An Ethnobotanical Study of Medicinal Plants used by Local People in Menz Gera Midir District, North Shewa Zone of Amhara Regional State, Ethiopia

Seble W/Yohannis Fekie

A Thesis submitted to

The Department of Plant Biology and Biodiversity Management

Presented in Partial Fulfillment of the Requirements for the Degree of Master of Science (Plant Biology and Biodiversity Management)

Addis Ababa University

Addis Ababa, Ethiopia

July 2013

ADDIS ABABA UNIVERSITY
GRADUATE PROGRAMMES

This is to certify that the thesis prepared by Seble W/Yohannis Fekie, entitled: *An Ethnobotanical Study of Medicinal Plants Used by Local People in Menz Gera Midir District, North Shewa Zone of Amhara Region, Ethiopia* and submitted in partial fulfillment of the Requirements for the Degree of Master of Science (Plant Biology and Biodiversity management) complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

Signed by Examining Board:

Name	Signature	Date
1. Prof Sebsebe Demissew (Examiner)	Seb Demissew	28/06/2013
2. Prof Sileshi Nemomissa (Examiner)		27/06/2013
3. Dr Zemede Asfaw (Advisor)	~~Zemede Asfaw~~	27/06/2013
4. Prof Ensermu Kelbessa (Advisor)	Ensermu Kelbessa	27/06/2013
5. Prof Ensermu Kelbessa (Chairman)	Ensermu Kelbessa	27/06/2013

An Ethnobotanical Study of Medicinal Plants used by Local People in Menz Gera Midir District, North Shewa Zone of Amhara Regional State, Ethiopia

Seble W/Yohannis Fekie

MSc

Addis Ababa University, 2013

ABSTRACT

An ethnobotanical study was conducted to document medicinal plants used by the local people and their indigenous knowledge in Menz Gera Midir District, North Shewa Zone of the Amhara Regional State, Ethiopia. Data were collected from 72 (12 of them key informants) informants using semi-structured interviews, group discussions and guided field walk. Priority ranking, paired comparison, direct matrix ranking and by calculation of the informant consensus factor (ICF) were used in data analysis. One hundred fifty five medicinal plant species from the natural vegetation (67.1%) and homegardens (32.9%) claimed to be used by the local people for the treatment of human and livestock ailments. A total of 115 species are mentioned for the treatment of only human health problems, 10 species for treatment of livestock ailments only and 30 for both human and livestock diseases. Asteraceae, which contributed 16 species, stood first followed by Lamiaceae with 12 species. The medicinal flora of the study area is composed of 68 (43.9%) herb, 47 shrub, 29 tree and 11 climber species. The most frequently used plant parts are leaves (43.9%) followed by roots (31%). The most frequent mode of preparation of plant medicine was pounding (27.9%) followed by powdering (16%). The most common route of administration of traditional medicine was oral (48%) followed by dermal (28.6%). The highest ICF values were linked to problems associated with abdominal and gastrointestinal diseases (0.86) followed by dermatological problem (0.83). Priority ranking showed that people of the area preferred Lupinus albus, which was the rarest medicinal plant in the study area. Paired comparison of five species of plants showed that Cucurbita pepo is the most preferred species by traditional healers for the treatment of headache. Olea europaea subsp. *cuspidata was shown to be the most multipurpose species. The medicinal plant resource of the area is threatened by agricultural expansion to grazing lands and forests, charcoal making, firewood collection and overgrazing. In-situ conservation and cultivation of medicinal plants in homegardens are recommended as remedial actions.*

Keywords: Ethnobotany, Medicinal plants, Indigenous Knowledge, Informant consensus factor, Menz Gera Midir District

Table of Contents **Page**

CHAPTER THREE

CHAPTER FOUR

CHAPTER FIVE

List of Figures

List of Tables

List of Appendices

ACKNOWLEDGEMENTS

I express deepest gratitude to my advisors Dr. Zemede Asfaw and Prof. Ensermu Kelbessa for their consistent invaluable advice, guidance, comments and follow-up right from start to the completion of this research work. Moreover, I thank Dr. Zemede Asfaw for his provision of orientation on various ethnobotanical techniques and literature on Ethnobotany and Prof. Ensermu Kelbessa for his help in identification of plant specimen and confirmation.

I would like to thank Female Scholarship Program that runed by AAU and SIDA for sponsoring my MSc. Study.

My thanks also go to the Department of Plant Biology and Biodiversity Management and the National Herbarium of Addis Ababa University that facilitated the study in several ways.

