ADDIS ABABA UNIVERSITY SCHOOL OF GRADUATE STUDIES BIOLOGY DEPARTMENT

AN ETHNOBOTANICAL STUDY OF MEDICINAL PLANTS IN SERU WEREDA, ARSI ZONE OF OROMIA REGION, ETHIOPIA

By

Mengistu Gebrehiwot

A Thesis Submitted to School of Graduate Studies Addis Ababa University in Partial Fulfillment of the Requirements for the Degree of Master of Science in Biology (Botanical Science)

October, 2010

Addis Ababa

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ACKNOWLEDGEMENTS

I am highly grateful to my advisors Prof. Sileshi Nemomissa and Dr. Tesfaye Awas for their consistent advice, comments and follow up from problem identification up to the compilation of this work. I am indebted to staff members of the National Herbarium (AAU) for their technical and material assistance for specimen collection and identification. My thanks also goes to the local people of Seru Wereda and Seru Wereda Administrative Office and other sectors for providing necessary data and materials.

An acknowledgement is also due to my wife W/o Aster Belay for her moral and practical support especially during specimen pressing. I want to record my grateful for the field assistant and interpreter Amin Alo for his help in data collection.

Last but not least, I would like to acknowledge all my friends who helped me in one or the other form for the work to be fruitful.

ABSTRACT

An ethnobotaniacal study of medicinal plants was carried out from October 20/2009 to April 15/2010 in Seru Wereda, Arsi Zone of Oromia Regional State, Ethiopia. The purpose of the study was to identify and document medicinal plant taxa. Ethnobotanical information of these plant taxa was gathered through a semi-structured interview, field observation, group discussion and market survey. Eighty informants from twelve Kebeles were subjected to this study. One hundred and twenty one medicinal plant taxa belonging to 109 genera and 58 families were reported and for each taxon a local name (Afaan Oromo) was documented. Plants, parts used and methods of preparation were also documented in the current study. Out of these medicinal plants collected, 62(51.24%) were reported to treat human aliments, 14 (11.57%) livestock ailments and 45 (37.19%) both human and livestock ailments. Ninety nine (81.82 %) of the plant taxa were collected from the wild and, 22 (18.18%) from home gardens. Herbs were found to be the most widely used life forms and this accounts for 53 (43.79%). This is followed by shrubs with 37.18% (45 taxa). The most frequently used plant parts were reported to be the leaves, which is 64 taxa (41.03 %) and then the roots 25.64% (40). The most widely used method of preparation was reported to be crushing and pounding a single plant part or a mixture of plant parts of different taxa. The different use categories of medicinal plant taxa in the area included food, firewood, charcoal, construction and forage. Major conservation threats included agricultural expansion, overgrazing, fire wood collection, charcoal production, cutting down trees for construction and furniture .There was no record that indicated the severe conservation impacts of overharvesting of medicinal plants and their parts in the current study area. Noteworthy is that both cultural and spiritual beliefs positively contributed to the management and conservation of medicinal plants of the study area. In addition to the aforementioned positive attitude of the local communities to the conservation of natural resources, supplementary environmental education with regard to sustainable uses of medicinal plants could be useful.

Key Word: Arsi Zone, Conservation, Ethnobotany, Indigenous knowledge, Medicinal plants, Seru Wereda

1. INTRODUCTION

1.1 Background

Ethnobotany is a broad term referring to the study of the relationship between people, plants and the environment involving wide range of disciplines (Martin, 1995; Cotton 1996). Over centuries, indigenous people of different localities have developed their own specific knowledge on plant resource, use, management and conservation (Cotton, 1996). One precondition for making ethnobotonical work effective is to be aware of the range of methods and approaches and to be able to choose the most appropriate ones for the problem at hand. Equally one has to be aware of the work already done.This is not an easy task due to its multidisciplinary nature, thus the approaches should focus on the active substances, a pharmacognostical, on the type of pathology to be threated, chemical composition, a laboratory approach concerned with the isolation and identification of active principles (Hoft and Cunnigham, 2000). Worldwide, about 85% of the traditional medicines used for primary health care are derived from plants (Farnsworth, 1988). It was also reported that the use of medicinal plants is a common phenomenon in Ethiopia. Accordind Dawit Abebe (2001), traditional remedies are the most imporotant and some times the only source of therapeutics for nearly 80% of the population and 95% of traditional medicinal preparations in Ethiopoia is of plant orgin.

According to Mesfin Tadesse (1986), herbal medicine used in the treatment of various maladies originated in much the same way through the world and has been used by many people for many years. At that ancient time people primarily select plants for food, in doing that they also select plants by trial and error processes for their health care. In most of the developing nations, the health care need of about 80% of the population depend on traditional medicines (Cunningham, 1993; Elujoba *et al*., 2005). Ethiopia is rich in its biodiversity as a result of the different ecological and climatic conditions. This rich biodiversity is also favored for a wide range of disease causing agents. These diseases were tackled by herbal remedies and religious beliefs now and then (Dawit Abebe and Ahadu Ayehu, 1993). In a similar way (Abebe Demissie, 2001), noted that the use of herbal medicine in Ethiopia is quite popular due to the mounting price for modern

pharmaceuticals and the inefficiency of modern health care services associated with reduced efficacy of some of the modern drugs which leads to the dependence of majority of the population on traditional medicines.

The cultivation and use of the medicinal plants are not new to Ethiopians. This means that Ethiopians have a body of expertise concerned with therapeutic properties of the local flora. Many skills such as the use of plants and animal products, and minerals as well as religious beliefs are included in Ethiopian traditional medicines (Pankhurst, 1965). Although most practices and treatments in herbal medicine require specialists or professionals which are called herbalists, self care using plants is also common in Ethiopia. The different language, beliefs and cultures of the peoples of Ethiopia contributed to the high diversity of traditional knowledge and practices of medicinal plants (Dawit Abebe, 1986).

The promotion of traditional health practices along side modern health services is the most promising means for ensuring affordable and sustainable health care for poor communities throughout the developing countries (Cunningham, 1993). The biodiversity of Ethiopia is eroded under a variety of anthropogenic pressure such as habitat destruction and deforestation by commercial timber interests and encroachment by agriculture and other land uses have resulted in the loss of some thousands hectares of forest which harbor useful medicinal plants (Abebe Demissie, 2001). The traditional knowledge is also affected when the plants that the traditional knowledge depends on are lost. Moreover, the indigenous knowledge diminishes from time to time by the expansion of modern education (Dawit Abebe, 1986). The knowledge of plant remedies depends on word of mouth and it passes from one generation to the other, this is not allowed to reveal to any one except to one who is an elect. Information of knowledge of the remedies can be also obtained from the medicoreligous manuscripts (Fassil Kibebew, 2001).

According to Cunningham (1996), in situ and ex-situ conservations are some conservation measures that have been undertaken around the world aimed at protecting

threatened medicinal plants from further destruction. Like all other parts of the country, majority of the people of the study Wereda used traditional medicines for a long time to treat human and livestock ailments. Still now the dependences on this medicine is continuing because of its acceptability, accessibility and affordability. The present study aimed at identification, documentation of the medicinal plants and the associated knowledge of using, managing and conserving medicinal plants by the community of Seru Wereda which also becomes useful in introduction of alternative resource management like in-situ conservation systems that involve local people which is an urgent task for the study area where its natural vegetation is lost rapidly. Moreover, the study is believed to be crucial for other researchers who are interested to conduct further study in the area.

1.2. Objectives of the Study

1.2.1 General objective

The overall objective of this study is to identify and document plant species which have medicinal value in Seru Wereda, Arsi Zone and to establish comprehensive information on the use, conservation, threats of these medicinal plants species and document the traditional medicinal knowledge of the community of this Wereda.

1.2.2. Specific objectives

- To idehtify plant species which are used to treat both human and livestoch ailments.
- To record use of medicinal plant species for purposes other than their medicine.
- To document the indigenous knowledge of the people on how to prepare and administer the medicinal plants to treat health problems in the study area.
- To record the plant parts used for medicinal purposes
- To assess indigenous medicinal plant knowledge of the people on how to conserve medicinal plant species
- To study and analyze the medicinal plant conservation or maintenance strategy applied by the people of the study area

2. LITERATURE REVIEW

2.1. Ethnobotany

Ethnobotany is formed from two words, 'ethno' which means the study of people and 'botany' which means study of plants. As it was reported (Cotton, 1996), the term Ethnobotany was defined differently depending on the interest of the workers involved in the study. The first person who proposed the term ethnobotany in 1895 was Harshberger (Balick and Cox, 1996). (Harshberger 1896; cited in Cotton, 1996) defined ethnobotany as the study of the use of plants by aboriginal people. Martin (1995), Balick and Cox (1996) defined ethnobotany as the study of direct interaction between humans and plants. Similarly Farnsworth (1994) defined ethnobotany as the study of direct interrelations between humans and plants, including plants used as food, medicines and for any other economic applications. Ethnobotany is an interdisciplinary and multi disciplinary science which focuses on documenting, analysis and use of indigenous knowledge, belief and practices related to plant resources (Martin, 1995). In the past, most ethnobotanical studies have recorded vernacular names and use of plant species with little emphasis on quantitative studies (Hoft *et al*., 1999). According to, Balick and Cox (1996) and Cotton (1996), ethnobotany has been developed over years from simple listing in to a new scientific field with appropriate methodology of documenting and studing indigenous accumulated knowledge on plants which then brought quantitative methods rather than simple listing of species.

The scope of ethnobotany expanded to include studies of modern cultures, interdisciplinary and more recently, greater attention to its application, conservation and sustainable development. According to Martin (1995), Balick and Cox (1996) ethnobotany is the scientific investigation of plants as used in indigenous cultures in food, medicine, magic, rituals, building, household utensils and implements, fire wood, pesticides, clothing, shelter and other purposes and is also used to define local community plant resource needs, utilization and management. Hence the conservation of ethnobotanical knowledge and practices between communities and the environment is essential for the conservation of biodiversity. As it was reported by Balick *et al.* (1996)

some of the steps followed in ethnobotanical research involve documenting how people classify, identify and relate to plants, examining the reciprocal interactions between plants and people, taxonomic identification of selected plants and biological as well as chemical evaluation of their constituents.

2.2. Indigenous Knowledge

Indigenous knowledge is the accumulation of knowledge as a result of many years experiences, careful observations, trial and error experiments (Martin, 1995). This knowledge is built by a group of people through generation of living in close contact with nature and it is cumulative and dynamic. Indigenous knowledge develops and changes with time and space with change of resource and culture. Therefore, such knowledge includes time tested practice that developed in the process of interaction of humans with their environment (Alcorn, 1984; Balick and Cox, 1996; Cotton, 1996). One of the indigenous knowledge is knowledge on the use of plants by humans as medicines. When primitive man started to select his food from plants growing nearby, he must have kept some of those which he found to cure some of the ailments or which he thought would cure disease (Mesfin Tadesse, 1986).

In similar way Fikadu Fullas (2001), reported that throughout history, humans had been looking to nature to provide them, with remedies for their various maladies. In so doing, they had been using a trial and error approach to sort-out which plants are therapeutic and which are not, and further which are too toxic to use. Through the centuries some of these plants have been used successfully in the treatment of disease and later on they constituted the basis for many of the modern day drugs.

2.3. Medicinal Plants in Ethiopia

The various climatic and topographic conditions of the country contributed to a rich biological diversity. Ethiopia is believed to be home for about 6,000 species of higher plants with approximately 10% endemism (Vivero *et al*., 2006). Similarly as it was reported by IBC (2005), the flora of Ethiopia consists of an estimated number of 6000 species of higher plants with 10-12% endemism. Medicinal plants species are also part of those many plant species of the country. Like all other parts of the world, plants are used

as a source of medicine in Ethiopia. According to Dawit Abebe (1986), 95% of traditional medicinal preparations are of plant origin. Ethiopia is also a country with many languages, beliefs and highly diversified culture. This diversification contributes to the people of the different localities of the country to develop their own specific knowledge of plant resource uses, management and conservation (Pankhurst, 1990). Ethiopia has a long history of using traditional medicines from plants and has developed ways to combat diseases through it (Asfaw Debela *et al.,* 1999). Although a significant number of people in Ethiopian societies use traditional medicinal plants for their primary health care. Much of the earliest knowledge was not written down due to the secrete kept by priest and other knowledgeable persons, as a source of power since ancient times (Mirutse Giday *et al*., 2003). It is not easy to get traditional medicinal knowledge of the healers because they claim that the knowledge is their own and wanted to transfer their knowledge only to a person they want to pass, mostly to the eldest son. This becomes practical when they approach death (Jansen, 1981).

2.3.1. Integration of traditional medicines with modern medicines

In Ethiopia health care coverage, management of disease and disorders is believed to be improved by the integration of modern and traditional medicines. According to Kebu Balemie *et al.* (2004), the adaptability base for the development of modern drugs is facilitated by keeping the efficacy, and quality of traditional medicines. This promotes its integration to the modern health system of the country. Integration in this case is an increase of health coverage through collaboration, communication, harmonization of the modern system with that of the traditional one while ensuring intellectual property, right and protection of traditional medicinal knowledge. Integration of the two systems is believed to be crucial due to the fact that people with different cultures, beliefs and locality have their own unique knowledge of traditional medicines and this helps for the development of modern health system (Sofowara, 1982; Dawit Abebe and Ahadu Ayehu, 1993; Yilma Desta *et al*., 1996; Dawit Abebe, 2001; Tsige Gebremariam and Kaleab Asres, 2001; Bekele Tefera, 2004).

2.3.2 Research status of medicinal plants in Ethiopia

About eighty percent of Ethiopia depend on medicinal plants for primary health care. Although the contribution of medicinal plant species to modern health system and the poor society who live mainly in the rural area is very high, lack of detailed descriptions of the medicinal plants has made it difficult for the researchers to decide the identity of these plants universally with the only reference being the local names of the plants and there is very little attention in modern research and development and the effort made to upgrade is not satisfactory. One of the reasons is that the traditional medicinal plant species are not well described (Mesfin Tadesse and Sebsebe Demissew, 1992).

According to Sebsebe Demissie and Ermias Dagne (2001), when research is conducted on the medicinal plant species, it must target on the fact that the providers of the indigenous knowledge should get a ffair share on the benefits of the development of medicines. According to Tesfaye Awas (2007), detailed information on medicinal plants of Ethiopia could only be obtained when studies are under taken in various parts of the country where little or no botanical and ethnobotanical studies have been conducted. Scientific research on medicinal plants provides additional evidence to the present knowledge of medicinal plants which has been handed down from generation to generation (WHO 1998). As it has already been stated by Cunningham (1993) and Alexiades (1996), it is better to involve traditionally medical practitioners in pharmaceutical companies. The modern health professionals and some of the consumers ask for scientific based evidence. This encourages for better and more research work. According to Kannon (2004), research on medicinal plants should direct for quality control and the research should examine active herbal constitute for efficacy and toxicity of the herbs.

2.3.3. The role of medicinal plants and practitioners

2.3.3.1. Traditional medical practitioners

WHO (1978) defines traditional practitioner as a person who is recognized by the community in which he/she lives as a component to provide health care by using plant, animal and mineral substances who serve as a nurse, physician, dentist, pharmacist, mid-

wife, dispenser, etc; and those knowledgeable people include bone setters, birth attendants, tooth extract, herbalists and spiritual healers. It is noted that cooperation and negotiation of the modern health professionals and the traditional health practitioners is crucial especially for those people who have no adequate access for modern health facilities (Jansen, 1981). In Ethiopia, the traditional healers are generally highly regarded for their valuable knowledge regarding therapeutic properties of plants. The high numbers of developing countries consult the professional traditional healers for most of their health problems (Dawit Abebe and Ahadu Ayehu, 1993). Traditional medical practitioners are valuable health resources in communities where the health facility is under served. They are important and influential member of their communities. This is fundamental to the primary health approach.

2.3.3.2 Medicinal plants and human health care

Traditional medicine is the sum total of knowledge and practices, whether applicable or not, used in diagnosis, prevention and elimination of physical, mental or social imbalance and relying exclusively on practical experience and observation handed down from generation to generation whether verbally or in writing (WHO, 1978). It is said that the use of medicinal plant species as a medicine is as old as man and this makes traditional medicine an integral part of the different cultures of Ethiopian people who are especially vulnerable to under served health facilities (Pankhurts, 1965; Fassil Kibebew, 2001).

It was reported that the traditional medicines serve mainly for those people living in the rural area as they have no access to modern medical health services due to shortage of modern drugs, health professionals, much more cost of the medicines, un even distribution that is most of the facilities are found in towns but a few or no health facilities are in rural areas (Jansen, 1981). Despite the high value of traditional medicine to Ethiopia societies especially to rural communities, the plant species along with the associated knowledge is lost due to factors such as deforestation and expansion ofmodern education (Pankhurst, 2001).

2.3.4 Transfer of knowledge of traditional health practitioners

In many counties one of which is Ethiopia, the use of traditional healing systems has evolved over a long period of time and the knowledge of selection of plant species for their medicinal value is not obtained over night but after many practices that is after a long trial and error, people distinguish plant species which have medical value. Even though people have almost equal access to those plants, a few people are lucky in having the remedial knowledge. Such persons include priests, witch doctors, expert herbalists, and the like. Those knowledgeable people don't easily transfer their knowledge to community where they live. Instead, they want their knowledge to be secreted and the knowledge of plant remedies remained in their hands (Mirutse Giday *et al*., 2003).

Poor people living in urban centers and others who have interest in using plant remedies also use them for their primarily health care. Abbink (1995), noted that 80% of people in Africa depend on traditional medicine for their health care practices. The dependence of majority of Africans including Ethiopia on traditional medicine will continue side by side with that of modern medicine due to cultural and economic factors (WHO, 1998). Similarly Dawit Abebe (2001) indicated that 80% of the population in Ethiopia use traditional medicines as their major health care system due to their accessibility, affordability and acceptability.

According to Fassil Kibebew (2001); Mirtuse Giday et *al*. (2003); Pankhurst, (2001) much of the earliest knowledge of plant remedies was not written down which makes the knowledge difficult to obtain easily. People who have knowledge of plant remedies pass their knowledge to the person to whom they trust. The person who has knowledge on the identities and use of medicinal plant species transmits his expertise mostly to first born son in an incomplete way. Some of the knowledgeable people take their sons to the field and show the plants with medical value, tell the time when and the place where they are collected and the son is told not to share the skills of healing to anybody. These persons pass their knowledge when they approach death and is transferred by oral communication. When the knowledge of healing by traditional medicinal plants is passed from generation to generation, the original and valuable information passed in an

incomplete fashion or even the medical healer may die without passing his knowledge of healing. In this way the traditional healing knowledge using plant, animal or mineral materials or spiritual system passes from one generation to the next. This and other facts of the nature of traditional medicines, traditional healers and the associated knowledge were also studied by different researchers including (Fikadu Fullas, 2001; Pankhurst, 1990).

2.3.5. Uses of medicinal plants other than their medicinal values

As it has already reported, medicinal plants are used for different purposes namely, as food, charcoal, fire wood, construction, fodder, forage, ornamental, spices, etc. many medicinal plants are used as a food. For instance plants like *Allium sativum* (Alliaceae), *Capsicum annum* (Solanaceae), *Carissa spinarum* (Apocynaceae), *Citrus limon* (Rutaceae), *Coffea arabica* (Rubiaceae), *Cordia africana* (Boraginaceae), *Dovyalis abyssinica* (Flacourtiaceae), *Embelia schimperi* (Myrsinaceae), *Ensete ventricosum* (Musaceae), *Ficus sur* (Moraceae), *linum usitatissimum* (linaceae), *Trigonella foenum-graecum* (Fabaceae), *Urtica simensis* (Urticaceae), *Ximenia americana* (Olacaceae) (Zemede Asfaw and Ayele Nigatu, 1995; Zemede Asfaw, 1997 ; Zemede Asfaw and Zerihun Woldu, 1997; Zemede Asfaw, 2001; Tigist Wondimu *et al*., 2006).

The pharmacologically active constituents in plants used as food would likely have a great impact on medicinal plant species than those in plants used as medicine which are taken only in small amounts (Etkin, 1988). Other medicinal plants like *Eucalyptus globulus, Prunus africana, Hagenia abyssinica, Acacia abyssinica, Allophyllus abyssinicus, Cordia africana, Juniperus procera, Millettia ferruginea, Olea europaea* subsp.*cuspidata* and *Vernonia amygdalina* are used as a fire wood, constructing and charcoal. Others like *Zingiber officinale* and *Coriandrum sativum* are used as a spice (Amare Getahun, 1976). Adding to this WHO (1998) and Farnsworth (1985) noted that traditional medicinal plants are also used as raw materials for the manufacture of modern drugs.

