	Seed	Hu	Pain	The seed (dried) is swallowed once a day for 3 -5 days.
67	*Rumex abyssinicus* Jacq.	Polygonaceae	Dhangago	H	Root	Hu Hu	Wound, Tinea Versicolor Blood pressure	The root is chopped, dried, made in to powder and bandaged/ rubbed to the body part in problem. The root (1-inch) is chewed daily.

69	*Ruta chalepensis* L.	Rutaceae	Ciladami	H	Root	Hu	Abdominal pain, Stomach ache	The root ground along with rhizome of *Z. officinale* and bulb of *Allium Sativum* and drunken with coffee or tea in empty stomach every morning for 5-7 days.
70	*Salix subserrata* Willd.	Salicaceae	Alaltu	T	Stem Leaf	LS	Joint dislocation, physical worsening	The leaf ground along with immature stem, mixed with bread and given to the cattle in problem.
71	*Schinus molle* L.	Anacardiaceae	Qudabarbare	T	Seed	Hu	Tonsillitis	The seed along with piece of *Z. officinale* chewed slowly for a while. Eventually the whole thing is swallowed.
72	*Securidaca longepedunculata* Fresen.	Polygalaceae	Amera	T	Bark	Hu LS	Gonorrhea Anthrax	The leaf ground in water, boiled with salt. Then 1 spoon is served twice a day for 3- 5 days. The bark crushed with leaf of *Melia azedarach* and given to the cattle daily 10 days.
73 74	*Senna occidentalis* (L.) Link *Sida rhombifolia* L.	Fabaceae Malvaceae	Atra Qamale Karabi	S S	Seed Leaf Leaf	Hu LS HL	Chest pain Skin rash Wound	The intact seed swallowed once a day for few days. The leaf infusion is used to wash the body. The leaf finely crushed and sprayed on the wound.
75	*Solanum marginatum* L.f.	Solanaceae	Hidi Warabesa	S	Fruit	Hu LS	Tooth ache Coughing	The fruit sap is applied on affected tooth drop by drop. The intact fruit is given orally, one fruit daily.
76	*Solanum anguivi* Lam.	Solanaceae	Hidi Sare	S	Seed Leaf	Hu	Tuberculosis	The seed & leaf ground together and taken with honey every morning for several months.
77	*Stereospermum kunthianum* Cham.	Bignoniaceae	Botoro	T	Stem	Hu	Tooth ache, stomach ache	The stem is chewed on affected teeth for 5-10 minutes & for stomach problem, the juice is swallowed after chewing the young stem.
78	*Thalictrum rhynchocarpum* Dill. & A.Rich.	Ranunculaceae	Fac'a	H	Root	LS	Trypsis (Gandi)	The root ground along with roots of *C. macrostachyus* and given to the cattle in problem every morning.

79	*Urtica simensis* Steudel	Urticaceae	Gurgube	H	Leaf	Hu	Relapsing fever	The leaf is powdered along with 2-inch inner bark of *Flacourtia indica* and drunk with tea (1 spoon per cup) every day for 5 days.
80	*Verbena officinalis* L.	Verbenacea	Atuchi	H	Root, Whole plant	Hu	Stomach ache	The root is crushed with rhizome of *Z. officinale*, boiled with salt and taken at on set of the illness or whole plant is crushed and smelled / drunk.
81	*Vernonia amygdalina* Del.	Asteraceae	Ebicha	S	Leaf	Hu	Flariasis Ascariasis	The leaf is used as a soap to wash the whole body. The leaf infusion is made and drunk ½-tea cup before break fast. Food and water are eschewed for 5 hours.
82	*Vernonia auriculifera* Hiern.	Asteraceae	Reeji	S	Stem	HL	Infected wound	The tip shoots ground along with tip shoot of *Entada abyssinica* and directly sprayed on the wound.
83	*Vigna unguiculata* L.	Fabaceae	Epho	C	Leaf Stem Seed	Hu Hu	Head fungus Rheumatism	The leaf and stem ground together finely and painted on the affected head part. Dried seed is cooked & eaten, and its water is drunk
84	*Warburgia ugandensis* Sprague	Canellaceae	Bifti	T	Bark	Hu Ls	Malaria, Stomach ache, Tonsilitis Trypsis.	The bark along with leaf of *Carica papaya* crushed finely and eaten with honey once a day for 3 weeks. The bark is chewed and either swallowed (for stomachache), Or spat (for tonsillitis). The bark is crushed, homogenized in water and given to the cattle in problem.
85	*Zingiber officinale* Roscoe	Zingiberaceae	Jibibila	H	Rhizome	Hu Ls	Asthema, Gastrite Black leg	The rhizome infusion is made and drunk as illness starts. The rhizome is pounded along with roots of *D. steudneri* and *M. azedarach*, and given to the cattle.