I also acknowledge the support I received from Menz Gera Midir District Administration Office through writing letter of support to kebeles and District Agricultural and Rural Development Office for providing me with necessary information about the District. I would also like to thank Mehal Meda Hospital and Veterinary clinic for providing of data on major human and livestock health problems in the District.

I would like to express deepest thanks to my field guides Mr. Mulu Tilahun and Mr. Aytenew Zergaw for their help in data collection.

Above all, I would like to extend my thanks to my family members particularly my father Mr. W/Yohannis Fekie, my mother Ms. Asegedech Mnalkulet, my uncle Mr. Tamrie Mnalkulet, Mr. Mandefro Mnalkulet and Mr. Lema Mnalkulet for their moral support during my study.

Finally heartfelt thanks to all who participated directly or indirectly in the successful completion of my thesis work.

List of Acronyms

AAU	Addis Ababa University
ASL	Above Sea Level
FL	Fidelity Level
EOC	Ethiopian Orthodox Christianity
FAO	Food and Agricultural Organization
GPS	Geographical Position System
ICF	Informant Consensus Factor
MGMDARDO	Menz Gera Midir District Agriculture and Rural Development Office
MGMDEO	Menz Gera Midir District Educational Office
MGMDHO	Menz Gera Midir District Health Office
MGMDVHO	Menz Gera Midir District Veterinary Health Office
M.Sc	Master of Science
NCI	National Cancer Institute
NMSA	National Meteorological Service Agency of Ethiopia
TBK	Traditional Botanical Knowledge
USA	United States of America
WHO	World Health Organization

CHAPTER ONE

1. INTRODUCTION

1.1 Background of the study

Ethnobotany is a multidisciplinary science defined as the interaction between plants and people. It is also defined as local people's interaction with their natural environment: how they classify, manage and use plants available around them (Martin, 1995). The relationship between plants and human cultures is not limited to the use of plants for food, clothing and shelter but also includes their use for religious ceremonies, ornamentation and healthcare (Schultes, 1992). Traditional people around the world possess unique knowledge of plant resources on which they depend for food, medicine, and general utility including tremendous botanical expertise (Martin, 1995). In general, ethnobotany is the scientific investigation of plants as used in indigenous culture for food, medicine, magic, rituals, building, household utensils and implements, musical instruments, firewood, pesticides, clothing, shelter and other purposes (Kelbessa Urga *et al.*, 2004).

Since ancient times, plants have been indispensable sources of both preventive and curative traditional medicine preparations for human beings and livestock. The wide usage of traditional medicine has been attributed to cultural acceptability, efficacy against certain type of diseases and economic affordability as compared to modern medicine (Asfaw Debela *et al.*, 1999). Considerable indigenous knowledge system, from the earliest times, is linked to the use of traditional medicine in different countries (Farnsworth *et al.*, 1994).

Medicinal plants have important contributions in the healthcare system of local communities as the main source of medicine for the majority of the rural population (Tesfaye Hailemariam *et al.*, 2009). About 80% of the world's population relies chiefly on traditional medicine for their healthcare systems (Prescott-Allen and Prescott- Allen, 1982; cited in Brown, 1992). This is partly due to poverty and partly due to the fact that traditional systems are more culturally acceptable and able to meet the psychological needs in a way western medicine does not (Prescott-Allen and Prescott- Allen, 1982; cited in Brown, 1992). Thus, medicinal plants are

widely used in the treatment of numerous human and livestock diseases in different parts of the world.

Ethiopia has a long history of traditional medicine and has developed ways to combat diseases through it (Birgit Negussie, 1998). The ways are also as diverse as the different cultures. Healing in Ethiopian traditional medicine is not only concerned with curing of diseases but also with the protection and promotion of human physical, spiritual, social, mental and material wellbeing (Makonnen Bishaw, 1991). It is widely believed in Ethiopia that the skill of traditional health practitioners is 'given by God' and knowledge on traditional medicines is passed orally from father to a favorite child, usually a son or is acquired by some spiritual procedures. Traditional healing knowledge is guarded by certain families or social groups (WHO, 1990). Traditional medicine has been brought into focus for meeting the goals of a wider coverage of primary healthcare delivery, not only in Africa but also, in all countries of the world. It is the first choice healthcare treatment for at least 80% of Africans who suffer from high fever and other common ailments (Hill, 1989).

In Ethiopia, up to 80% of the population uses traditional medicine due to the cultural acceptability of healers and local pharmacopeias, the relatively low cost of traditional medicine and difficult access to modern health facilities (Kebede Deribe, *et al.*, 2006). Hamilton (2003) attributes the dependence on medicinal plants to the low proportion of medical doctors to patients in Africa. The ethnomedicinal healing systems vary across cultures. In Ethiopia, there is cultural diversity and the use pattern of the various flora differ accordingly (Kebu Balemie *et al.*, 2004).