2.3.6. Sources of medicinal plants

According to Frankel *et al*. (1995) medicinal plants species are grown in the natural ecosystem. Similarly, the work of Tesfaye Awas and Sebsebe Demissew (2009) indicated that most of the medicinal plants in Ethiopia are collected from the wild, some are cultivated and some others are grown in homegardens either purposely for medicinal use or non medicinal purpose (Zemede Asfaw and Ayele Nigatu, 1995). According to Zemede Asfaw (1997), plant species cultivated in Ethiopian home gardens for the purpose of medicine is about 6%. This figure indicates that a large number of medicinal plant species that are used by the herbalists are collected from the natural vegetation. Local forests are sources of plant processes into therapies used in traditional medical system (Balick and Cox, 1996). The natural ecosystems of the forests, grass lands, wood lands, wet lands, field margins, contain a significant number of medicinal plants species. These are places where traditional healers and other members of the community collect medicinal plant species and use it (Endashaw Bekele, 2007).

2.3.7. Medicinal plant diversity and distribution in Ethiopia

Ethiopia is a country with a great range of ecological edaphic and climatic conditions (Dawit Abebe and Ahadu Ayehu, 1993; Dawit Abebe *et al*., 2003). The number of plant species in each corner of the country and the vegetation type is also varied ranging from arid low land to Afroalpine vegetation (Abebe Demissie, 2001).Similarly, it was reported that the variation in vegetation type of the country is due to the country's significant geographical diversity (TewoldeBrehan GebreEgziabhar, 1991).

As it was reported by Edwards (2001), the wood lands, montane vegetation including grassland, forests and the evergreen scrubs and rocky areas contain more medicinal plants which indicated that traditional medicinal plant species are not equally distributed throughout the country similar to the distribution of the total plant species. According to this report the vegetation types found in the wood lands contain more medicinal plant species while the Afroalpine vegetation consists of the least medicinal plants of all the vegetation types (Edwards, 2001; Endashaw Bekele, 2007).

2.3.8. Threats and conservation of medicinal plant species

2.3.8.1 Treats to medicinal plant species

As medicinal plants are part of the total plant of the different ecosystems of the earth, they are affected by anthropogenic and natural forces. Apart from other species of plants, medicinal plant species can also be exploited for their medicinal value and leads to a serious threat to the biodiversity in the area, as a result, several plant species have been exploited to such an extent that they are seldom found in unprotected areas (Cunningham, 1991; Williams, 2004). People who have some traditional knowledge of healing in general and those professional healers in particular harvest medicinal plant mainly from the wild habitat (Tesfaye Awas and Sebsebe Demissew, 2009). According to Cunningham (1996); Abebe Demisse (2001) and Kebu Balemie *et al*. (2004), vegetation types where traditional medicinal plant species are collected are declined from time to time. Similar to other countries of Africa, medical plant species of Ethiopia is vulnerable to problems of continuity and sustainability primary due to loss of taxa of medicinal plants and loss of habitats (Ensermu Kelbessa *et al.*, 1992). The threatened factors can be elaborated as lose of cultural diversity including traditional knowledge due to, uncontrolled grazing, drought, agricultural expansion, fire wood, charcoal, urbanization and construction (kloos, 1976; Mirutse Giday *et al.,*2003*)* It has also been reported that medicinal plant species are affected by unsustainable harvesting for export and extraction of pharmaceuticals (Farnsworth, 1985; WHO, 1998). Beside to these known factors which treat medicinal plant species, other condition like the types of the medicinal plant and the part used also affect the medicinal plant. for example harvesting the roots and barks of medicinal plant possess more of a threat than collecting leaves for medicinal value (Edwards 2001; Haile Yineger, 2005). Besides to other factor, the younger generation under estimate the traditional system of healing (Sofowara, 1982) and this is bad fortune for the advancement and the conservation of medicinal plants and associated knowledge.

2. 3.8.2 Conservation of medical plants

As it was stated by Abebe Demissie (2001) conservation should be aimed at conserving maximum diversity within each species to ensure that its genetic potential will be

available in the future. Sustainable management of traditional medicinal plant resources is important not only because of their value as a potential source of new drugs built also due to reliance on traditional medicine for health (Cunningham, 1993).

As it was reported by different researchers plant species with medicinal value that are harvested from the wild, especially those which are highly used either for local use or trade are not found in a near by places rather the professional traditional healers move along distance to harvest. In contrast to this problem of scarcity, the demand and recognition for traditional medicine is increased and this is a good opportunity to the medicinal plants to conserve (Zemede Asfaw, 2001). According to Shanker (1993), the wise use of medicinal plants species needs the involvement of different sectors and greater public support and for this, awareness creation is recommended.

As it was reported, home gardens have a great contribution to conservation of biodiversity in general and at the same time medicinal plants species can also be conserved, thus homegardens are strategies and ideal farming systems for the conservation, production, and enhancement of medicinal plants (Zemede Asfaw and Nigatu Ayele, 1995; Zemede Asfaw, 2001). Some traditional medicinal plants are collected on selective days and seasons. An account that have been made by Cunningham (1993) indicated that plant species whether medicinal or non-medicinal plants grown in religious sites like churches, mosques and the like are forbidden to be cut. Moreover, the author reported, harvesting of medicinal plants using pointed wooden digging stick than using metal axes are some of the cultural methods of medicinal plant collection and this has contribution to the conservation strategy (Cunningham, 1993). In the field, medicinal plants conservation goes side by side with conservation of ethnobotanical and ethnopharmacological information.

The conservation of medicinal plants is achieved through in-situ and ex-situ conservation methods (Cunningham, 1996). In-situ is a type of conservation where species are conserved in their natural habitats which include the national park and reserviors. This method is especially preferable for those species where domestication and management is difficult out of their natural and normal habitats and ecosystem (Zemede Asfaw, 2001). Ex-situ conservation is another method of conservation where endangered species are

protected by removing part of them from a threatened habitat and place them in a new location which may be a wild area or within the care of humans which includes seed gene banks, field gene banks, arboreta, botanic gardens. In situ and ex-situ should be complementarily implanted in Ethiopia to conserve valuable plant species which are threatened due to natural or manmade factors (Abebe Demissie, 2001).

2. 3.9 Ethnoveterinary Medicine in Ethiopia

Ethnoveterinary medicine involves the use of medicinal plants, surgical techniques and livestock management practices to prevent a range of animal disease (Mc Corkle and Mathias, 1996). In rural Ethiopia mixed farming which encompasses crop cultivation and herding is the major means of livelihood though some alternative income generating, activities such as fattening, petty trade, traditional bee keeping, firewood collection, hand craft, and wage based employments are also practiced to some extent (SWBS, 2007).

In general, crop cultivation followed by herding remains the major livelihood activity in the country. According to the Ethiopian Agricultural Research Organization (EARO, 1999 as cited in Mirutse Giday and Gobena Ameni, 2003), Ethiopia has the highest livestock population from Africa. In Ethiopia, livestock production directly constitutes important sources of livelihood, in addition to its contribution to crop production (Tafesse Mesfin and Mekonnen Lemma, 2001). Although the number of livestock population is many in number, disease play role in reduction.

To over come this problem, many people mainly use traditional medicines to treat their livestock ailments. This is due to the insufficient number of veterinarian drugs and the high cost of most of drugs which is out of the reach of the Ethiopian farmers and pastoralists (Mirutse Giday,and Gobena Ameni, 2003). This and other similar factors make Ethiopian livestock raises develop their own ways of keeping their animals healthy and productive using locally available materials, predominantly plants

3. MATERIALS AND METHODS

3.1 Description of the Study Area

3.1.1 Location

Fig.1 shows the map of the study area. Seru Wereda is one of the administrative units of Arsi Zone in Oromia National Regional State. The capital town of the Wereda, Seru Abas, is located at about 300 kms away from Addis Ababa to the south - east and 175 kms from the Zonal capital, Asella to the East. Seru Wereda is located between 7^0 27' 05"N to 7^0 54' 36" N and 40^0 02' 56"E to 40 ^{0} 43' 59" E. The relief of the Wereda is characterized by undulating plain of extensive lowland, hill and high plateau with an altitude ranges1000 to 2600 m asl. The lowest place is found in Wabe gorge (1000 m asl) while the highest place is found in Abas (2600 m asl). The size of Seru is 1687.7 km^2. The Wereda is bordered by Amigna Wereda in the north, Bale zone in the south, south east, and east; western Hararghe zone in the North east; Bele Wereda in the west. It has 15 Kebele administrations of which 14 are peasant associations while one is urban administrative.

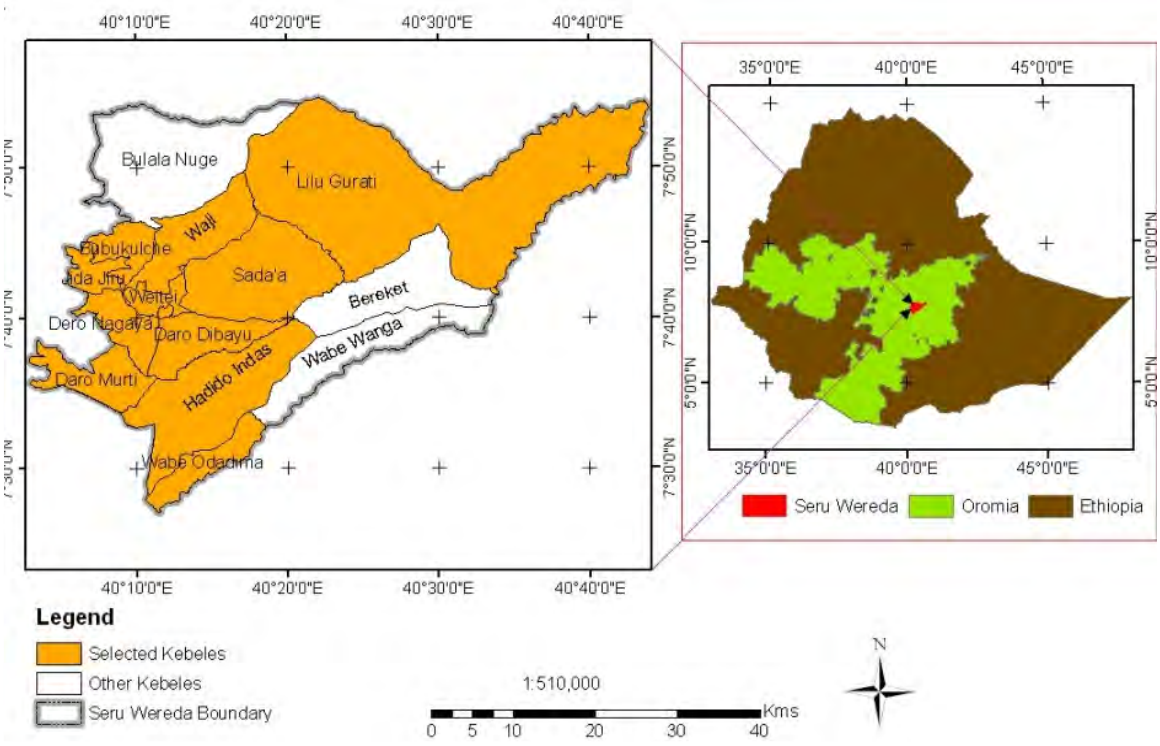

Fig.1 Map of the Study Area modified from SWEO (2008)

3.1.2. Agro-ecology and climate

Seru Wereda is generally divided in to two agro-ecological zones, namely the lowlands (<1500 m asl.) locally corresponds to "**gammoojji**; and midaltitude (1500-2500 m asl cooresponds to '**badadaree**' and also there are few places which are referred to as high lands (>2500 m asl.) corresponds to '**baddaa'**. The rainfall pattern is bimodal, with short rains received from March to April and the long rains from June to October. The data from National Meteorological Service Agency (NMSA, 2010) also indicated that the dry season extends from November to February and short dry time in May. The maximum mean annual rainfall of the area within twelve years was 144.59 mm recorded in April where as the minimum mean annual was 8.38 mm recorded in December. The highest mean temperature over twelve years was 20.62^{O}C recorded in February and the lowest was 8.07 recorded in December (Fig. 2).

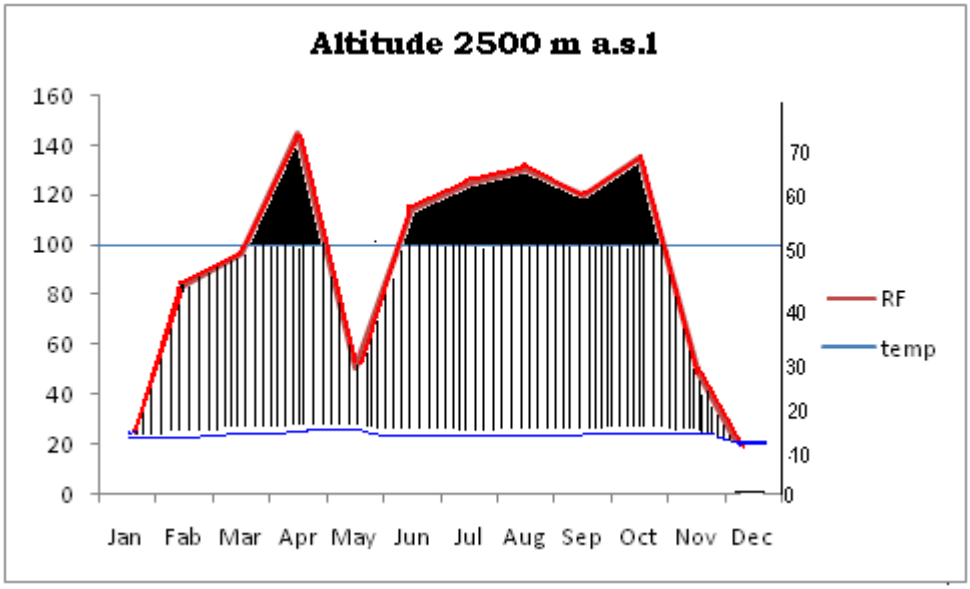

Fig. 2 Climadiagram of Seru Wereda based data from Seru Station (1996-2007).

Data source: NMSA (2010).

3.1.3. Population

According to central statistical agency (CSA, 2007), Seru Wereda had an estimated population size of 73,591 whereby 36,449 were male and 37,142 were female. Of the total population mentioned above 69,135 are rural dwellers and 4,456 are urban residents. Average household size was reported to be 6.8 persons. Whereas household

members below the age of 15 years comprise 53%. Of the population, those aged between 15 and 65 years were 46% . People aged 65 years and above constituted only 1% of the total population. Noteworthy is that, unless too young or too old, all members of the household necessarily participate in the livelihood activities. Children above 10 years involve mainly in herding livestock and guarding animals from crop damage. Concerning the settlement pattern of the Wereda the rural parts are characterized by scattered type of settlement. The great majority covers 98% of the population in the Wereda belong to the Oromo ethnic group, followed by Warradubes and Amharas. In terms of religion over 90% are Muslims, while the Orthodox Christians, living in the mid altitudes make 9.3% of the population.

3.1.4 Economic activities of the residents

With the exception of the people living in Seru Abas town, mixed farming, which encompasses crop cultivation and herding, is the major means of livelihood in the Wereda although some alternative income generating activities such as fattening, petty trade, traditional bee keeping, hand craft, fire wood collection and selling, wage based employment also practiced to some extent. Despite the existing potentials, the non-farm activities are limited to very few people at very small scale, because of capital shortage, poor infrastructure, poor market development, lack of technology inputs and limited external support. Therefore, crop cultivation followed by herding remains the major livelihood activity except for two Kebeles (Lillo Gurati and Bereket) in which case livestock rearing takes the lead.

The major annual crops grown in the Wereda during the short rainy season (locally called **bonna**) and main (long) rainy season (locally called **ganna**) seasons are: cereals (Wheat, maize, sorghum, barely, and Teff) pulses (haricot bean, peas, been) and oil seeds (linseed and sesame) permanent crops such as mango, banana, coffee and chat; vegetable (cabbages, onion etc); root crops (sweet potatoes, and Irish potato) are produced for market and home consumption, for most households in Seru Wereda. Maize followed by sorghum, haricot bean and wheat are the major crops but in terms of productivity, the largest mean grain yield is obtained from wheat followed by maize, sorghum and barely

respectively. This is because wheat grows mainly in midaltitude where the rainfall distribution is relatively favorable and use of inputs like improved seed and fertilizers.

The major crop pests and diseases in the Wereda are stake borer, cut worm, ball worm, rust, and smut and root rot. Weeds and rainfall variation are also the major constraints in crop production. They have a great contribution in decreasing volumes of production both before and post harvest time.

Seru Wereda is also famous in livestock resources. Cattle, sheep, goat, horses, mule, donkeys and camels are the major livestock population found in the Wereda. From livestock found in the Wereda cattle, goats, and sheep account for about 59.4%, 29.6% and 4.8% of the total livestock population in the year 2008 respectively.

According to SWBS (2007), livestock and poultry disease are blackleg, lumpy skin, pasteurolsis, fasciolosis, trips, salmonellae, new castle, chronic respiratory disease internal and external parasites, lymphatic disease and Anthrax.

3.1.5. Land use

In Seru Wereda, the types of land use change from time to time depending on the economic change. That is, the grazing land, natural forest and fallow lands are decreasing from time to time, while cultivated, residential lands are increasing. Accordingly from the total area of the Wereda the cultivated land represented about 76,974.76 ha. (45.61%), the vegetation covered land (small trees, bush and shrubs accounted for 74,900.126 ha. (44.38%), the residential land areas covered about 16, 895.114 ha. (10.01%).

3.1.6 Education and health

According to Seru Wereda Education Office SWEO (2008), there is one governmental kindergarten school and no non-governmental kindergarten school. There are also 14 first cycle school (1-4), 15 second cycle elementary schools (5-8) and one secondary school (9-10) and one non governmental first cycle school (1-3) in the Wereda. However, there are not governmental and non governmental technical and vocational education schools in the Wereda.

According to SWHO (2008), there is one governmental health center, one government clinic and fourteen health posts and two private clinics. In general the health problems in the Wereda is directly or indirectly related to the problems of sanitation, in adequate diet, lack of potable water and poor physical condition of house. In this area intestinal parasite is the most prominent health problem (Table 1).

Table 1. The ten top human ailments in the year 2007/08 and 2008/09 in the Wereda. Source: Seru WHO, 1998).

No.	2007/08			2008/09		
	Type of diseases	No. of cases	%	Type of diseases	No. of cases	%
1	Intestinal parasite	858	30	Intestinal	902	37.3
2	Pneumonia	398	14	gastritis	258	10.7
3	Acute respiratory Infection	349	12.2	ARI	248	10.2
4	Typhoid fever	291	10.2	Anemia	244	10.1
5	Gastritis	257	9	Pneumonia	189	7.8
6	Anemia	235	8.2	Urinary	163	6.7
7	Urinary tract infection	231	8.1	Typhoid fever	129	5.3
8	Dental disease	80	2.8	Obitis media	101	4.2
9	Eye disease	76	2.7	Dental	95	3.9
10	Skin infection	76	2.7	Skin	91	3.8

3.1.7. Landscape and soil

According to SWBS (2007), the Wereda is divided in to four livelihood zones on the basis of ecological settings of their geographical locations, ethnic, cultural background and livelihood sources and other factors which brings similar peasant associations together. Based on this classification, the main natural features of the livelihood zone are:

1. Zone one, is fairly flat and gently sloping topography with deep and relatively fertile soil. The highest mountain peak of the Wereda Mt. Deltu with about 2600 m asl. is found in this livelihood Zone.

2. The natural environment of livelihood zone two is characterized by rugged topography, partly hilly clefts with steep slopes and the soil type is dark brown to light brown fertile soils at the foot hills which gets lighter as the altitude decreases further down the slope, dry sandy soils divided by different drainage systems including Dero and Waji rivers are found in this livelihood zone.

3. The third livelihood zone is characterized by large flat land with deep soils found at low altitude that was dissected by intermittent, rivers.

4. The fourth livelihood zone is situated in the narrow gorge of Wabe river and surrounded by steep slopes where the lowest altitude with about 1000 m as1. is found there.

3.1.8 The vegetation of the study area

Generally, the natural vegetation of the area has been broadly classified as dry evergreen montane forest and Acacia woodland vegetation type (Sebsebe Demissew and Friis,2009). The vegetation of the area includes Acacias, Olea, Juniperus, gallery forest, and shrubs. There is also very small community forest in the Wereda. The livelihood zone is characterized by sparsely vegetated with remnants of some old big trees on the hills and bushy vegetation further down slope.

Fig.3. Part of the vegetation of the study area (Photo taken by Mengistu G/ Hiwot, October, 2009)

3.2 Reconnaissance Survey

Reconnaissance survey of the study area was conducted from 19 to 28 September 2009. At that time the topography, distribution of polants etc was observed which were used for the data collection.

3.3 Site Selection

Twelve Kebeles were selected out of 15 Kebeles of the Wereda for ethnobotanical data collection based on the availability of traditional medical practitioners present which were identified with the assistance of the Kebele administration leaders, elders, religious leaders and others who have information about traditional healers. Those Kebeles which have almost the same climatic conditions with other neighboring Kebeles are not included in the study and this is also additional factor for site selection. The study Kebeles are Seru 01, Walte'e, Jida Jiru, Dero Negaya, Dero Dibayu, Dero Murti, Sada'a, Lilo Gurati, Hadido Indas, Wabe oda dima, Bubu kulche and Waji.

3.4 Informant Selection

Informant selection was done following Martin (1995). For data collection method, a total of 80 persons (51 males and 29 females) were selected both randomly and purposefully. Out of the 80 informants, 54 of them were selected randomly and the rest, 26 traditional healers and knowledgeable informants were selected purposefully based on the recommendations obtained from the local authorities, elders and religious leaders. The age of the informants ranged from 20-80 (Table 2).

3.5 Ethnobotanical Data Collection

3.5.1. Semi-structured interviews

Semi-structure interview was prepared and done following Martin (1995) and Cotton (1996). Semi structured interviews ensured that there was a checklist of issues and areas to be discussed. During the interview new and more ideas were raised that were nessary for the collection of the date.

3.5.2 Field observation

Field observation on the study sites including the markets survey was done with the help of local guide and interpreter. At the time of observation, important points including culture of the community, market value and cultivation practices of the medicinal plants were recorded.

3.5.3 Group discussion

Group discussion was made in DERO NEGAYA and DERO DIBAYU study kabeles with an instimated number of 20 community memberws which composed different groups that included one traditional healer in each the kebeles where the discussion took place prior to ethnobotanical data collection.At the time of discussion ethnomedicinal knowledge was gathered from the residence and knowledgeable members of the community recorded carefully.

Fig. 4. Group discussion with informants in Dharoo Naggaya Kebele (Photo taken by Mengistu G/Hiwot, November, 2009)

3.5.4 Guided field walk

During the guided field walk, the traditional medical practitioners went together with the researcher to the place where the medicinal plant is growing, provide its local name and explain his / her ethnomedicinal knowledge of the medicinal plant species. Then after, the medicinal plant species were collected by recording all the important information about the particular medicinal plant species.

3.5.5. Market survey

During the study, market survey was made to distinguish and record the type of herbal drugs sold in the market, and the multipurpose role of some medicinal plants was observed. Further more, herbal drug sellers and others who brought plant species were interviewed.

3.5. 6. Informant consensus

In order to confirm the reliability of the information each informant was contacted at least twice and if the responses that were given at different time contradict to each other, they were considered to be unreliable and are rejected or reliability of the information can be confirmed by similarly of information given by different informants on the same issue.

3.6. Data analysis

The data were mainly analyzed and summarized by preference ranking, paired comparison and direct matrix ranking following Martin (1995). The relationship of the number of medicinal plants mentioned with informants age was analysed using multi-variate computer programme PAST-PALaeontological Statistics, Ver.1.56 (Ryan *et al*., 1995).

3.6.1. Paired comparison

Evileye is one of the seventy reported traditionally known diseases in the study area but is not known by the modern health professionals.this disease is only treated by the traditional system.There were eleven medicinal plants that traditionally treat eveleye.Out of these ,five medicinal plants with the highesy informant concensus were selected.Then after apaired comparison was employed following Martin (1995) that is by pairing,arranging using number table and flipping coins .Ten informants were selected to give value independently based on their perception of the efficacy of the medicinal plants to treat evileye and then scores were added and ranked.

3.6.2. Preference ranking

Preference ranking was made following Martin (1995) for five most important medicinal plants used to treat wound. This plants were presented to ten of the key informants to identify the best preferred medicinal plants based on their personal preference for the treatment of wound. In doing this, the informants were requested to mark five to the most preferred medicinal plant and one to the least preferred medicinal plant. The values given to each medicinal plant were added and the plants were ranked. This is important to show the most effective medicinal plant used by the community to treat wound.Moreover ranking of threats to medicinal plants was done. The biodiversity of the area including

medicinal plants are highly affected mainly by the human made factors,namely, agricultural expantion,cutting trees for firewood,charcoal,construction,and overgrazing.These factors which were reported by almost all of the informants were provided to ten key informants to rank according to their damage to the medicinal plants and the informants were reqestedto give 4 for the most threatening factor and 1 for the least.Finally the scores were added and ranked.This helps to aware the people to use other alternative source of livelihood source like using irrigation and other income generating means which may minimize the destruction of vast area for agriculture.

3.6.3. Direct matrix ranking

Direct matrix ranking was done following Martin (1995) to compare plant species for their multipurpose use. Five plants which were used highly for many purposes by the community members were selected based on the information obtaind from the informants and six attributes which included medicine, firewood charcoal, construction, edible and forage were listed and the species were provided to 10 key informants to give value according to the use of the species for the particular attribute listed in the above and then the scores which were given to each attribute were added ,ranked so as to compare use values of the reported plant species.

3.6.4. Informant consensus factor (ICF)

The informant consensus factor (ICF) was calculated for each category to identify the agreement of the informants on the reported use of medicinal plants to cure a group of ailments. The ICF is calculated as follows:

$$ICF = \frac{N_{ur} - n_t}{N_{ur} - 1}$$

Where N_{ur}= number of use citations in each category

n_t= the total number of plant species used.

3.7. Plant Specimen Collection and Identification

Medicinal plant species were collected from the wild, home gardens based on the report of the informants. At the time of collection all the necessary information about the

specimens was recorded. Then after, the voucher specimens were pressed and taken to the National Herbarium of Addis Ababa University (ETH). After the specimens had taken to the National Herbarium, they were identified using taxonomic keys; the volumes of the Flora of Ethiopia and Eritrea (Hedberg and Edwards, 1989 and 1995; Edwards *et al*., 1995; Edwards *et al*., 1997; Edwards *et al*., 2000; Hedberg *et al*., 2003; Hed berg *et al*., 2004; Hedberg *et al*., 2006) and by making a comparison with the already identified specimen that are deposited at the National Herbarium (ETH).

3.8 Characteristics of the Informants

The age of the informants included in the study shows that the highest number was 19 ranging 30 – 39 (23.75%) followed by 18 ranging 40 – 49 (22.50%) (Table 2). Males accounted for the highest number which was 51 (63.75%) and females were 29 (36.25%). The educational status of the informants showed that most of them were illiterate accounted for 40 (50%) followed by those having modern education 27 (33.75%) and others 13 (16.25%). The martial status of the informants showed that most them were married people that accounted for 61 (76.25%) and others were divorce that were 11 (13.75%) and single 8 (10.00%).

Table 2. Age of the informants

No.	Age range	Sex and number			%
		Male	Female	Total	
1	20-29	6	5	11	13.75
2	30-39	11	8	19	23.75
3	40-49	11	7	18	22.50
4	50-59	9	4	13	16.25
5	60-69	5	4	9	11.25
6	70-80	9	1	10	12.50

4. RESULTS

4.1. Ethnomedicinal knowledge of the local people

The people of the study area know the environmental components of their surroundings. This is well reflected in their elaborate classification system of land forms, vegetation, plant based medicine and agroecology.

4.2. Agroecology and Land form Classification by Indigenous People

The local people classified the agroecology of the area in to 3 categories based on altitude and climate and land form in to 6 based on altitude (Table3 and 4).

Table 3 Agroecology of the study area

Agro ecology classification	Meaning of category	Corresponding etic category	Where in the study area it is found
Baddaa	Areas greater than 2500 m asl	Highland	Part of Walta'ee
Baddaa Daree	Areas in b/n 1500 – 2500 m asl	Middle land	Jida Jiru, Seru 01, Walta'ee, Dharo Nagaayaa,Dharo Dibayu,parts of Waji,Sada'a, Dharo Murti, Bubukulche
Gammojjii	Areas less than 1500 m asl	Lowland	Wabe Odadima, Wabe Wangaya, Bereket, Lilo Gurati, parts of Hadido Indas,Dharo Murti, Sada'a and Bubukulche

Table 4. Land form of the study area

Landform classification	Meaning of category	Corresponding etic category	Where in the study area it is found
Gaara	An area higher than hill	Mountain	Walta'ee, Lilo Gurati
Tullu	Areas less in height than mountain	Hill	Hadido Indas, Dharo Nagayaa, Dharo Murti, Dharo Dibayu, Sada'a
Tabba	Flat area found at the top of the hills	Plateau	Jida Jiru, Walta'ee
Lafa diriira	More or less straight flat area	Plain	Jida Jiru
Sulula	An area relatively lower than the surroundings, surrounded by steep slopes	Valley	Wabe Wangaya, Wabe Odadima
Dhooqa	Very low depression with highest temperature	Very low depression	Few places in Wabe Odadima and Wabe Wangaya

4.3. Emic Vegetation Classification

The indigenous people classify the vegetation of the area into different categories based on the density of plants and growth forms. These are: Bosona rukkaa (Danqaraa), Bosona haphii, Bosona bakka bakkee, marga and Caffee (Table 5).

- **Bosona rukkaa (Danqaraa)**: This refers to densely populated plant species growing close to each other which include mainly shrubs and trees with different size. This type of forest is the home of many wild animals such as hyenas, lions, monkeys, fox, birds, pig, etc. Although the name Bosona rukkaa (Danqaraa) is there, the areas with such vegetation cover are few in number. Such areas are only found in some parts of Waji, Bubukulche and Sada'a. According to the information gathered from the informants and others, there were many such areas in the Wereda some twenty or thirty years ago. But due to deforestation for

agriculture, firewood, charcoal, timber and other construction purposes the areas which cover by densely populated plants are decreased.

- **Bosona haphii**: It refers to an area covered with relatively less number of trees, shrubs but more herbaceous species.
- **Bosona bakka bakkee**: An area with sparsely growing trees and shrubs but a good number of herbaceous species including grasses used for grazing.
- **Marga:** Grassland used mainly for grazing
- **Caffee**: vegetation types found in marshy area.

Table 5. Emic Vegetation Classification

Emic vegetation classification	Meaning of category	Corresponding etic category	Where in the study area it is found
Danqaraa	Dense trees and shrubs	Forest	Waji,Bubukulche, Sada'a
Bosona haphii	Less trees/ Shrubs	Scrub	Hadido Indas Wabe Odadima
Bosona bakka bakke	Sparsely trees/shrubs	Grassland complex	Some parts ofLilo Gurati, Bereket, Wabe Wanga
Margaa	Grass	Grassland	Lilo Gurati, Bereket
Caffee	Marshy	Ripariane	Parts of Jida Jiru, Walta,ee

4.4. Plant habit and Soil type Classification by Indigenous People

The local people classified the plant types of the area in to 4 categories based on height and growing nature of the plant. More ever, they also classified the soil type of the area in to5 based on colour and fertility of the soil (Table 6 and 7).

Table 6. Plant habit classification

Plant habit classification	Meaning of category	Corresponding etic category	Where in the study area it is found
Mukken	Woody plants with a single main stem	Tree	Found in all study Kebeles with different numbers
Miciree	Woody plants with many stems coming from near the ground	Shrub	The same with the above
Daggala	Plants with no persistent stem above ground	Herb/others	The same with the above
Gaalee	Plants which use other plants for support	Climber	The same with the above

Table 7. Soil type of the study area

Soil classification	Meaning of category	Corresponding etic category	Where in the study area it is found
Biyyee dimaa	Soil type that can pass water through it & become leeched	Red soil	Seru 01, Walta'ee, Dharo Nagaya, Dharo Murti, Hadido Indas, Bubukulche
Suphee	Soil type that is used to make pots, etc., & can hold much water	Clay soil	Seru 01 & Walta'ee
Cirracha	Soil that has larger and irregular particles that can allow water to pass easily	Sandy soil	Parts of Bereket, Lilo Gurati, Wabe Odadima,Wabe Wangaya, Waji
Biyyee gurrachaa	Soil type that cracks when the moisture of the soil decreases	Black soil	Waji,Dharo Nagayo, Dharo Dibayu, Dharo Murti
Koosii (Biyyee gabataa)	Soil type made upof decomposed materials	Loam soil	Jida Jiru,Walta'ee, Seru 01

4.5 Distribution of the Medicinal Plants among the Plant Families

One hundred and twenty one medicinal plants were collected from the study area and are distributed among 58 families and 109 genera (Appendix 4). The most popular family

was Asteraceae which contributed for 10 (8.26%) species followed by Lamiaceae with 9 (7.44%) species. (Table 8)

Table 8**.** Distribution of the medicinal plants among the plant families

Family	No of species	Percentage
Asteraceae	10	8.26
Lamiaceae	9	7.44
Fabaceae	8	6.61
Cucurbitaceae	6	4.96
Solanaceae	6	4.96
Rutaceae	5	4.13
Euphorbiaceae	5	4.13
Others	72	59.50
Total	121	100

4.6 Sources and Habit of Medicinal Plants

The data collected from the study site showed that most of the medicinal plants were collected from the wild, i.e., 99 (81.82%) species (Table 8). In addition, the habit of the medicinal plants indicated that most of them were herbs (53 species) and then shrubs (45 species) (Table 9).

Table 9 Sources and habit of medicinal plants

Source	Habit								Total	%
	Herbs		Shrubs		Trees		Climbers			
	No	%	No	%	No	%	No.	%		
Wild	39	32.22	39	32.22	17	14.05	4	3.32	99	81.82
Homegarden	14	11.57	6	4.96	2	1.66	0	-	22	18.18
Total	53	43.79	45	37.18	19	15.71	4	3.32	121	100

4.7 Types of Human and Domestic Animal Diseases of the Study Area

As it has already been reported by the informants, there are a total of 70 traditionally known human and livestock ailments in the study area. Out of these, 53(75.71%) of them were human and 17 (24.29%) livestock ailments (Fig. 5).

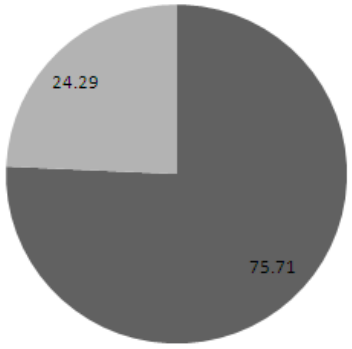

Fig.5 Human and livestock health problems in percentage

4.8 Medicinal Plants Used to Treat Human, Livestock and both Human and Livestock Ailments in the Study Area

The data collected in the study area showed that 62 (51.24%) traditional medicinal plants were used to treat human ailments only, 14 (11.57%) were used to treat livestock ailments only, and 45 (37.19%) were used to treat both human and livestock ailments (Appendix 3). In addition, the data obtained from the study site also showed that herbs were found to be the highest life forms used to treat human and livestock ailments (Table

10). On the other hand, shrubs were found to be the highest number to treat both human and livestock ailments.

Table 10 **Medicinal plants used to treat human, livestock and both human and livestock ailments in the study area**

Organism	Habit								Total	%
	Herbs		Shrubs		Trees		Climbers			
	No	%	No	%	No	%	No	%		
Human beings	30	24.79	20	16.53	9	7.44	3	2.48	62	51.24
Livestock	8	6.61	2	1.65	4	3.31	0		14	11.57
Both human and livestock	15	12.39	23	19.01	6	4.96	1	0.83	45	37.19
Total	53	43.79	45	37.18	19	15.71	4	3.32	121	100

4.8.1 Medicinal plant parts used for the preparation of the remedies

The study showed that the widely used plant part for the preparation of the remedies in the study area were leaves 64 (41.03%) and followed by roots 40 (25.64%) (Table11).

Table 11 Plant parts used in the preparation of the remedies

Plant part used	No of preparations	Percent of the total
Bark	16	10.26
Bulb	1	0.64
Flower	2	1.28
Fruit	6	3.85
Latex	2	1.28
Leaves	64	41.03
Roots	40	25.64
Seed	17	10.90
Stem	3	1.92
Whole plant	5	3.21

4.8.2 Mode of preparation, dosage and route of administration

The study revealed that the highest mode of preparation was in the form of pounding and crushing 76(50.33%); followed by powder 15(9.93%) (Table11). The most widely used route of administration was oral accounted for 85(51.52%) followed by dermal 58(35.15%) (Table12.)

Table 12 Mode of preparation and route of administration

Preparations	No of preparations	%	Route of administration	No.	%
Pounding and crushing	76	50.33	Oral	85	51.52
Powder form	15	9.93	Dermal	58	35.15
Smoke and vapor	13	8.60	Nasal	13	7.88
Chewing	11	7.28	Eye	6	3.64
Juice	10	6.62	Ear	3	1.82
Other forms	26	17.21			

4.8.3 Condition of preparation of the remedies

The study revealed that majority of the remedies were prepared from fresh material of the plants which accounted for 77 (49.68%) followed by fresh / dry 55 (35.48%) (Fig. 6)

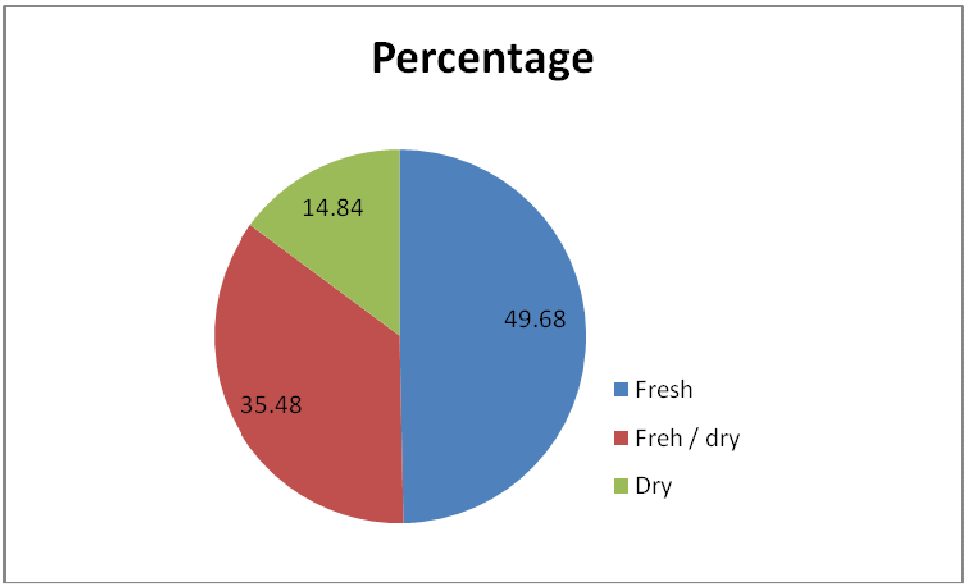

Fig. 6. Condition of preparation of the remedies

4.8.4 Dosage administered and unit of measurement

The dosage of the medicines used is as variable as the diseases treated and the practitioners who treat the diseases. There are some common measurements though the amount of remedies given by these measurement varies from healer to healer. There is also variation, duration, and time at which, remedies are taken and prescribed by healers for the same kind of health problems.

4.9 Ranking and Scoring

4. 9.1 Preference ranking of medicinal plants used for the treatment of wound

In the study area, wound infection was reported to be the most common disease. Five medicinal plants were reported as effective to treat wound infection. Ten traditional healers (key informants) ranked these five plant taxa based on their perception of the degree of effectiveness. Accordingly, *Dodonaea angustifolia* was rated the most effective in treating wound and followed by *Solanium marginatum* (Table13).

Table 13 Preference ranking of medicinal plants used to treat wound (R stands for respondents

	Respondents											
List of medicinal Plants	**R_1**	**R_2**	**R_3**	**R_4**	**R_5**	**R_6**	**R_7**	**R_8**	**R_9**	**R_{10}**	**Total**	**R**
Coffea arabica	1	1	2	1	2	1	1	1	2	1	13	5
Datura stramonium	2	3	1	5	3	3	2	2	1	4	26	4
Dodonaea angustifolia	5	5	5	3	4	5	5	5	3	5	45	1
Guizotia scabra	3	2	4	2	1	2	4	3	4	2	27	3
Solanum marginatum	4	4	3	4	5	4	3	4	5	3	39	2

4.9.2. Paired comparison

A paired comparison was made for five medicinal plants which were used to treat evil eye in the study area. For this, ten key informants were requested to give rank these plant taxa according to their effectiveness. Accordingly, *Withania somnifera* stood first and followed by *Ocimum lamiifolium* (Table, 14).

Table 14 paired comparison of medicinal plants used to treat eivl eye (R stands for informants.

Medicinal plants	**Respondents**										**T**	**R**
	R_1	**R_2**	**R_3**	**R_4**	**R_5**	**R_6**	**R_7**	**R_8**	**R_9**	**R_{10}**		
Ocimum lamiifolium	3	2	2	3	3	2	2	3	3	3	26	2
Artemisia abyssinica	2	3	2	2	1	2	1	1	3	2	19	3
Echinops kebericho	1	2	1	1	2	1	2	1	1	1	13	4
Withania sominifera	3	2	3	3	3	4	4	3	2	3	30	1
Capparis tomentosa	1	1	2	1	1	1	1	2	1	1	12	5

4.9.3 Direct matrix ranking

In the study area, many medicinal plants were used for different purpose other than their medicinal value. The major uses include medicine, edible, firewood, charcoal,

construction and furniture and forage. For this ten key informants were requested to give value, 5 to the most used plant for that particular purpose and 0 to the least. Accordingly, *Acacia abyssinica* was found to be the most multi-purposed plant scoring 84, followed by *Carissa spinarum* scoring 81 (Table 15).

Table 15. Direct matrix ranking for the multipurpose of five medicinal plants. The value given to each plants is the sum of the scores given by the informants

Name of species	**Use categories**						**Total**	**Rank**
	Medicine	**Fire wood**	**Charcoal**	**Construction and furniture**	**Edible**	**Forage**		
Acacia abyssinica	14	18	20	16	0	16	84	1
Olea europaea subsp. *cuspidata*	12	17	20	17	0	6	72	3
Podocarpus falcatus	10	17	13	20	0	0	60	5
Carissa spinarum	16	16	13	14	8	14	81	2
Cordia africana	11	10	12	14	9	8	64	4

4.9.4 Informant consensus

Application of informant consensus analysis showed that some medicinal plants were more popular than others. Accordingly, *Croton macrostachyus* was cited by 24(30 %) followed by *Calpurnia aurea* 23 (28.75%) (Table 16)

Table 16. Informant consensus of medicinal plants in the study area

Scientific name	No of informants cited	%	Rank
Achyranthes aspera	16	20.00	9th
Allium sativum	20	25.00	4th
Calpurnia aurea	23	28.75	2nd
Carissa spinarum	19	23.73	6th
Croton macrostachyus	24	30.00	1st
Echinops kebericho	18	22.50	7th
Nicotiana tabacum	13	16.25	10th
Ocimum lamiifolium	22	27.50	3rd
Verbena officinalis	17	21.25	8th
Withania somnifera	20	25.00	4th

4.9.5 Informant Consensus Factor (ICF)

The result of the study indicated that certain medicinal plants are effective in treating certain disease. The medicinal plants that are effective in treating certain diseases have a high consensus factor value. Accordingly, Plants used against intestinal parasite and ascaries have high ICF scoring 85% followed by plants used against evil sprit and evileye scoring 84% (Table 17).

Table 17 Informant Consensus Factor (ICF)

Disease categories	n_t	%	N_{ur}	%	ICF	%ICF
Intestinal parasite and ascaries	10	8.26	61	76.25	0.85	85
Evil sprit and evileye	13	10.74	75	93.75	0.84	84
Amoebiasis and diarrhoea	9	7.44	45	56.25	0.82	82
Placental retention and urine retention	8	6.61	35	43.75	0.79	79
Gastritis and stomach ache	13	10.74	55	68.75	0.78	78
Malaria and fever	8	6.61	30	37.50	0.71	71
Wound and bleeding	12	9.92	38	47.50	0.70	70
Mich and cough	22	18.18	65	81.25	0.67	67

4.10 Mode of Preparation and use of the most Popular Medicinal Plants based on informant consensus.

- ***Achyranthes aspera* (Amaranthaceae); Derguu (Or.)**: Fresh leaves are pounded and tie on the wound or squeeze its juice drop by drop in to the nostrils to stop bleeding.

- ***Allium sativum* L. (Alliaceae); Qullubbi addi (Or.):** Fresh bulb is pounded, mixed with honey and 2-3 spoon is eaten every day for three days to treat colds; bulb together with *Zingiber offinale*, *Lepidium sativum* is pounded mixed with honey and is taken against evil eye. Dried bulb together with fresh root of *Ruta chalepensis, Solanum incanum* and applied externally to prevent malaria; bulb together with the seed of *Lepidium sativum, Ricinus communis* is pounded and tie on the wound every two days for five days.

- ***Calpurnia aurea* (Fabaceae); Ceeketaa (Or.):** Fresh leaf is ground, mixed with water and wash the body of the animal every morning to treat lice infestation. Fresh leaf is chewed and swallowed to treat diarrhea. The seeds are crushed

mixed with honey and half a tea spoon is eaten for three consecutive days to treat syphilis. Fresh leaf and or seed is pounded together with *Nicotiana tabacum* and applied through the nostrils to expel leech.

- ***Carissa spinarum* (Apocynaceae); Agamsa (Or.):** Dried root together with *Echinops kebericho, Withania sominifera* and Sulphur are pounded together insert to fire and smoke to the patient to treat evil eye; dried root is ground, boiled in water and is drunk to treat stabbing pain. Dried or fresh root together with dried root bark of *Euclea racemosa,* is crushed, boiled and added goats milk and is drunk after cooling to treat gonorrhea.
- ***Croton macrostachyus* (Euphorbiaceae); Bakkannisa (Or.):** It is used by the community to treat Ascarris bloating, Jaundice, Gonorrhea and Stomach ache. (Appendix-3).
- ***Echinops kebericho* (Asteraceae); Qabarichoo (Or.);** Dried root together with dried root of *Silene macrosolen, Withania somnifera* is smoked to the patient to treat evil eye and the above plant parts are pounded mixed with water and the body of the patient is washed or smoked to treat mich.
- ***Nicotiana tabacum* (Solanaceae); Tamboo (Or.):** The young stems and or leaves is ground, add salt, mixed with water and one glass of the mixture is given every morning for three days through the nose or orally to expel leech; Bath the patient with leaf decoction of *Nicotiana tabacum, Ocimum lamiifolium, and Withana somenifera* for a week to treat epilepsy.
- ***Ocimum lamiifolium* (Lamiaceae). Damakese (Or.):** Fresh leaf together with leaf of *Eucalyptus globulus*, *Silene macrosolen* is pounded, mixed with water and drunk or let the patient inhale the vapor of the boiled mixture to treat mich.
- ***Verbena officinalis* (Verbenaceae); Dergu (Or.):** It is used by the local community to treat tonsillitis, diarrhoea, and snake bite.
- ***Withania somnifera* (Solanaceae), Gizaawaa ;** Dried root is fumigate to the patient or fresh leaf is pounded, mixed with water and wash the body to treat febrile illness; dried root together with the root of *Verbena officinalis, Carissa spinarum, Ruta chalepensis* is fumigate to the patient to treat evil eye. Dried root together with root of *Phytolacca dodecandra*, leaf of *Ruta chalepensis*, bark of

Croton macrostachyus is pounded, mixed with water and then after a day given to the animal to treat anthrax.

4.11. Transfer of Medicinal Plant Knowledge

According to the data gathered, the highest number of transfer of knowledge of traditional medicine is to trusted eldest son which accounted for 24 (30%) followed by trusted sons 22(27.5%) (Table 18)

Table 18. Transfer of medicinal plant knowledge.

Medicinal knowledge transfer	No. of informants	Percentage
Trusted eldest son	24	30
Trusted sons	22	27.5
All members of the family	17	21.25
Relatives	11	13.75
Friends	6	7.5

4.12 Number of Medicinal Plants Collected from the Range of Altitudes

The altitudinal range of the Wereda can be categorized as follows: a few areas with an altitude range greater than 2500 m asl, 1500-2500 m asl. and < 1500 m asl. The highest number of medicinal plants were collected from altitude between 1500-2500 m asl., followed by altitude <1500 m asl. and the least number of medicinal plants were harvested from the altitude > 2500m asl.(Fig. 7)

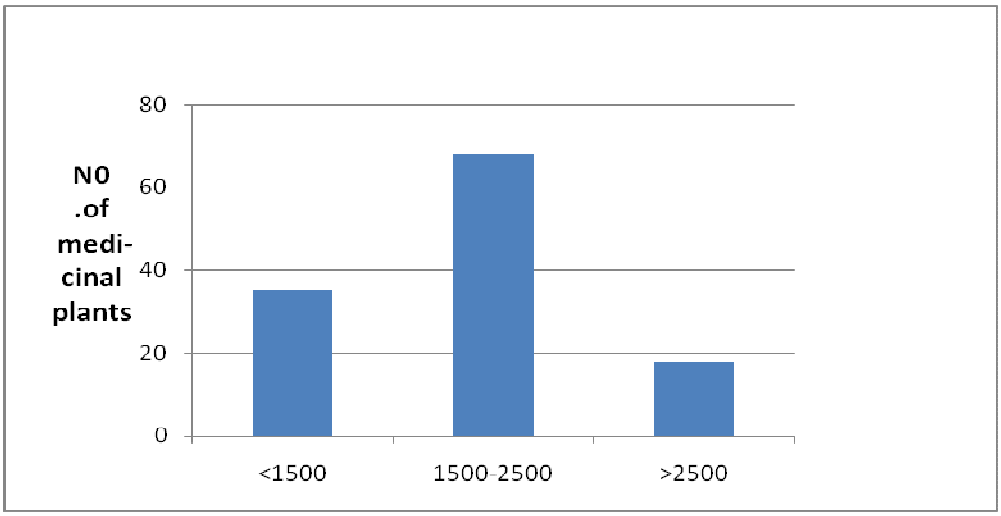

Fig. 7. Medicinal plants collected from different altitudinal range

4.13 Medicinal Plant Trade in the Study Area

The study indicated that there is no widely observed trade on medicinal plants in the study area though some practitioners and women sell some medicinal plants in the market and in their homes. Some of the plant medicines that grow in home gardens and sold are: *Allium sativum, Olea europaea,* subsp. *cuspidata, Ruta chalepensis, Withania somnifera*, *Echinops kebericho, Nicotiana tabacum, Artemisia abyssinica* and *Hagenia abyssinica*. Since the price of those medicines is low as compared to the modern medicines, many of the community members consult the traditional healers, vendors and buy the plant medicines available in the market and home of the sellers. In addition to these people, other vendors came to the Wereda from Adele, Bele weredas and Bale Zone during the market days and sell their plant medicines.

4.14 Conservation in traditional places of worship

The study indicated that many of the persons who have knowledge on traditional medicine usage give priority to the immediate use of the medicinal plants than to its sustainable future uses, as a result their harvesting style is destructive. However, some places are protected for their spiritual and cultural purposes and these placeses include medicinal plants such as *Podocarpus falcatus, croton macrostachyus, Juniperus procera, Ricinus comunis,* and *Olea europaea. Thus, these placeses are good sites for the*

protection of the medicinal plants since cutting and harvesting are not allowed in such particular areas (Fig. 8 – 9).

Fig.8. Vegetation in a Church Compound (Photo taken by Mengistu G/Hiwot, November, 2009)

Key: the red colourd mark in figure 8 shows the site of the church

Fig. 9. Vegetation protected in Muslims' burial area (Photo taken by Mengistu G/Hiwot, November, 2009)

Fig. 10. Unprotected vegetation as compared to Fig.8 &9 (Photo taken by Mengistu G/Hiwot, November, 2009).

4.15. Consevation through cultivation

Some medicinal plant species such as *Eucalyptus globulus, Cordia africana, Allium sativum, Ruta chalepensis* and *Withania somnifera* are cultivated in or near thier vicinity. This is a good practice for the conservation of medicinal plants.

4.16 Threats to Medicinal Plants

Anthropogenic factors affect the medicinal plants in the area. These factors which include agricultural expansion, over grazing, cutting trees down for fire wood, charcoal and construction are the major threatening factors. To rank these factors according to their degree of damage, ten informants were selected to give 4 to the most threatening factor and 1 to the one which threats least. Accordingly, agricultural expansion was the most threatening factor scoring 36, followed by fire wood collection and charcoal scoring 28 (Table 19).

Table 19. Threatening factors of medicinal plants in the study area

	Respondents											
Threatening factors	**R_1**	**R_2**	**R_3**	**R_4**	**R_5**	**R_6**	**R_7**	**R_8**	**R_9**	**R_{10}**	**T**	**R**
Agricultural expansion	4	3	3	4	3	4	4	3	4	4	36	1
Fire wood and charcoal collection	3	4	4	2	1	3	3	4	2	2	28	2
Overgrazing	2	1	2	3	4	2	2	1	3	3	23	3
Exploitation of materials for Construction	1	2	1	1	2	1	1	2	1	1	13	4

4.17. Relationship of Traditional Medicinal Knowledge and Age of the Informants.

The result of the study showed that as people become older and older their knowledge of traditional medicine becomes better and better (Fig. 11).

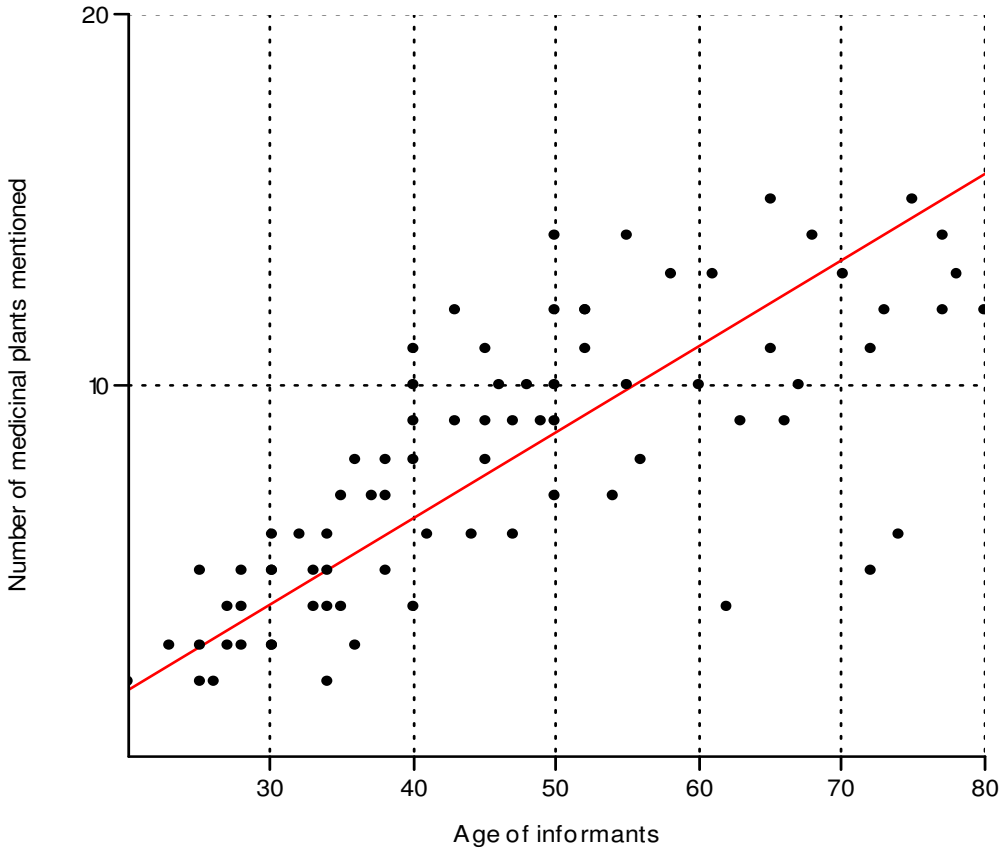

Fig.11. Comparison of medicinal Plants Knowledge and age of Informants

5. DISCUSSION

5.1. Medicinal Plants and the Associated Knowledge of the Study Area

The local community classifies plants, landscapes, soil, and the agroecology of the area in to different categories based on some criteria, in a similar way the local people of Konso special Wereda, SNNPR, Ethiopia classify plants, land form, soil in to different categories (Tizazu Gebre, 2005). This emic categorization is also true for the indigenous people in Gimbi Wereda, Western Wellega, Ethiopia (Etana Tolossa, 2007). This indicated that local people have an accumulated knowledge of their own that they use to classify, use manage and conserve the natural resources. The use of traditional medicine and medicinal plants in most developing countries as a normative basis for the maintenance of good health has been widely observed (UNESCO, 1996).

It is important to give emphasis to traditional medicinal plants and the associated knowledge not only because of their importance in traditional health care system but also their importance in the development of modern medicines (Dawit Abebe, 1986; Tilahun Teklehaimanot and Mirutse Giday, 2007). Additinally, their report indicated that medicinal plants are reservoirs of potentially useful chemical compounds that serve as a basis for many standard drugs used in modern medicine. Although the importance of traditional medicine in primarily health care for the community of the study Wereda is high, there is misunderstanding on the traditional medicinal knowledge and practices especially by the young generation and some modern health professionals that they completely ignore as if it was hundred percent harmful. However, the study revealed that traditional medicine is crucial to the community as it is the only means of remedy especially for those who are far from the town where modern health facilities are relatively not available.

Traditional medicinal knowledge in the study area is transferred mostly to the family members. Accordingly 24 (30%) of the total is transferred to the trusted eldest son. This indicated that traditional professional medical practitioners want their knowledge to be kept secret. It was reported by other studies that traditional health professionals believed

that traditional medicine is effective if done within a family or close relatives (Abbink, 1995).

5.2 Habit and Part of the Medicinal Plant Used for the Preparation of the Remedies

It was reported that Ethiopians use traditional medicinal plants as remedies for a long period of time (Getachew Addis *et al*., 2001; Mirutse Giday *et al*., 2003). The knowledge about the type, part used, dosage, administration of the medicinal plants is circulating chiefly among practitioners of traditional medicine or other members of the community (Mesfin Tadesse, 1986). In the study area, all plant growth forms are not equally used as remedies.This is because of the differnce in distribution among the growth forms. This leads to the wide use of shrubs and herbs for their medicine. Accordingly herbs were found to be the highest which accounted for 53 (43.79 %) and followed by shrubs 45 (37.18 %). This study agrees with similar studies elsewhere in Ethiopia (Bayafer Tamene, 2000; Mirutse Giday and Gobena Amen 2003; Tesfaye Awas and Sebsebe Demissew, 2009). According to this finding, the part of the plant which is highly used for the preparation of the remedies were leaves 64 (41.03%) followed by roots 40 (25.64%).The work agrees with Mirutse Giday *et al.* (2003), Fisseha Mesfin (2007).

5.3. Preparation Methods, Routes of Administration and Dosage of Medicinal Plants

Based on the information gathered from the key informants especially from those who are highly accepted by the society for their ability in healing different health problems, the condition of preparation of remedies was not the same. The highest condition of preparation was fresh 77 (49.68 %) followed by fresh/dry 55 (35.48%). In contrast to this idea, some professional traditional healers sell their plant medicines in dried form in the market and also store the dried plant medicines in different containers in their homes. This is in agreement with Kebu Balemie *et al.* (2004). The end products of the traditional medicinal remedies preparations are in the form of decoctions, powder juice, infusions, pounded and crushed forms smoke and vapour forms. The results of the study also showed that the plant remedies were administered orally 85 (51.52%) followed by dermal 58 (35.15%). This study agrees with a similar studies else where in Ethioopia (Dawit Abebe and Ahadu Ayehu, 1993; Tilahun Teklehaimant and Mirutse Giday, 2007).

With regard to the dosage given to patients in the study area, there is no standardized known unit of measurements of the plant remedies. This means that the same types of medicinal remedies for the same types of ailment were given with different measurements in the same or different Kebeles of the study Wereda. The result of this study is in line with study made by Amare Getahun (1976), Sofowara (1982) and Dawit Abebe (1986) who indicated that lack of precision and standardization as one draw backs for the recognition of traditional health care system. Although the measurement types were different, there are some common measurements like coffee cup, small areke glass, digits of a finger, teaspoon, glass that people use to drink tella or water and palm of hand. Age, sex and stage of illness were also considered in the study area by some professional healers to determine the amount of the remedies to be given. This finding is also similar with the study conducted by Dawit Abebe (1986). At the time of group discussion almost all the informants agreed on the variation in dosage given by different healers and the analysis of the data based on the information gathered from the key informants and even from the customers (the users), indicated that taking over dosage or under dosage have their own negative impact that is over dosage may lead to different health complication and even death and under dosage may not cure the disease under question.

5.4. Source and Distribution of Medicinal Plants

According to Frankel *et al*., (1995); Tesfaye Awas and Sebsebe Demissew (2009), medicinal plants are among the diverse categories of useful plants obtained from the wild. The works of Etana Tolassa (2007) and Fisseha Mesfin (2007) also showed that majority of the medicinal plants were collected from the wild which accounted for 72.94% and 61.1% respectively and some are collected from homegardens in their respective study sites. In a similar way Miruse Giday and Gobena Ameni (2003) reported that the habit of cultivating plants in or around home gardens in the two Weredas of Southern Tigray for their medicinal purposes is very limited. This indicated that the practice of cultivation of plants for their medicinal purpose in home gardens of most of the country is low though many plants are cultivated for other purposes, mainly for food. In a similar way people in the study area have less effort to cultivate medicinal plants in their home gardens rather they go to the near by or far places and harvest the plants. As it was reported by informants nowadays some medicinal plants are not found in the places where they grew

some ten or twenty years ago. The scarcity of the medicinal plants initiated some traditional professional healers to cultivate plants such as *Nicotiana tabacum, Lepidium sativum, Foeniculum vulgare, Silene macrosolen, Phytolacca dodecandra* which have medicinal value though the practice is not widely observed.

5.5. Threats and Conservation of Medicinal Plants in the Study Area

As it was reported, the biodiversity of Ethiopia is eroding by natural and anthropogenic pressures (Abebe Demissie, 2001). Like all other parts of the country, human-made factors in its different forms affect the biodiversity of the study area.

According to Ensermu Kelbessa *et al*. (1992), Ethiopia's traditional medicine, as elsewhere in Africa, is faced with problems of continuity and sustainability primarily due to loss of taxa, habitat of medicinal plants and other categories. The results of the analysis showed that the source of threats to medicinal plants especially the human made factors pose a great impact on them. Similar findings were reported elsewhere in the country (Mirutse Giday *et al*., 2003; Tesfaye Awas, 2004 and Fisseha Mesfin, 2007). The study also revealed that the type and degree of threats varies from place to place and species to species in the study area. For example, the medicinal plants grown near to the town of Seru are highly threatened by firewood collectors, timber and other plant providers and charcoal sellers which use them as a means of supplementary income generation by providing to the urban dwellers. Indoing that medicinal plant species such as *Podocarpus falcatus, Cordia africana, Juniperus procera, Acacia abyssinca, Ekebergia capensis, Olea europaea* subsp. *cuspidata* are the most vulnerable than other medicinal species. The medicinal plants which grow in the relatively densely populated study kebeles such as Welte'e. Jida Jiru, Dero Negaya, Dero Dibayu, Sadaa and Dero Murti are highly threatened by agricultural expansion.

Those medicinal plants grown in the place with low and erratic distribution of rain fall which is located in the lowland part of the Wereda are threatened by drought. This finding of the variation of the threatening factor and the treated species agrees with that of the findings of Kebu Balemie *et al.* (2004). Although over harvesting of medicinal plant species is considered to be threatening factor, this study indicated that over

harvesting of plant medicines for self-care or trade was not practiced in the way that can threaten medicinal plants. In a similar way, Frankel *et al.* (1995) noted that the principal threat to medicinal plant species is not over harvesting but the destruction and conversion of their habitats to other purposes like agricultural expansion, urbanization, cutting for construction, fire wood and charcoal. Moreover, destructive harvesting is another problem, for example if they want to harvest the leaves, fruits or seeds from a tall tree, they cut the whole plant instead of climbing and pick the parts. These destructive collecting practices and the general threats to the biodiversity like the population pressure in one or the other form leads to the scarcity of medicinal plants. Due to these factors some medicinal plants especially those which grow in the wild and with high preventive or curative power are not easily available and people move to far away places, whether they are on the top of a mountain, hillside, along the river or gorges to collect them. Those medicinal plants which are collected from far away places and the medicines which are prepared from them were sold to a high price compared with those medicinal plants that are easily available.The results of the study indicated that the effort made by the community to conserve medicinal plants is not satisfactory though their importance is obvious especially to the professional traditional healers but some sites in the Wereda are protected for spiritual and cultural purposes. Cultural and spiritual beliefs some how helped in the conservation of medicinal plants. For instance, the claim of the traditional healers that medicinal plants are effective only if cut or collected and administered by the knowledgeable persons and healers helps in conservation of medicinal plants. This can contribute to the conservation of biodiversity in general and in this case medicinal plants in particular and also some members of the community cultivate different plant species in homegardens and around their vicinities, serving as food, shade, ornamental, wind break, live fence and to some extent for their medicinal purpose. The field observation, and discussion with the informants showed that many of the plants in homegradens or grown near the homegardens were mainly cultivated for other purposes than for their medicinal value especially as a food crop but species like *Ruta chalepensis*, *Ocimum lamiifolium* and *Withania somnifera* are cultivated for their medicinal value. This study is similar with the study of Zemede Asfaw (1997), which indicated that the plant species, primarily cultivated for medicinal purposes are few, accounting for about 6% of the total crop

species grown in home gardens. The results of the study showed that whether the plants are cultivated for their medicinal purpose or other purpose, it has a great contribution to the conservation of medicinal plants and the associated traditional medicinal knowledge.

5.6 Threats to Indigenous Knowledge of Medicinal Plants

It was reported that 80% of Ethiopian population depend on traditional medicine for their primary healthcare (Dawit Abebe and Ahadu Ayehu, 1993). The plants used, parts used method of preparation are often closely guarded secrets. In a similar way the result of the study showed that the indigenous knowledge of plant medicines of the study area is kept secret to a few practitioners and many of the dwellers consult them for their primarily health care, though some member of the community practice themselves for their self-care.

According to the information gathered from the informants and other traditional medicine users of the study area, majority of the professional traditional healers do not show and share the medicinal plants and their traditional knowledge freely to any body. But they share their knowledge of medicinal plants to one or in some cases to their family member who they trust most when they become older and older. In doing this, they told to the person to follow the same principle of secrecy and even some healers die without transferring their knowledge. When the practitioners are asked why they kept their knowledge secret, they answered in such a way that the knowledge of medicinal plant is one means of income generating, and also said the healing power of the plant remedy decreases if the secret is out. Similar findings were reported elsewhere (Fassil Kibebew, 2001; Mirutse Giday and Gobena Ameni, 2003). This secrecy of traditional knowledge of the study area could lead to its eventual loss over a period of time. In addition to this the informants consensus showed that the establishment of health posts in each Kebele along with the extension health workers who teach health education by moving through the kebeles, the teachers who teach modern education in the school of each Kebele of the Wereda try to make the community understand the importance of using only modern therapy without saying something good about the traditional ones. This poses threat to the traditional knowledge of plant remedies. In a similar way, Miruitse Giday *et al*.

(2003) reported that loss of traditional knowledge has been aggravated by the expansion of modern education.

5.7. Comparison of Medicinal Plants Knowledge and Age of Informants

The result of the study revealed that many of the remedies to treat different maladies are shared among the communities of the area though some of the most effective ones are kept in the hands of a few individuals (the healers). Similar finding was reported elsewhere that people share traditional medicinal knowledge among themselves to treat and/or prevent human and livestock ailments (Mirutse Giday *et al.*, 2003). It was reported that medicinal plant knowledge passes from the oldest people to the next generation (Pankhurst, 2001; Mirutse Giday *et al*., 2003)

The finding of the present study is also in agreement with these researchers in that most of the young individuals obtain the knowledge from the elders. The result of the study also indicated that there is a strong positive correlation (r=0.75) between the age of informants and their traditional medicinal knowledge. This means that the older people have accumulated knowledge during their past life time than the younger ones. This is in agreement with Mirutse Giday *et al*. (2003), Tesfaye Awas (2007).

6. CONCLUSIONS

The ethnobotanical study of medicinal plants in Seru Wereda showed that plant medicines are used by a large member of the population and it is the most important means of treating some common human and livestock ailments such as diarrhea, eye disease, snakebite, stomachache, wound, taeniosis, malaria, ascaries, toothache, evileye, cough, headache, gonorrhea, Feberile illness, anthrax, control of leech, external animal parasites, tonsillitis, urine retention and fever especially for those community members who can't buy the modern medicines with a relatively higher price.

Like all parts of Ethiopian society, the common diseases in the study Wereda were treated and protected either by self-care system at household level or by the professional healers. At first, most of the community members tried to treat by themselves. But if the disease is not cured,they went to the nearby or to a specialist who live in a far place to be treated. Since the price for herbal remedies is relatively cheap as compared to the modern drugs and their strong belief on the traditional system,many of the community members visit the healers for their own and their livestock healh problems.Inaddition to the prevention and treatment of diseases using the plant materials,many people went to Debteras and or witch doctors to be treated spiritually.Many people in the area went to the nearby health center or clinic if and only if their health problem is not solved by the traditional system. But recently that is after the establishment of the health posts,the health extention workers aware the people on how to prevent and cure diseases by keeping themselves and their surroundings clean and they also advised them to go and treat only by the modern health system and also the health workers teach the society about the harmness of the traditional system without saying something good about it.This and other similar factors may lead to the decline of the traditional system in the longrun. Although this study is about medicinal plants and the associated knowledge, it was observed that the people use the same species of medicinal plants for other services such as food, firewood, construction, charcoal and the like.

The use of medicinal plants for multiple purposes is leading to deplation in an alarming rate. This is worthly because of some of the uses (fire wood, construction and charcoal)

are destractive. However, over harvesting of medicinal plants don't pose a serious threat on the medicinal plants of the study area. This might be due to the fact that the price of the plant medicines in the area is low which doesn't encourage healers or collectors to harvest more. Although this is true, the destructive harvesting was clearly seen. When some healers and/or collectors harvest leaves, roots, barks, fruits, flowers, seeds and whole plant to prepare the plant remedies. The mode of their harvesting is not a way that leads to the continueity of the plants. Forexample if they want to prepare the remedies from a herbaceous plant that has many roots, they uprooted the whole plant rather than digging and cutting one or some of the many roots This means that their collection style targets mainly on the immediate use of the plant without considering its future value.

The findings of the study showed that harvesting of roots and barks have great impact on the plants and leads to the scarcity of the medicinal plants. Fortunately, the plant parts which are mostly used for the preparation of the remedies in the study area were leaves and harvesting of leaves has less impact on the plant than harvesting of roots and barks. Moreover, the study revealed that agricultural expansion is a leading factor in threating medicinal plants in the area. The study also showed that most of the medicinal plants were collected from the wild and some are from the homegarden. With regard to the usage of the growth forms, herbs were found to be the dominant followed by shrubs, trees and climbers. Remedies were mainly administered orally followed by dermal application. In the study area most of the professional healers were males and a few of them were females. The study also showed that older people know more medicinal plants than the younger ones. The study revealed that the variation of traditional medicinal knowledge by sex and age is probably due to the fact that most professional traditional healers, transfer their knowledge to their sons than to their daughters and this might be one factor for the limited number of female professional traditional practitioners. Moreover, most healers in the study area transfer their knowledge to the first born son on their later ages, though this is not always true. At that time the elder son might be thirty-five or above years of old. The results of this study also showed that cultivation of plant species in and around home gardens for different purposes and protecting some areas for spiritual and cultural purposes have great contribution to the conservation of medicinal plants and the associated knowledge.

7. RECOMMENDATIONS

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

- The traditional healers and other members of the community should be encouraged to cultivate or grow medicinal plants in their homegardens, on farm lands, around their vicinities and in the form of live-fences. To make these practical non-governmental sectors, governmental organizations including educational health and agricultural institutions should train, support and work together with dwellers to facilitate the task of cultivation and to ensure the sustainability of the medicinal plants.
- In the study area, majority of the people use traditional healing system because of the factors like the shortage of well trained modern health professionals and the insufficient of modern health facilities.Although this is true, Some modern health professionals undermine and even ignore the traditional healers and the traditional healing system. This might affect the system and if the system is decline,those especially the poor members of the society will be at risk. So Integration of the traditional and modern health systems is crucial to increase the health coverage, to control the disease and disorders and to narrow the gap between the two health systems.
- Further and relevant scientific research should be conducted on medicinal plants to dig out their quality, efficacy and safety and this helps to ignore the unwanted part and to accept the best part of it. These plants with known therapeutic activities should be given special concern and develop modern dosage forms of drugs from those medicinal plants.
- The destructive harvesting methods of medicinal plants, for example some healers and collectors cut the main branches of tall trees like *Berchemia discolor* and *Ehretia cymosa* to harvest the leaves instead of climbing and picking them or instead of using a long cutting material.This should be reversed by giving awareness to people in any public meeting. More over, the methods that employ roots and barks cause a serious problem on the existence of the plant. To minimize this problem, further research should be conducted which reverse this problem.

- Trainings should be given to the practitioners on the best way to collect, document, use, store and conserve the medicinal plants. This training helps practitioners to widen the already existing knowledge of their own and helps to improve the quality of the herbal drugs.
- Medicinal plants like *Hagenia abyssinica, Olea europaea subsp.cuspidata, Podocarpus falcatus, Juniperus procera, Cordia africana, Brucea antidysentrica,Ekebergia capensis, Ficus sur, Millettia ferruginea, Ximenia americana* which are highly threatened, should be given prioritization for conservation. Promoting the establishment of in –situ conservation measures is also one method of conservation epecially for those medicinal plants which are only found growing wild and this should be encouraged.

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9. APPENDICES

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

1. Name _____ Sex _____ Age _____ Kebele _____
   Village _____ Religion: Orthodox _____ Islam _____ Protestant _____ Others _____
   Marriage Status: Married _____ Unmarried _____
   Educational Status _____
2. Health status
   2.1 What types of traditional medicines do you use? For how many times did you use it?
   2.2 What are the major human diseases in this area?
   2.3 What are the major livestock diseases in this area?
   2.4 How do you treat the diseases that you know?
3. About the plant medicines
   3.1 List the medicinal plants used to treat humans?
   3.2 Which traditional medicinal plants are used to treat livestock ailments?
   3.3 Which medicinal plants are used to treat human and livestock ailments?
   3.4 Where do the medicinal plants obtained (grow)? In home gardens or in the wild or both
4. Which part of the plant is used as remedy? (Leaf, stem, root, flower, bark, fruit, seed, latex, or whole plant) and what is the method of preparation of the medicine? (Crushed and pounded, powdered, concoction, decocoction, infusion, used alone or mixed with others)
5. Form of the medicinal plant used
   5.1 In fresh form
   5.2 In dry form
   5.3 In fresh or dry form
6. Is there difference in dosage among age or sex groups?
7. Is the way of administration internal or external? If internal how?? Oral, nasal? If external how?
8. What solutions people use to the side effects of the traditional medicines? (anti dote)
9. Is the medicinal plant marketable?
10. What are the ways of transferring of knowledge of the healers to the next generation?
11. Are the medicinal plants easily accessible? If not why?
12. How does modernization interfere with traditional medicinal knowledge?

13. How do you judge the price of the traditional medicine with that of the modern medicine?
14. Do the communities use only traditional medicine?
15. What are the threats and conservation measureas to the medicinal plants
16. What is the status of using traditional medicine in the moment?

17. Do the traditional healer use only a single traditional medicinal plant to prepare the remedies or by mixing with others?

Appendix 2. List of Informants (Key: No-no education/illiterate, 2, 3, 4… refer Formal education, *= Key informants, RE= Religious education, M = married, S= Single, D= Divorce

S.No	Name	Sex	Age	Educational Status	Marital Status	Kebeles	No. of MPTs
1	Abdulmenan Mohammed *	M	40	No	M	Sada'a	11
2	Mehadi H/Mohamud*	M	35	8	M	Sada'a	8
3	Tuba Mohammed	F	62	No	M	Sada'a	4
4	Israel H/Mohammed	M	48	R.e	D	Sada'a	10
5	Abdulmejid Umer	M	54	No	M	Sada'a	7
6	Muder Abas	M	26	R.E	S	Sada'a	2
7	Jemila Mame *	F	28	No	M	Sada'a	5
8	Bedria Mohammed	F	27	No	M	Sada'a	3
9	Sh/Mohammed Abdulah	M	25	7	S	Welte'e	3
10	Arebe Sh/Adem*	F	43	No	M	Hadidi Indas	9
11	Ibro Mohammed	M	47	3	D	Hadidi Indas	9
12	Nesiro Abdulfetay	M	49	5	M	Hadidi Indas	9
13	Zeni Abdulahi	F	52	No	M	Welte'e	12
14	Ismo Aliyi	M	38	R.E	M	Hadidi Indas	8
15	Ayelu Worku	F	36	5	M	Welte'e	3
16	Hadisa Alo	F	34	2	M	Welte'e	6
17	Mamo Ahmed *	M	45	No	M	Waji	11
18	Alfia Sh/Amed *	F	50	No	M	Waji	12
19	Mema Hussen*	M	50	4	M	Waji	9
20	Gebu shuba	M	30	5	D	Waji	5
21	Abdulwahab Sh/Ahmed	M	38	2	M	Waji	7
22	Zetu Reshid	F	36	No	M	Waji	8
23	Jemal Kedir *	M	40	No	M	Lilo Gurati	7
24	Zaeneba Ahmed	F	30	NO	M	Lilo Gurati	6

25	Abdo Abdulrahiman	M	58	R.E	D	Lilo Gurati	13
26	Kedir Musa	M	70	No	M	Lilo Gurati	13
27	Zetu Nuho *	F	28	No	S	Lilo Gurati	4
28	Abdulaziz H/kedir	M	75	3	M	Bubu kulche	15
29	Alfiy Kedir	F	61	No	M	Bubu kulche	13
30	Aman Abdo *	M	60	5	M	Bubu kulche	10
31	Sh/Musa Hussen	M	77	R.E	M	Bubu kulche	14
32	Memu Musa	F	80	No	M	Bubu kulche	12
33	Gero Kedir *	F	25	N.o	S	Bubu kulche	5
34	Abuna Sh/Taha	M	23	5	S	Bubu kulche	3
35	Kasim A/Aziz*	M	32	3	D	Wabe Odadima	6
36	Geden Fara *	M	72	R.E	M	Wabe Odadima	5
37	Wordiya Shefe	F	41	No	D	Wabe Odadima	6
38	Maney Mohad	M	68	No	M	Wabe Odadima	14
39	Rhama Ott	F	55	No	M	Wabe Odadima	10
40	Shenin Nur	M	63	No	M	Wabe Odadima	9
41	Ahmed Usman	M	50	NO	D	Seru 01	10
42	Mamite Dorsis	F	66	NO	M	Seru 01	9
43	Tamirat W/Tsadik	M	78	NO	M	Seru 01	13
44	Negash Lebese	M	33	5	M	Seru 01	4
45	Ejigayehu Ayele *	F	56	No	M	Seru 01	8
46	Sh/Adigm Usman *	M	40	4	M	Seru 01	9
47	Berhane kebede	F	34	No	M	Welte'e	4
48	Bekele K/Yimer	M	65	Prist	M	Welte'e	11
49	Amin Alo	M	34	10	M	Welte'e	2
50	Nure kebir Aliyi*	M	77	No	M	Welte'	12
51	Jemal ahmed *	M	55	No	M	Hadido Inda	14
52	Sh/kedir Abdulahi	M	74	R.E	M	Hadido Indas	6
53	Mama Mussen*	M	65	2	M	Dhero Dhibayu	15

54	Alyi Kasim *	M	50	6	M	Dhero Dhibayu	14
55	Tuba Sado	F	67	No	M	Dhero Dhibayu	10
56	Hussen Alo	M	73	NO	M	Dhero Dhibayu	12
57	Jemal Kasim	M	52	5	M	Dhero Dhibayu	12
58	Fatuma Keder*	F	30	No	D	Dhero Dhibayu	5
59	Zeneba kasim	F	27	No	S	Dhero Dhibayu	4
60	Nura Adiem	M	37	R.E	M	Dhero Dhibayu	7
61	Hussen Sh/Amed	M	44	10	M	Jida Jiru	6
62	Abe Kaso	M	25	4	M	Jida Jiru	2
63	Kediro H/Mama *	M	45	2	M	Jida Jiru	9
64	Worku Ayele *	M	50	No	M	Jida Jiru	7
65	Bedriya Hussen	F	45	No	M	Jida Jiru	8
66	Fatee Ahmed	F	46	No	M	Jida Jiru	10
67	Boge Ayele	F	40	No	M	Jida Jiru	8
68	M/nur H/Hussen	M	43	R.E.	M	Dhero Murti	12
69	Kuma Kedir	M	20	No	S	Dhero Murti	2
70	Mohammed Adem *	M	33	R.E	S	Dhero Murti	5
71	Misira Mamo*	F	34	3	M	Dhero Murti	5
72	Sh/Taha Ahmed	M	47	No	D	Dhero Murti	6
73	Kemal K/Aliya	M	72	R.E	M	Dhero Negaya	11
74	Medo Sh/Abduljwad	F	30	No	D	Dhero Negaya	3
75	Shueba K/Adem	M	52	R.E	M	Dhero Negaya	11
76	Asefu Erarsu	F	38	2	M	Dhero Negaya	5
77	Esey Lemma	F	40	6	M	Dhero Negaya	4

78	Tekil Abebe *	M	30	4	M	Dhero Negaya	3
79	Sefu H/Jemal *	M	35	No	M	Dhero Negaya	7
80	Tessema Befirdu	M	28	4	M	Dhero Negaya	3

Appendix 3. Lists of medicinal plants used to treat human and livestock ailments in the study area (Hb= habit, Pu-part used, Ut=used to treat, Cp=condition of preparation, RA= route of administration, T=tree, H=herb,Sh=shrub, Cl=climber, Hu=human, Ls=livestock, B=both, F=fresh, D=dry, F/D=fresh and dry, O= oral, Ex= external, Na= nasal, Ey=eye, Er=Ear, L=Leaf, R=root, St=stem, Ba=bark, Fl=flower, Fr=fruit, S= seed, Bu=bulb, La= latex, Wp=whole plant) Ct = Collected from, C=common, Re= rare, Dt= distant, Av= availability, *=endemic

Scientific name	**Family**	**Local name**	**Hb**	**PU**	**UT**	**CP**	**RA**	**Disease treated**	**Preparation and Application**	Ct	Av	Coll. No
Acacia abyssinica Hochst.exBenth.	Fabaceae	Laaftoo	T	L	HU	F	O	Back- pain	Fresh crushed leaves are mixed with water and drunk.	W	C	MG 011
Acalypha fruticosa Forssk.	Euphorbiaceae	Baaltokkee	SH	R	HU	F	O	Stabbing pain	Fresh root is crushed and mixed with coffee and drunk one coffee cup a day for three consecutive days.	W	C	MG 098
Achyranthes aspera L.	Amaranthaceae	Dargu	H	L	HU	F	Na	Nose-bleeding	Fresh Leaves are crushed and tie on the wound and squeeze in to the nose.This helps to stop nose bleeding.	W	C	MG 100
Acmella caulirhiza Del.	Asteraceae	Gutichaa	H	R	Hu	F	In	Tonsillitis	Fresh root is pounded and given a small drops of the squeezed juice.	W	C	MG102
Acokanthera schimperi (A.DC.) Schweinf.	Apocynaceae	Qaraaru	Sh	L	Hu	F	Ex	Leprasy	Leaves of this plant are pounded to gether with *Brucea antidysentetica*, *Rumex abyssinicus* then mixed with butter and applied on the skin.	W	C	MG 023

Agave sisalana Perrine ex.Engl.	Agavacea e	Algee	H	R	Ls	F	O	Black leg k	Fresh root is crushed, mixed with water and given to cattle.	W	D	MG 077
Ajuga integrifolia. Buch. Ham.ex D.Don	Lamiaceae	Harmagusa a	H	L	Hu	D	O	Swelling	Dry or fresh leaves are pounded & drunk or tied on the swelling.	W	C	MG 046
Allium sativum L.	Alliaceae	Qullubbii - Adii	H	Bu	Hu	D	O	Colds	The blub is pounded, mixed with honey and 2-3 teaspoon is eaten everyday for three days.	Hg	C	MG 0 19
								Evil eye	Blub is crushed together with one rhizome of *Zingiber officinale*, *Lepidium sativum* pasted with honey and 2 teaspoon is taken			
				Bu	Hu	F	Ex	Malaria	Blub is pounded, mixed with the crushed fresh leaves of *Ruta chalepensis, Solanum nigrum*, and applied externally to prevent the disease.			
				Bu	Hu	D	Ex	Wound	Blub is pounded together with the seed of *Lepidium sativum* and *Ricinus communis* and tied on the wound every two days for five days.			
Aloe macrocarpa	Aloaceae	Hargeessaa	H	L	Ls	F	O	Bloat	Fresh leaf is pounded together with *Ruta chalepensis, Allium sativum,*	W	D	MG 033

Tod.								Fire-burn	*Foeniculum vulgare,* mixed with water and given to cattle with a big can . Applied the sap to the damaged part every other day unitl the wound is cured.			
Artemisia abyssinica Sch. Bip.ex A. Rich.	Asteraceae	Harrittaa	H	Wp	Hu	F	Ex	Evil eye Relapsing-fever	Leaf concocation together with root of *Echinops kebericho* is added to a burning fire and smoked to the patient. Decoction whole part is added to pounded *Crotan macrostachyus* and *Ruta chalepensis* mixed with water and wash the body of the patient.	W	R	MG 002
Artemisia schimperi Sch. Bip. ex Engl.	Asteraceae	Harrittaa	H	Wp Wp	Hu Hu	F F	Ex O	Bleeding Headache	Leaves are inserted into the nostrilis to stop bleeding. The whole plant is boiled in water and drunk and the head of the patient is washed with it or smell the plant as it.	Hg	R	MG 081
Asparagus africanus Lam.	Asparagaceae	Sariitii	Sh	R	Hu	F	O	Placeata-retention	Root is pounded, warm in water then mixed with honey and is drunk.	W	C	MG 051
				L	Ls	F	O	Placenta-retention	Leaves and root is pounded mix with water with out boiling and given to the animal with a large local drinking cup /Merti/.			
				R	B	F	Ex	Wound	Fresh root is pounded together with			

									leaves of *Dodonea angustifolia*, mixed with butter and applied on the wound.			
				L	Hu	F/D	O	Malaria	Leaf is crushed, mixed with milk and taken one coffee cup every morning until the individual goes from the malarious area.			
Asparagus racemosus Willd.	Asparagaceae	Sariitii	Sh	L	Ls	F	Ex	Anti worms	Leaf is pounded and mixed with the latex of *Aloe spp*, put on flat stone and then pray to kill the worms in the wound.	W	C	MG 026
Berchemia discolor (Klotzsch)Hemsl..	Rhamnaceae	Jajaba	T	L	Hu	F	O	Hook worm	Leaf concoction is mixed with honey, warm the solution and drunk.	W	D	MG 111
Bersama abyssinica Fresen.	Meliantha ceae	Lolchiisaa	Sh	R	Hu	F	O	Syphilis	Fresh root is chewed and swallow its content or dry root is crushed, boil and drunk for three consecutive days.	W	C	MG 003
				Ba	Hu	F	O	Ascaris	Fresh bark is pounded, pasted with honey and is eaten.			
Brucea antidysenterica. J.F.Mill.	Simarouba ceae	Ciroontaa	Sh	R	B	F/D	Ex	Wound	Crushed root is mixed with pounded fresh leaf of *Dodonea angustifolia* and tied on the wound for two days every other day.	W	R	MG 0 76
				L	Hu	F	Ex	Evileyes	Fresh leaf of *Brucea antidysentrica* is placed in the nostrils.			
Buddleja	Loganiace	Adadoo		S	Hu	D	O	Diarrhea	Seeds are pounded, mixed with honey	W	C	MG 035

polystachya Fresen.	ae								or sugar in water solution and drunk.			
			Sh	L	Hu	F	O	Malaria	Leaves are pounded together with *Calpurnia aurea*, mixed with water and the infusion is drunk to cure or prevent the disease.			
Cadaba farinosa Forssk.	Capparidaceae	Qalqalcha	Sh		Hu	F	Ex	Ring worm	Fresh leaf together with leaf of *Boechmeria macrophylla* is pounded, mixed with water then after 2 days apply to the affected part.	W	D	MG 099
				R	Hu	D/F	O	Intestinal parasite	Fine powder of root is mixed with honey and eat a tea spoon a day for four days every morning.			
				L	B	F	Ex	Wound	Leaves are rubbed on the affected area until it heals.			
				Ba	Hu	D/F	Ex	Eczema	Powder of bark is mixed with butter and applied after washing the wound with warm salted water.			
				L	Hu	F	Ey	Eye disease	Fresh leaf is pounded, squeezed and a small amount of its juice is added to the eye.			
Calpurnia aurea (Ait.) Benth.	Fabaceae	Ceckataa	Sh	L	Ls	F	Ex	Lice	Fresh leaves are pounded, mixed with water and wash the body of the animal every morning until the parasites are	W	C	MG 078

									eradicated.			
				L	B	F	O	Diarrhea	Fresh leaf is chewed and swallow for humans or the seeds are roasted, pounded, mixed with water and drunk by areke glass and leaf is pounded, mixed with water and given to animal with a can unitl the diarrhea stops.			
				S	HU	D	O	Syphilis	The seeds are crushed, mixed with honey and half teaspoon is eaten for three consecutive days.			
				L	Ls	F	Na	Leech	Fresh leaf and/or seed is pounded together with leaf of *Nicotiana tabacum* and is applied through the nostrils.			
Capparis tomentosa Lam.	Capparidaceae	Harangama a	Sh	R	Ls	F/D	Ex	Swelling	Fresh root is pounded, mixed with butter and is applied to the affected breast.	W	C	MG 067
				L	Hu	F	O	Toothache	The leaf of *Capparis tomentosa* is chewed and placed on the teeth for some hours.			
				L	Hu	D	Ex	Evileye	Leaf or root is crushed, add to fire and smoked to the victim.			
Capsicum annuum L.	Solanacea e	Barberee	H	Fru it	Ls	D	In	Bloat	Pounded, mixed with water and given orally	Hg	C	MG059

Carduus schimperi Sch..Bip.	Asteraceae	Qorii harree	H	R	Hu	F	Ex	Hemmoroids	Fresh root and/or bark is pounded, boiled in water, allow to cool-for some minutes and wash the affected part with it.	W	C	MG 010
Carica papaya L.	Carricaceae	Papaya	T	S	Hu	F	O	Jaundice	Seed is roasted, pounded and is drunk two coffee cups every morning for three days.	Hg	R	MG 086
Catha edulis (Vahl) Forssk . ex Endl.	Celastraceae	Catii	Sh	L	B	F	O	Urine - retention	Fresh leaf together with *Ruta chalepensis, Foeniculum vulgare* is pounded, mixed with water add local areke (katkala) and is given orally.	Hg	C	MG 069
Carissa spinarum L.	Apocynaceae	Agamsa	Sh	R	Hu	F	Ex	Evil sprit	Root together with *Withania sominifera* and suphur are pounded together added to fire and smoke to the patient.	W	C	MG 113
				R	Hu	F	O	Stabbing pain	Root is pounded, boild in water and is drunk by an areke glass.			
				R	Hu	F/D	O	Gonorrhea	Root together with dried root bark of *Euclea racimosa* is crushed, boiled, add goats milk and is drunk after cooling.			
				R	Hu	F	O	Malaria	Fresh root is pounded, insert into cold water, wait for aday and is drunk.			
Chenopodium ambrosioides L.	Chenopodiaceae		H	L	Hu	F	Ex	Wound	Leaves are pounded mixed with butter and applied to the affected part until the wound is healed.	W	C	MG 025

				L	Hu	F	O	Kidney problem	Leaf decoction together with *Allium sativum* is drunt.			
Cissus rotundifolia (Forsk.) Vahl.	Vitaceae	Cophii	Cl	L	Hu	F	O	Mitch	Fresh leaf is pounded, boiled and drunk or the root is chewed.	W	C	MG 066
Citrus limon (L.) Burm.f .	Rutaceae	Dhugo	Sh	Fr Fr	Hu Hu	F F	O Ex	Stomach ache Scabies	Fruit juice is added to water and drunk. Fruit juice mixed with fine powder, root of *Acokanthera schimperi*, and applied to the affected part and sit under the sun for about half an hour.	Hg	C	MG 088
Clematis simensis Fresen.	Ranunculaceae	Fitii	Cl	L	Hu	F	Ex	Cough	Place young leaves in the nostrils	W	C	MG 044
Clerodendrum myricoides (Hochst.) Vatke	Lamiaceae	Marasisaa	Sh	R R R	Hu Hu Hu	F/D F F	Ex O O	Evil eye Snake bite Malaria	Root is inserted on fire and the smoke is inhaled through the nostrils. Fresh root decoction is drunk immediately after the bite. Root together with the root of *Withania somnifera* are pounded, mixed with water, boil,.cool and then drunk	W	C	MG 018

Coffea arabica L.	Rubiaceae	Buna	Sh	S	Hu	D/F	Ex	Wound	Roasted seeds grounded, and tied on the wound.	Hg	R	MG 021
Cordia africana Lam.	Boraginaceae	Waddeessa	T	Ba	Hu	F/D	O	Bleeding/cont-inous flow of menstruation	Bark is pounded,mixed with water and drunk with one coffee cup for three consecutive days	W	D	MG 114
				L	B	F	Ex	Wound	Leaf is pounded and the fine powder is mixed with butter and applied on the affected part			
				Ba	Hu	F	O	Rheumatic pain	Bark is crushed, boiled together with honey and drunk			
Croton macrostachyus Del.	Euphorbiaceae	Bakkanisa	T	L	Hu	F	O	Ascaris	The tip of fresh young leaf and the bark is pounded, boiled, add butter, cool it and after it solidifies, three – nine tablets are made and three tablets for children, five to nine tablets for elders is given. Milk is drunk as an antidote.	W	C	MG 017
				Ba	Ls	F	O	Bloat	The bark of root is grounded, mixed with water and given to the animal by tella drinking material (merti).			
				L	Hu	F	O					

				L Ba	Hu Hu	F F	O O	Jaundice Gonorrhea Stomach ache	Cooked, pasted with honey and eaten. Seven, nine or eleven shoot tips is cut, cooked together with *Ruta chalepensis* and one spoonful of the solution is drunk per a day for seven consecutive days. Fresh bark together with bulb of *Allium sativum,* is pounded, mixed with butter and eaten .			
Cucumis dipsaceus Ehrenb .ex Spach	Cucurbitaceae	Abbaholaa	H	R	Hu	D	O	Diarrhea and vomiting	The root is grounded and is eaten together with porriage of teff.	W	C	MG 103
Cucumis ficifolius A. Rich.	Cucurbitaceae	Abbaholaa	H	L	Ls	F	Ex	Dislocated leg	Fresh leaf together with butter warms on fire and apply on the part.	W	C	MG 115
Cucurbita pepo L.	Cucurbitaceae	Debaquulaa	H	S R	Hu Ls	F/D F	O F	Hookworm Bloat	Seeds are soaked in water overnight, chew and swallowed as they are . Fresh root together with *Vernonia amygdalina* is pounded, local areke (katicala) is added and given orally or sprinkled on their feed.	HG	R	MG 039
Cyphostemma	Vitaceae	Gaalee	Cl	Fl	Hu	F	Ex	Hemmoroi	Fresh flower is squeezed and the juice	W	C	MG 012

cyphopetalum (Fresen.)Desc. ex Wild and Drummond		waraabessa a						ds	is applied or the flower is rubbed over the wound.			
Cynoglossum lanceolatum Forssk.	Boraginaceae	Cigoogit	H	L	Hu	F	O	Mich	Fresh leaf together with *Ocimum lamiifolium* is pounded and drunk with coffee or rub the body with the leaves.	W	C	MG 064
Datura stramonium L.	Solanaceae	Manjii	H	L	Hu	F/D	O	Cough	Dried or fresh leaf together Withania-sominifera and *Laggera tomentosa*, are pounded, half spoon is added to a cup of coffee and drunk every morning until recovery.	W	C	MG 109
				S	Hu	F/D	O	Toothache	Seeds are boiled in water and inhaled the vapour.			
				L	Hu	F	Ey	Eye disease	Leaf is squeezed and the juice is applied to the eye.			
Dodonea angustifolia L.f.	Sapindaceae	Iticha	Sh	L	B	D	Er	Ear wound	Crushed, mixed with butter and placed on the damaged part.	W	C	MG 070
				S	Ls	F/D	O	Internal parasite	Grounded, pasted with oat flour, bake and give to the animal.			
				L	B	F	Ex	Wound	Fresh or dried leaf is grounded and			

									apply to the wound after washing with squeezed leaf of *Calpurnia aurea*.			
Dovyalis abyssinica (A.Rich.) Warb.	Flacourtiaceae	Koshommii	Sh	R	Hu	F/D	Ex	Rheumatic pain	The root powder is together with the pounded young shoot of *Cordia africana* is smoked.	W	R	MG 037
Echinops angustilobus S.Moore	Asteraceae	Qoree harree	H	R	Hu	F/D	O	Head ache	Fine root powder is mixed with pounded *Allium sativum* and taken pasted with honey.	W	R	MG 034
Echinops kebericho * Mesfin	Asteraceae	Qabaricho	H	R R	Hu Hu	F/D F	Ex Ex	Evil eye Mich	Root together with dried root of *Silene macroselen,* is smoked to the patient. The method is the same as *Echinops kebericho* of evil eye.	Hg	R	MG 043
Ehretia cymosa Thonn.	Boraginaceae	Ulaagaa	T	R L	B Hu	F/D F	O O	Stomach ache Mich	Leaf and/or root together with dried root of *Zehneria scabra* and *Zaleya pentandra* are pounded, add katicala and given to cattle. Fresh leaf together with leaf of *Cissus* spp is curshed and is drunk.	W	R	MG 093
Ekebergia capensis Sparm.	Meliaceae	Somboo	T	B	Ls	F/D	Na	Leech	Bark is pounded, mixed with small amount of water and is added through the nostrils for three consecutive days.	W	R	MG 110
Embelia schimperi Vatke	Myrsinaceae	Haanquu	Sh	S	Hu	F/D	O	Taeniasis	Seeds are grounded, mixed with water and left over night and is drunk.	W	R	MG 009

Ensete ventricosum (Welw.) Cheesman	Musaceae	Worqee	H	R	Hu	F	O	Stomachache	Dried root is crushed, mixed with honey and is drunk.	HG	R	MG 057
*Erythrina brucei** Schweinf.	Fabaceae	Waleena	T	L	Ls	F	In	Eye disease	Fresh leaves are pounded, squeezed and the juice is added to the eye.	W	C	MG 091
Eucalyptus globulus Labill.	Myrtaceae	Baarzaafii adii	T	L	Hu	F	Ex	Cough	Fresh young leaves are boiled in water and fumigate the vapour under sealed clothes at bed time.	Hg	C	MG 036
Euclea racemosa Murr.	Ebenaceae	Mi'eessaa	Sh	R	Hu	F/D	O	Gonerrhea Internal parasite	Fresh or dried root is pounded, boiled in water and drunk with yoghurt. Crushed root is boiled and drunk with sugar.	W	C	MG 080
Euphorbia abyssinica Gmel.	Euphorbiaceae	Adaamii	T	La B	Hu Hu	F/D F/D	O O	Gonerrhea Ascaris	Very small amount of the milky latex is mixed with red tef flour, bake and eaten for three consecutive days. Fine powder of pounded bark of *Croton macrostachyus* is mixed and taken at meal time.	W	R	MG 107
Euphoriba depauperata A.Rich.	Euphorbiaceae	Anxarfaa	H	La	Hu	F	Ex	Eczema	Latex and pounded seed of *Calpurnia aurea* are mixed and applied at the part in the morning for three days.	W	C	MG 054

Ficus sur Forssk.	Moraceae	Harbuu	T	Bak	B	F/ D	Ex	Wound	Fine powder of the bark is mixed with butter, applied to the wound and sit for some minutes under the sun.	W	R	MG 060
Foeniculum vulgare Miller	Apiaceae	Insilaalii	H	L L	B B	F F	O O	Urine retention Stomach ache	Fresh leaf together with leaf of *Justicia schimperiana* are pounded, mixed with water and given. Fresh leaf together with garlic, pepper are grounded, mixed with water and katicala and then given orally.	Hg	C	MG 045
Galium thunbergianum Eckl. and Zeyh.	Rubiaceae	Sebebi	H	L R L	Hu B B	F/ D F F	Ex O In	Jaundice Miscarriage Tuberculosis	The affected part is rubbed with the squeezed leaf, and butter at bed time for five days. Root is pounded, mixed with water and drunk. The leaf is chopped, soaked overnight and apply through the mouth and nose.	W	C	MG 041
Guizotia scabra (Vis.) Chiov.	Asteraceae	Hadaa	H	Wp	B	F/ D	Ex	Wound	The plant parts are crushed, the fine powder is mixed with butter and is applied to the wound. The root is infused in water solution of	W	C	MG 095

				R	Hu	D	O	Taeniasis	*Silene macroselen*, and three full cups of coffee is drunk.			
Hagenia abyssinica (Brace) J.F. Gmel.	Rosaceae	Heexoo	T	Fl	Hu	F/D	O	Tapeworm	Flowers are crushed, soaked in water for a day and drunk with local beer.	W	R	MG 020
Heteromorpha arborescens (Spreng.) Cham. and Schltdl.var. *abyssinica* (A.Rich.) H.Wolff	Apiaceae	Aliyaanqaa	Sh	R	Ls	F/D	Ey	Eye disease	Fine powder of the root mixed with very small amount of water is applied to the eye.	W	R	MG 014
Hordeum vulgare L.	Poaceae	Garbuu	H	S	Ls	F/D	O	Bloat	Seed together with dry leaf of *Melia azedarack* is crushed and sprinkled on the feed.	Hg	C	MG 029
Hypoestes forskaolii (Vahl) R.Br.	Acanthaceae	Darguu	H	L	Ls	F	Ex	Bleeding	Fresh leaf is rubbed on the damaged part until the bleeding stops.	W	C	MG 116
Ipomoea spathulata Hall. f.	Convolvulaceae	Baalaaanbelxoo	Sh	R	Ls	F	O	Urine-retention	Fresh root together with fresh leaf of *Foeniculum vulgare* is pounded, mixed with water, add one glass of areke (katikala). Then about two glass of the solution is given for 2-4 days.	W	C	MG 072

Jasminum grandiflorum L.	Oleaceae	Biluu	Sh	L L	B Hu	F D	O Ex	Snake bite Tosilitis	Rub fresh leaf on the part or drink the fine powder mixed with milx, a glass of it. Crushed leaf mixed with butter and the paste is applied on the head.	W	C	MG 083
Juniperus procera Hochst .ex Endl.	Cuppressaceae	Gaatiraa	T	B	Hu	D	O	Toothache	Powder form mixed with fine powder of *Rumex nepalensis* in the presence of food oil is kept on the teeth	W	R	MG 096
Justicia schimperiana (Hochst.ex Nees) T. Anders	Acanthaceae	Sansal	Sh	L	B	D	Ex	Lice	Leaf decoction of this plant is mixedwith *Calpurina aurea* and wash the body.	W	C	MG 073
Kalanchoe marmorata Bak.	Crassulaceae	Bosoqee	H	L L	Ls Ls	F D	Na Na	Nose full of mucus Anthrax	Fresh leaf is grounded and the juice is applied through the nostrils. Fresh leaf together with root of *Phytolaca dodecandra* are crushed and drunk and also given to a person who eat meat of an animal affected by anthrax.	W	C	MG 052
Lagenaria siceraria (Molina) Standl.	Cucurbitaceae	Buqee	H	S L	Hu Hu	F F	Ex O	Evileye Snake bite	Seeds are grounded and add to fire and smoke or drink with honey. Fresh leaves are pounded and drunk in the presence of small amount of water	W	R	MG 030

*Laggera tomentosa** (Sch.Bip.ex A.Rich.) Oliv. & Hiern	Asteraceae	Ajoo	H	L	B	F	Ex	Any swelling expecting tuber culosis	Pounded leaf is tied on the smelling	W	C	MG 058
Lepidium sativum L.	Brassicaceae	Shunfaa	H	S S	Hu B	F D	O Ex	Diarrhea Mich	Grounded seed is mixed with honey and the paste is eaten. The seeds are inserted in to fire and smoke to the patient.	Hg	R	MG 028
Leucas martinicensis (Jacq.) R.Br.	Lamiaceae	Bokkoluu	H	L	Hu	F	Ex	Ring worm	Fresh leaf is pounded, squeezed juice of lemon is added and paint on the part.	W	C	MG 087
*Linum Usi*tatissimum L.	Linaceae	Talbaa	H	S S	Hu B	D D	O O	Amoebisis Constipation	The poundered seed is drunk in an empty stomach. Seeds are soaked in water over night and the water solution is drunk.	Hg	C	MG 001
Lippia adoensis var. adoensis Hochst. ex Walp.	Verbanaceae	Kusaayee	Sh	R L	Hu Hu	D D	O O	Intestinal parasite Cough	Fresh dired root together with the dried bark of *Croton macrostachyus* is crushed and eaten after breakfast. Dried leaf is pounded and boiled and a tea spoon of it is added to cup of coffee and drunk for three days every	W	C	MG 112

Maesa lanceolata Forssk.	Myrsinaceae	Abbayii	Sh	R L	B Hu	D D	O Ex	Retention of placenta Eczema	Root is boiled with seed of *Linum usitatissimum* and drunk. The fIne powder of dried leaf together with the powder of leaf of *Croton macrosrachyus* are pasted with butter and apply once a day for seven days.	W	C	MG 006
Maytenus senegalensis (Lam.) Exell	Celastraceae	Kombolcha	Sh	L Ba	Hu Ls	D D	Ex O	Hemmoroids Diarrhea	Leaf together with dried root of *Rumex abyssinicus,* young stem of *Olea europea* subsp. *cuspidata* are pounded, mixed with butter and the paste is applied on it. Fresh bark together with flower of *Hagenia abyssinica* are pounded, mixed with water and local beer and given orally.	W	R	MG 120
Melia azedarach L.	Meliaceae	Nimii	T	St Ba	Hu Ls	F D	O O	Toothache Anthrax	Young stem is chewed and kept on the teeth. The fine powder of dried bark is added to a glass of water and applied through the mouth only once.	W	R	MG 008
*Millettia ferruginea**	Fabaceae	Birbirraa	T	Fr	Ls	D	O	Fish poison	Crushed fruits are spread on the water surface.	W	D	MG 068

(Hochst.) Bak.				L Fr	B Hu	F F	Ex Ex	Wound Scabies	Squeezed fresh leaf applied on the wound. Fruits are pounded, the fine powder is mixed with butter and applied to the affected area.			
Momordica foetida Schumach.	Cucurbitaceae	Gaalee bafaa	H	L Fr	B Hu	F F	Ex O	Snake bite Jaundice	The leaf is squeezed and the juice is applied twice a day through left ear or tie on the site of the bite Chew the fresh fruit and swallow.	W	C	MG 121
Myrsine africana L.	Myrsinaceae	Qacamo	Sh	S	Hu	D	O	Stomachache	Seeds are crushed, mixed with small amount of water keeping for a day and a tea spoon of the mixture is eaten only once.	W	R	MG 031

Nicotiana tabacum L.	Solanacea e	Tombo	H	L L	Ls Hu	F F	O Ex	Leech Epilepsy	The young stems and or leaf is ground, add salt then one glass of the mixture is given every morning for three days orally or through the nose. Bath the patient with leaf decoction of *Nicotiana tabacum, Ocimum lamii folium, Withania somenifera* for a week	Hg	C	MG 090
Ocimum lamiifolium Hochst. ex Benth.	Lamiaceae	Damakesse	Sh	L	Hu	F	O	Mich	Fresh leaf together with leaf of *Eucalyptus globules, Silene macroselen*, is pounded, mixed with water and drunk or the leaves are boiled and let the patient to inhale the vapour.	W	C	MG 040
Ocimum urticifolium Roth.	Lamiaceae	Coopi	Sh	L	Hu	F	In	Mich	Boil the leaf in water and inhale or chew the stem and swallow.	W	C	MG 119
Olea europaea L. *subsp.cuspidata* (Wall. ex G.Don) Cif.	Oleaceae	Ejersa	T	L St	Hu B	F D	Ex Ex	Itchy skin Wound	Leaf together with dried leaf of *Chenopodium myricoides* is boiled in water and steam the vapour to the part. Partly dried stem is inserted into fire and the oily liquid produced from the	W	R	MG 004

				St	Hu	D	O	Gastritis	stem is applied on the wound. A very small amount of the oily liquid produced from the stem is drunk after meal for three consecutive days.			
Olinia rochetiana A. Juss.	Oliniaceae	Guuna	Sh	L	Hu	F	Ex	Tuber culosis	The tip of the stem is chopped and tied on the swelling part.	W	C	MG 074
Phytolacca dodecandra L.'Herit.	Phytolaccaceae	Handoode	Sh	R	B	F	O	Rabies	Root together with root of Artemesia abyssinica, *Justicia schimperiana* is pounded, mixed with water , one katical glass of the solution is given on the 7th day, 15th day and 21st day (for humans) for animals all is being the same but the amount should be 10 times more.	W	R	MG 118
				R	Hu	F	O	Malaria	Root is grounded mixed with water and drunk in the morning for three consecutive days.			
Plantago lanceolata L.	Plantaginaceae	Qorxoobii	H	L	Hu	F	Ex	Mitch	Rub the body with the squeezed leaves	W	C	MG097
Platostoma rotundifolium (Briq.) A. J.	Lamiaceae	Tontona	H	L	Hu	F		Mitch	Fresh leaf is pounded squeezed and drink.	W	C	MG 101

Paton												
Plumbago zeylanica **L.**	Plumbaginaceae	Merxes	H	L R Ba	Ls Ls Hu	D D F	O In O	Cough with muchus Eye disease Toothache	A glass of concoction leaf is druk in the morning for three days. Fine powder of the root mixed with drops of water is applied to the eye. Partly dried bark of the root together with *Melia azadarach* are chewed turn by turn and hold on the teeth.	W	C	MG 007
Podocarpus falcatus (Thunb.) R.B. ex..Mirb.	Podocarpaceae	Birbirsa	T	Ba	Hu	F	o	Intestinal parasites	Decoction of the fine powder of the bark, grounded garlic and honey are pasted and about two tea spoon is eaten at bed time for 3-5 days.	W	R	MG 015
Premna schimperi Engl.	Lamiaceae	Urgessa	Sh	R L	Hu Hu	F F	O Ex	Toothache Eczema	Remove the bark from the root, chew the remaining part and kept on the teeth. Fresh leaf is rubbed again and again on the affected part.	W	C	MG 117
Psidium guajava L.	Myrtaceae	Roqaa	Sh	B	B	F	Ex	Wound	Pounded bark is mixed with butter and apply on the wound.	W	D	MG084

Rhamnus prinoides L. ' Herit.	Rhamnaceae	Geeshoo	Sh	L L	Ls Hu	F F	In O	Leech Tonsillitis	Fresh leaf together with *Nicotiana tabacum*, pepper is pounded, mixed with water and milk, then applied through the nose. Chew the leaf and swallow twice a day for three days.	Hg	C	MG 005
Rhus natalensis Krauss	Anacardiaceae	Daboobessaa	T	L	Ls	F	O	Bloat	Fresh leaf is pounded, mixed with water, add salt and given orally.	W	R	MG 0 94
Ricinus communis L.	Euphorbiaceae	Qobboo	H	L S	B Hu	F D	Ex 0	Tuberculosis (swelling) Impotency	The leaf is warmed on fine and rubbed on the swelling. Seeds are pounded, mixed with small quantity of latex from *Aloe* spp. and drunk one coffee cup before bed time for three days.	W	R	MG 024
Rosa abyssinca Lindley	Rosaceae	Goraa	Sh	L	Hu	F	O	Ascaris	Fresh leaf is pounded, mixed with water a cup of the mixture is drunk once.	W	C	MG 061
Rubia cordifolia L.	Rubiaceae	Mexene	H	L R	B Hu	F F	Ex O	Bleending Kindey problem	Three leaves are pounded ,squeezed and the juice is applied or the affected part is rubbed with the leaf or tie on it. Root is crushed, two tea spoon of it is added to a glass of milk and drunk for	W	C	MG 055

									three days.			
				R	B	F	O	Miscarriage	Powder of the root with honey is boiled in water and two cups of it is drunk only once. (for humans) but cattle are given with out boiling.			
Rumex abyssinicus Jacq.	Polygonaceae	Maqmaqoo	H	R	B	D	O	Stomachache	Root together with dried leaf of *Ruta chalepensis* and *Allium sativum* are pounded, mixed with honey and taken orally.	W	C	MG 032
				R	B	F	Ex	Wound	The fine powder of the root is mixed with butter and apply the paste on the wound.			
				R	Hu	F	O	Asthma	Root is crushed, the fine powder is mixed with water and then one cup of the solution is drunk when the patient feels pain, cough or other symptoms .			
Rumex nepalensis Spreng.	Polygonaceae	Shabe	H	R	B	D	O	Internal parasite	Chew the root and swallow or boil in the water and one glass of the solution is drunk only once.	W	C	MG 089

				L L	Hu B	D F	O O	Amoebiasis Stomachache	Dried leaf is ground, mixed with water and unspecified solution of it is drunk. Leaf infusion of this plant is mixed with crushed seed of *Carica papaya* and drunk with coffee.			
Rumex nervosus Vahl.	Polygonaceae	Dhangaggoo	Sh	R	B	F/D	Ex	Wound	Crushed root together with butter is placed on the wound	W	R	MG 048
Ruta chalepensis L.	Rutaceae	Xenaaddaa	Sh	L L L	Hu B Hu	F F F	O O O	Fever Stomachache Headache	Fresh leaf is pounded together with *Zingiber officinale*, added to coffee and then a cup of coffee is drunk every morning for three corsecutive days. Fresh leaf together with garlic, is pounded, mixed with a glass of milk and drunk. Fresh leaf together with *Zingiber officinale* is pounded, add to coffee and drunk.	Hg	C	MG 013

				L	Hu	F	Ex	Evileye	Fresh leaf together with leaf of *Datura stramonium* are rubbed on the body of the patient or wash with the solution of these plants.			
Salvia nilotica Jacq.	Lamiaceae	Bokkolluu	H	R	Hu	F	O	Mich	Chewed the fresh root and swallow.	W	C	MG 050
Schefflera abyssinica (Hochst. ex A.Rich.) Harms	Araliaceae	Harfatuu	T	Ba	Hu	F	In	Tooth	Fresh bark is chewed and keep it between the teeth.	W	R	MGO62
Senna italica Mill.	Fabaceae	Fitii	H	L	Hu	F	In	Cough	Leaf infusion is inhaled or place the leaf in the nostrils again and again	W	C	MG 042
Senna occidentalis (L.) Link.	Fabaceae	Shekshekke e	H	L S	Hu B	F D	Ex O	Bleeding Snake bite	Fresh leat is chopped and place on the nose. Toasted seeds are pounded, mixed with honey and then two tea spoon of the paste is eaten twice a day.	W	C	MG 105
Sida schimperiana Hochst.ex A.Rich.	Malvaceae	Harmellaa	Sh	R R	Hu Ls	D D	Ex In	Evil eye Horse disease	Fumigate every evering with the root. Grounded, mixed with water and drunk or applied through the nostrils.	W	C	MG -047
Silene macrosolen A. Rich.	Caryophyl laceae	Woggert	H	R	Hu	F	Ex	Evilsprit	Partly dried root together with *Carisa spinarium, Capparis tomentosa, Ruta chalepensis* is fumigated in a closed	W	R	MG 016

									room.			
Solanum incanum L.	Solanaceae	Hiddii	Sh	R R	Hu Hu	D D	O O	Snake bite Toothache	Root powder is drunk with coffee. Root is chewed and keep between the teeth.	W	C	MG 022
Solanum marginatum L.f.	Solanaceae	Hiddii	Sh	Fr St Fr Fr Fr L	Hu Hu Ls Ls Hu Hu	F F F F F F	Ex Ex O In In O	Bleeding Wound Bloat Placenta-retention Leech Nose bleeding	Fruit and/or leaf is pounded and tie on the bleeding part. Warm the stem on fire and placed it on the head again and again. Squeeze the fruits on their feed. Root is pounded, added to water and drunk. Fruit is squeezed and the juice is mixed with milk and apply through the nostrils. The leaf is chopped and placed in the nostrils or small amount of the fruit juice is applied thiough the nostrils.	W	C	MG053

				R	Hu	D	Ex	Evil eye				
									Root is fumigated			
Teclea nobilis Del.	Rutaceae	Hadheesa	Sh	L	Ls	F	In	Trips	Leaf is pounded, mixed with water and given to the animal.	W	C	MG 108
Toddalia asiatica (L.) Lam.	Rutaceae	Harangama a	H	Ba	Hu	D	Ex	Evil eye	The root is chewed and swallowed. Leaf is crushed and then the decoction is mixed with coffee and drunk. Fresh root is crushed and the infusion is taken, a cup of the solution twice a day.	W	C	MG079
Trigonella foenum-graecum L.	Fabaceae	Abish	H	S	Ls	F	O	Urine - retention Eye disease	Leaf is pounded, added to the fruit juice of *Solanum marginatum* and given. Fresh leaf is chopped into pieces and added to a residue of local beer in the presence of salt and given as food. Leaf is pounded together with toasted	Hg	C	MG106

									seeds of *Coffea arabica*, mixed with butter and rub the external eye.			
Urera hypselodendron (A.Rich) Wedd	Urticaceae	--------	Cl	Wp	B	F	In	Urine retention	Pounded, mixed with water and given orally.	W	D	MG027
Urtica simensis * Steudel	Urticaceae	Saamma	H	R	Hu	F	Ex	Gonorrhea	Leaf is pounded, mixed with water and given .	W	C	MG092
Verbena officinalis L.	Verbenaceae	Derguu	H	R	Hu	F	O	Tonsilites	Root is fumigate to the patient or fresh leaf is pounded, mixed with water and drunk.	W	C	MG056
				R	Hu	D	O	Mich	Root together with the root of *Verbena officinalis, Carissa spinarum, Ruta chalepensis,* is fumigated to the patient.			
				R	Hu	F	D	Diarrhea	Root of this plant and root of *Phytolacca dodecandra*, bark of *Croton macrostachyus* is pounded, mixed with water and then after a day is given.			

Vernonia amygdalina Del.	Asteraceae	Ebichaa	Sh	L	Hu	F	Ex	Jaundice	Fresh leaf is pounded, mixed with water, filter and drunk.	W	C	MG071
				L	Ls	F	O	Internal-parasites	Freslh leaves chopped and added to local beer and salt and will be given to the animal			
				L	Hu	F	O	Diarrhea	Leaf is pounded together with coffee seeds, mixed with butter and eaten			
Vicia faba L.	Fabaceae	Baaqelaa	H	S	Hu	F	D	Stomach ache	Leaf decoction of this plant and that of *Clerodendrum myricoides* is drunk.	Hg	C	MG049
				S	Hu	F	O	Tape worm	Seeds are soaked in water over night and eaten for three days			
Viscum tuberculatum A.Rich.	Viscaceae	Dheertoo	H	Wp	Hu	F	O	Mich	Fresh leaf is pounded, squeezed and wash the body. Leaf is crushed, mixed with butter and place on the head and cover with a piece of cloth.	W	D	MG085

Withania somnifera (L.) Dun**al**	Solanaceae	Gizaawwaa	Sh	R R	Hu Ls	F F	Ex O	Mich Anthrax	Fresh leaf is chewed and swallowed. Root of this plant together with *Phytolacca dodecandra*, bark of *Croton macrostachyus* is pounded, mixed with water and is given	Hg	R	MG075
Xanthium strumarium L.	Asteraceae	Herwooxa	H	L	Hu	F	In	Ear problem	Dried or fresh root and/or leaf together with root of *Zaleya pentandra, Ehretia cymosa* is pounded, mixed with water and is added.	W	R	MG082
Ximenia americana L.	Olacaceae	Hudhaa	Sh	L L	Hu Hu	F F	In Ex	Tooth ache Nose bleeding	Bark of the root is chewed and kept it for a while between the teeth. The fine powder of the root is mixed with the powder of the leaf of *Asparagus africanus* and is applied.	W	D	MG104
Zaleya pentandra (L.) Jeffrey	Aizoaceae	Areddoo	H	L	Hu	F	O	Ear	Fine powder together with *Foeniculum vulgare* is rubbed.	W	C	MG065

Zanthoxylum chalybeum Engl.	Rutaceae	Gedaa	Sh	B R	Hu Ls	F D	O O	Toothache Horse disease	Fresh bark is chewed and keep it between the teeth. The fine powder of the root is mixed with the powder of leaf of *Asparagus africanus* and is given together with their feed	W	R	MGO62
Zehneria scabra (Linn.f.) Sond.	Cucurbitaceae	Ancootee	H	R	Hu	F	Ex	Dingetegna	Fresh root is pounded, mixed with water and is drunk.	Hg	C	MG063

Appendix 4. List of family and number of genera and species of medicinal plants used for traditional medicinal purposes

Family name	No of genera	%	No of species	% of the total species
Acanthaceae	2	1.83	2	1.65
Agavaceae	1	0.92	1	0.83
Aizoaceae	1	0.92	1	0.83
Alliaceae	1	0.92	1	0.83
Aloaceae	1	0.92	1	0.83
Amaranthaceae	1	0.92	1	0.83
Anacardaceae	1	0.92	1	0.83
Apiaceae	1	0.92	1	0.83
Apocynaceae	2	1.83	2	1.65
Araliaceae	1	0.92	1	0.83
Asparagaceae	1	0.92	2	1.65
Asteraceae	7	6.39	10	8.26
Boraginaceae	3	2.75	3	2.48
Brassicaceae	1	0.92	1	0.83
Capparidaceae	2	1.83	2	1.65
Caricaceae	1	0.92	1	0.83
Caryophyllaceae	1	0.92	1	0.83
Celastraceae	2	1.83	2	1.65
Chenopodiaceae	1	0.92	1	0.83

Convolvulaceae	1	0.92	1	0.83
Crassulaceae	1	0.92	1	0.83
Cucurbitaceae	1	0.92	6	4.96
Cuppressaceae	1	0.92	1	0.83
Ebenaceae	1	0.92	1	0.83
Euphorbiaceae	4	3.67	5	4.13
Fabaceae	7	6.39	8	6.61
Flacourtiaceae	1	0.92	1	0.83
Lamiaceae	7	6.39	9	7.43
Linaceae	1	0.92	1	0.83
Loganiaceae	1	0.92	1	0.83
Malvaceae	1	0.92	1	0.83
Meliaceae	2	1.83	2	1.65
Melianthaceae	1	0.92	1	0.83
Moraceae	1	0.92	1	0.83
Musacaceae	1	0.92	1	0.83
Myrsinaceae	3	2.75	3	2.48
Myrtaceae	2	1.83	2	1.65
Olacaceae	1	0.92	1	0.83
Oleaceae	2	1.83	2	1.65
Olinaceae	1	0.92	1	0.83
Phytolaccaceae	1	0.92	1	0.83
Plantaginaceae	1	0.92	1	0.83

Plumbaginaceae	1	0.92	1	0.83
Poaceae	1	0.92	1	0.83
Podocarpaceae	1	0.92	1	0.83
Polygonaceae	2	1.83	3	2.48
Ranunculaceae	1	0.92	1	0.83
Rhmnaceae	2	1.83	2	1.65
Rosaceae	1	0.92	2	1.65
Rubiaceae	3	2.75	3	2.48
Rutaceae	5	4.59	5	4.13
Sapindaceae	1	0.92	1	0.83
Simaroubaceae	1	0.92	1	0.83
Solanaceae	5	4.59	6	4.96
Urticaceae	2	1.83	2	1.65
Verbenaceae	2	1.83	2	1.65
Viscaceae	1	0.92	1	0.83
Vitaceae	2	1.83	2	1.65
Total	109	100	121	100

Appendix 5. Number of plant species in each family used to treat human, livestock or both human and livestock ailments in the study area

S. No	Families	Number of species			Total
		Human only	Livestock only	Both	
1	Acanthaceae	-	-	2	2
2	Agavaceae	-	1	-	1
3	Aizoaceae	1	-	-	1

4	Alliaceae	1	-	-	1
5	Aloaceae	-	1	-	1
6	Amaranthaceae	1	-	-	1
7	Apiaceae	-	-	1	1
8	Araliaceae	1	-	-	1
9	Anacardaceae	-	1	-	1
10	Apocynaceae	2	-	-	2
11	Asparagaceae	1	1	-	2
12	Asteraceae	7	-	3	10
13	Boraginaceae	1	-	2	3
14	Brassicaceae	1	-	-	1
15	Caricaceae	1	-	-	1
16	Caryophyllaceae	1	-	-	1
17	Capparidaceae	-	-	2	2
18	Chenopodiaceae	1	-	-	1
19	Celastraceae	-	-	2	2
20	Cucurbitaceae	3	1	2	6
21	Cuppressaceae	1	-	-	1
22	Crassulaceae	-	1	-	1
23	Convolvulaceae	-	1	-	1
24	Ebenaceae	-	-	1	1
25	Euphorbiaceae	3	-	2	5
26	Fabaceae	4	3	1	8
27	Flacourtiaceae	1	-	-	1
28	Lamiaceae	8	1	-	9
29	Linaceae	-	-	1	1
30	Loganiaceae	1	-	-	1
31	Melianthaceae	1	-	-	1
32	Meliaceae	-	1	1	2
33	Myrtaceae	1	-	1	2
34	Myrsinaceae	2	-	1	3
35	Malvaceae	-	-	1	1
36	Moraceae	-	-	1	1
37	Musacaceae	1	-	-	1
38	Olacaceae	-	-	1	1
39	Oleaceae	-	-	2	2

40	Olinaceae	1	-	-	1
41	Polygonaceae	-	-	3	3
42	Plantaginaceae	1	-	-	1
43	Phytolaccaceae	-	-	1	1
44	Plumbaginaceae	-	-	1	1
45	Poaceae	-	1	-	1
46	Podocarpaceae	1	-	-	1
47	Rubiaceae	1	-	2	3
48	Rosaceae	2	-	-	2
49	Rhamnaceae	1	-	1	2
50	Rutaceae	3	-	2	5
51	Ranunculaceae	1	-	-	1
52	Sapindaceae	-	-	1	1
53	Solanaceae	1	1	4	6
54	Simaroubaceae	-	-	1	1
55	Urticaceae	1	-	1	2
56	Vitaceae	2	-	-	2
57	Verbenaceae	1	-	1	2
58	Viscaceae	1	-	1	2
Total		61	14	46	121

Appendix 6. Human health problems and the number of medicinal plant species that treat those diseases as cited by informants

S.N	Types of aliment treated	Local name of the ailments	No of plant species	%	No of informants cited	%
1	Amoebiasis	Bua'a	2	1.01	3	0.37
2	Ascaris	Raamoo ulee	5	2.51	33	4.06
3	Asthma	Asmii	1	0.50	4	0.49
4	Over bleeding during menstration	Garmalee dhiiguu	1	0.50	5	0.61
5	Back pain	Waransa	1	0.50	1	0.12
6	Bleeding	Dhiiguu	1	0.50	14	1.72
7	nose bleeding	Funuuna	5	2.51	20	2.46
8	Cough	Qufaa	10	5.03	25	3.08

9	Constipation	Garaan yoo goggoge	1	0.50	5	0.61
10	Diarrhea	Albaati	7	3.52	42	5.17
11	Sudden sickness	Dingetegna	2	1.01	15	1.85
12	Ear problem	Dhukkuba gurra	1	0.50	4	0.49
13	Eczema	Chiffee	4	2.01	9	1.11
14	Evil eye	Budaa	11	5.53	54	6.65
15	Evil spirit	Seexana	2	1.01	21	2.59
16	Eye disease	Dhukkuba ijaa	4	2.01	22	2.71
17	Epilepsy	Gaggabsaa	1	0.50	4	0.49
18	Fever	Oa'a	2	1.01	18	2.22
19	Fire burn	Gubaa abidda	1	0.50	7	0.86
20	Gastritis	Gubiinsa garaachaa	2	1.01	9	1.11
21	Gonorrhea	Cophxoo	5	2.51	13	1.60
22	Headache	Mata bowoo	3	1.51	14	1.72
23	Hemorrhoids	Kintaarota	4	2.01	6	0.74
24	Hook worm	Raamoo hookoo	2	1.01	5	0.61
25	Impotency	Dadabiinsa saalaa	1	0.50	3	0.37
26	Intestinal parasite	Ramoogaraa	5	2.51	28	3.45
27	Itching skin	Dhibeenafa hori	1	0.50	4	0.49
28	Jaundice	Simbiroo	5	2.51	18	2.22
29	Kidney problem	Dhukkuba kalee	2	1.01	5	0.61
30	Leprosy	Qurcii	1	0.50	3	0.37
31	Malaria	Busaa	6	3.02	12	1.48
32	Fibrile illness	Michii	12	6.03	40	4.93
33	Miscarriage	Gatata	2	1.01	7	0.86
34	Placenta retention	Obbatiin yoo tura	3	1.51	6	0.74
35	Rabies	Dhibee saree	1	0.50	30	3.69
36	Relapsing fever	Dedebiinsa ho'ina qaamaa	1	0.50	3	0.37
37	Rheumatic pain	Qurxumatti	3	1.51	5	0.61
38	Ring worm	Roobbbii	2	1.01	17	2.09
39	Snake bite	Cininaa bofa	7	3.52	21	2.59
40	Stabbing pain	Waraansa	2	1.01	10	1.23
41	Stomach ache	Dhukkabu garaa	11	5.53	46	5.67
42	Scabies	Cittoo	2	1.01	8	0.99
43	Swellings	Dhita'uu	2	1.01	19	2.34
44	Swelling of breast of cattle	Dhita'u harma horii	1	0.50	5	0.61

45	Syphilis	Cophxoo	2	1.01	17	2.09
46	Tape worm	Heexxo	4	2.01	34	4.19
47	Tinea corporis	Roobi	1	0.50	7	0.86
48	Tooth ache	Dhukkuba ilkaan	10	5.03	32	3.94
49	Tuberculosis	Dhibee sonbaa	3	1.51	7	0.86
50	Tonsillitis	Horsasee	3	1.51	15	1.85
51	Vomiting	Hoqqisisuu	2	1.01	4	0.49
52	Urine retention	Dhidiinsa fincaanii	5	2.51	29	3.57
53	Wound	Madaa	11	5.53	24	2.96
	Total		199	100	812	100

Appendix 7. List of livestock ailment, number of plants species used to treat, number of informant cited and percentage.

S.N	Ailment type	Local name	No of plant species	% of total medicinal plants	No of informant cited	% of total informant
1	Anthrax	Abbasangaa	4	7.14	12	7.06
2	Worms	Ramoolee	1	1.78	10	5.88
3	Black leg	Abagorba	1	1,78	14	8.24
4	Bloating	Bokoksaahorii	9	16.07	16	9.41
5	Cough	Qufaa	4	7.14	13	7.65
6	Diarrhea	Albaati	3	4.35	20	11.76
7	Horse disease	Dhibeefardaa	2	3.57	8	4.71
8	External parasites	Maxxantoota qaaman alaa	3	5.35	25	14.71
9	Leech	Dhulaandhula	5	8.92	20	11.76
10	Placenta retention	Obbatiinyoo ture	3	5.35	4	2.35
11	Rabies	Dhibee saree	1	1.78	30	17.65
12	Stomach ache	Dhukkaba garaa	5	8.92	22	12.94
13	Swelling	Dhitoo	1	1.78	11	6.47
14	Urine retention	Didiinsa fincaanii	3	5.35	16	9.41
15	Wound	Madaa	6	10.70	15	8.82
16	Eye disease	Dhukkuba ijaa	4	7.14	22	12.94
17	Trips	Gandii	1	1.78	5	2.94
Total			56	100	170	100

Appendix 8. Medicinal plants, number of informant citation and percentage.

Scientific name	**Family**	Local Name	Number of informants cited	Percentage
Acacia abyssinica	Fabaceae	Laaftoo	2	0.31
Acalypha fruticosa	Euphorbiaceae	Baal-tokkee	1	0.15
Achyranthus aspera	Amaranthaceae	Derguu	16	2.45
Acmella caulirhiza	Asteraceae	Gutichaa	1	0.15
Acokanthera schimperi	Apocynaceae	Qaraaruu	1	0.15
Justicia schimperiana	Acanthaceae	Sensellii	2	0.31
Agave sisalana	Agavaceae	Algee	3	0.46
Ajuga integrifolia	Lamiaceae	armaguusaa	2	0.31
Allium sativum	Alliaceae	Qullubbiiadii	20	3.07
Aloe macrocarpa	Aloaceae	Hargeessa	4	0.61
Artemisia abyssinica	Asteraceae	Arrittaa	7	1.07
Artemisia schimperi	Asteraceae	Arrittaa	6	0.92
Asparagus africanus	Asparagaceae	Sariitii	12	1.84
Asparagus racemosus	Asparagaceae	Sariitii	5	0.77
Berchemia discolor	Rhamnaceae	Jejjebaa	1	0.15
Bersama abyssinica	Melianthaceae	Lolchisaa	3	0.46
Brucea antidysenterica	Simaroubaceae	Cirontaa	8	1.23
Buddleja polystachya	Logniaceae	Adaadoo	3	0.46

Cadaba farinosa	Capparidaceae	Qalqalcha	7	1.07
Calpurnia aurea	Fabaceae	Ceekataa	23	3.53
Capparis tomentosa	Capparidaceae	Arongamaa	5	0.77
Capsicum annuum	Solanaceae	Barbaree	2	0.31
Carduus schimperi	Asteraceae	Sokorruu	4	0.61
Carica papaya.	Caricaceae	Pappayyee	6	0.92
Carissa spinarum .	Apocynaceae	Agamsa	19	2.91
Catha edulis	Celastraceae	Caatii	2	0.31
Chenopodium ambrosioides	Chenopodiaceae	-	3	0.46
Cissus sp.	Vitaceae	Coopii	2	0.31
Citrus limon	Rutaceae	Dhuugoo	5	0.77
Clematis simensis	Ranunculaceae	Fiitii	6	0.92
Clerodendrum myricoides	Lamiaceae	Marasiisaa	3	0.46
Cordia africana	Boraginaceae	Waddeessaa	8	1.23
Coffea arabica	Rubiaceae	Buna	3	0.46
Croton macrostachyus	Euphorbiaceae	Bakkanniisaa	24	3.68
Cucumis dipsaceus	Cucurbitaceae	Abbahoolaa	1	0.15
Cucumis ficifolius	Cucurbitaceae	Abbahoolaa	2	0.31
Cucurbita pepo	Cucurbitaceae	Debaaqula	2	0.31
Cynoglossum lanceolatum	Boraginaceae	Ceegogitii	2	0.31
Cyphostemma cyphopetalum	Vitaceae	Gaaleewaraabeessa	1	0.15

Datura stramonium	Solanacceae	Manjii	12	1.84
Dodonaea angustifolia	Sapindaceae	Ittacha	11	1.69
Dovyalis abyssinica	Flacourtiaceae	Koshommii	4	0.61
Echinops kebericho	Asteraceae	Qarabichoo	18	2.76
Echinops angustilobus	Asteraceae	Qoree harree	4	0.61
Ehretia cymosa	Boraginaceae	Ulaagaa	2	0.31
Ekebergi capensis	Meliaceae	Somboo	5	0.77
Embelia schimperi.	Myrsinaceae	Hannquu	3	0.46
Rumex nervosus	Polygonaceae	Dhanggago	1	0.15
Enseet ventricosum	Musaceae	Warqee	4	0.61
Erythrina brucei	Fabaceae	Waleenaa	4	0.61
Eucalyptus globulus	Myrtaceae	Baarzafiiadii	10	1.53
Euclea racemosa	Ebenaceae	Mieessa	12	1.84
Euphorbia abyssinica	Euphorbiaceae	Adaumii	4	0.61
Euphorbia depauperata	Euphorbiaceae	Anxarfaa	2	0.31
Ficus sur	Moraceae	Harbuu	3	0.46
Foeniculum vulgare	Apiaceae	Insilaala	12	1.84
Gallium thunbergianum	Rubiaceae	Sebebii	3	0.46
Guizotia scabra	Asteraceae	Hadaa	5	0.77
Hagenia abyssinica	Rosaceae	Heexoo	12	1.84
Heteromorpha arborescens	Apiaceae	Aliyaankaa	3	0.46
Hordeum vulgare	Poaceae	Garbuu	2	0.31

Hypoestes forskaolii	Acanthaceae	Darguu	5	0.77
Ipomoea spathulata	Convolvulaceae	Baalanbelxoo	2	0.31
Jasminum grandiflorum	Oleaceae	Biluu	6	0.92
Juniperus procera	Cuppressaceae	Gattiraa abashaa	2	0.31
Kalanchoe marmorata	Crassulaceae	Bosoqqee	8	1.23
Lagenania siceraria	Cucurbitaceae	Buqqee	4	0.61
Laggera tomentosa	Asteraceae	Ajoo	2	0.31
Lepidium sativum.	Brassicaceae	Shunnfaa	11	1.69
Lippia adoensis	Verbenaceae	Kusaayee	7	1.07
Leucas martinicensis	Lamiaceae	Bokkolluu	2	0.31
Linum usitatissimum	Linaceae	Talbaa	4	0.61
Maesa lanceolata	Myrsinaceae	Abbayyii	2	0.31
Maytenus senegalensis	Celastraceae	Kombolcha	1	0.15
Melia azedarach	Meliaceae	Niimii	3	0.46
Millettia ferruginea	Fabaceae	Birbirraa	10	1.53
Momordica foetida	Cucurbitaceae	Gaalee bofaa	1	0.15
Myrsine africana	Myrsinaceae	Qacomoo	2	0.31
Nicotiana tabacum	Solanaceae	Taboo	13	1.99
Ocimum lamiifolium	Lamiaceae	Damakasee	22	3.37
Ocimum urticifolium	Lamiaceae	Coopii	1	0.15
Olea europea sub.sp. *cuspidata*	Oleaceae	Ejersa	9	1.38

Olinia rochetiana	Oliniaceae	Guunaa	1	0.15
Phytolacca dodecandra	Phytolaccaceae	Andoodee	8	1.23
Plantago lanceolata	Palantaginaceae	Qoxxobii	1	0.15
Platostoma rotundifolium	Lamiaceae	Tontonaa	1	0.15
Plumbago zeylanica	Pulumbaginaceae	Merxees	1	0.15
Podocarpus falcatus	Podocarpaceae	Birbirsa	2	0.31
Premna schimperi	Lamiaceae	Urgeessaa	1	0.15
Psidium guajava	Myrtaceae	Roqaa	9	1.38
Rhamnus prinoides	Rhamnaceae	Geeshoo	3	0.46
Rhus natalensis	Anacardaceae	Daboobessa	1	0.15
Ricinus communis	Euphorbiaceae	Qobbooo	1	0.15
Rosa abyssinica	Rosaceae	Goraa	1	0.15
Rubia cordifolia	Rubiaceae	Maxxannee	2	0.31
Rumex abyssinicus	Polygonaceae	Maqmaqqoo	7	1.07
Rumex nepalensis	Polygonaceae	Shabbee	4	0.61
Ruta chalepensis	Rutaceae	Xeenaaddaam	12	1.84
Salvia nilotica	Lamiaceae	Bakkolluu	3	0.46
Schefflera abyssinica	Araliaceae	Harfatuu	2	0.31
Senna italica	Fabaceae	Fiitii	1	0.15
Senna occidentalis	Fabaceae	Shekshekkee	2	0.31
Sida schimperiana	Malvaceae	Harmeellaa	4	0.61
Silene macrosolen	Caryophyllaceae	Woggartii	11	1.69

Solanum incanum	Solanaceae	Hiddii	9	1.38
Solanum marginatum	Solanaceae	Hiddii	12	1.84
Teclea nobilis	Rutaceae	Hadhessaa	5	0.77
Toddolia asiatica	Rutaceae	Harangamaa	1	0.15
Trigonella foenum-graecum	Fabaceae	Abishii	2	0.31
Urera hypselodendron	Urticaceae	Lalisaa	1	0.15
Urtica simensis	Urticaceae	Doobbii	2	0.31
Verbena officinalis	Verbenaceae	Darguu	17	2.61
Vernonia amygdalina	Asteraceae	Ebbichaa	8	1.23
Vica faba	Fabaceae	Baaqilaa	2	0.31
Viscum tuberculatum	Viscaceae	Dheertoo	3	0.46
Withania somnifera	Solanaceae	Gizaawwaa	20	3.07
Xanthium strumarium	Asteraceae	Herwoxaa	2	0.31
Ximenia americana	Olacaceae	Hudhaa	6	0.92
Zaleya pentandra	Aizoaceae	Araddoo	1	0.15
Zehneria scabra	Cucurbitaceae	Ancotee	4	0.61
Zanthoxylum chalybeum	Rutaceae	Gedaa	1	0.15
Total			652	100

Declaration

I, the undersigned declare that this thesis is my orginal work and has not been presented for a degree in any other university and that all sources of materials used for the thesis have been correctly acknowledged.

Name Mengistu G/Hiwot Signature _____

This thesis has been submitted for examination with our approval as advisors.

Prof. Sileshi Nemomissa Signature _____

Dr. Tesfaye Awas Signature _____