Medicinal plants play a key role in the development and advancement of modern studies by serving as a starting point for the development of novelties in drugs (Pramono, 2002). The knowledge and use of plants is an integral part of many ethnic rural cultures in Ethiopia, the extent of which has not yet been studied in depth (Abbink, 1995). For instance, the ethnobotanical study of people of Menz Gera Midir District has remained unexplored and no documentation has been done on the medicinal plants and the associated knowledge available

before this study. Therefore, this study has been conducted to document medicinal plants used by local people for the treatment of human and livestock aliments and indigenous knowledge in Menz Gera Midir District, Ethiopia.

1.2 Statement of the problem

In Ethiopia, both human and natural factors heavily contribute to the loss of medicinal plants, which links with the gradual displacement of indigenous knowledge associated with these plants. In developing countries like Ethiopia, the indigenous knowledge about traditional medicinal plants is transferred secretly from generation to generation orally. Since, there is a gap in the documentation and records on medicinal plants in the country, indigenous knowledge on usage of medicinal plants as remedies for both human and livestock ailments will be lost. Until this moment, no research on ethnobotanical study of medicinal plants was conducted in Menz Gera Midir District. The findings of this study will help people of the study area to be aware of problems associated with medicinal plants and give attention for sustainable use and conservation of medicinal plants of their surroundings.

1.3 Research questions

The main focus of this study is to investigate the traditional medicinal uses of various plants which are used by Menz Gera Midir District people and also to compile and document the traditional knowledge of local people in the study area on medicinal plants. The findings of the study will try to answer the following research questions:

- Are there medicinal plants, which local people use to treat their own health problems and livestock ailments?
- What are the medically important plant species used by indigenous people of the District and where in the landscape and in which plant community types they are distributed?
- How do the local people obtain and use the plant species to treat various diseases?
- Which part of the medicinal plants is useful to treat ailments?
- How is the current status of the medicinal plants and what are the traditional conservation systems?

1.4 Significance of the study

Until this time, as far as the literature survey to prepare this proposal is concerned, there is no research on ethnobotany of medicinal plants has been carried out in Menz Gera Midir District. The findings of this study, which will most likely be the first of its kind in the area, will help people of the study area to be aware of the uses and the modes of sustainable use and problems associated with medicinal plants and give attention for the threatened medicinal plants. The documentation of the indigenous knowledge on medicinal plants can be part of the information source for those who want to conduct a further research in ethnobotany and the development of modern drugs. In addition, it serves to record, compile and document medicinal plants and their associated indigenous knowledge used by indigenous people for the proper utilization, management and conservation of medicinal plants. Through proper utilization, conservation and management of medicinal plants in particular and natural resources in general to bring about protection and conservation of biodiversity. It provides a basis for further ethnobotanical studies that contributes towards protection and conservation of medicinal plants.

1.5 Objectives

1.5.1 General objective

- To document plant species of medicinal value to the community and the associated knowledge on use, management, preparation and other aspects of the indigenous knowledge of the people in Menz Gera Midir District.

1.5.2 Specific objectives

- To document indigenous knowledge of the people on use of medicinal plants in the study area;
- To identify and document plant species that are used as medicines for the treatment of human and livestock health problems;
- To describe the taxonomic diversity of medicinal plants;
- To identify and document the plant parts used for medicinal purposes;
- To describe the use, preparation and administration routes of medicinal plants as remedy for human and livestock diseases;
- To find out about distribution of medicinal plants in etic and/or emic vegetation categories;
- To assess the current conservation status and existing threats of medicinal plants;

CHAPTER TWO

2. LITERATURE REVIEW

2.1 Origin and development of ethnobotany

Among the many definitions of ethnobotany, the one that is widely employed is "the study of the relationship between plants and people" (Balick and Cox, 1996). Ethonobotany is also defined as local people's interaction with their natural environment: how they classify, manage and use plants available around them (Martin, 1995). It is also described as "a unit of ecological study specializing in the interaction of people and the plant world "(Ford, 1978). It is an attempt to understand how people view the world of plants and their relation to it. The Prefix "ethno" refers to the study of people or "the way that other people look at the world", while the word "botany" refers to the study of plants (Martin, 1995).

Ethnobotanical work seems to have started with Christopher Columbus in 1492, at a time when he brought tobacco, maize, spices and other useful plants to Europe from Cuba (Cotton, 1996) and when other immigrants from the new world documented food, medicine and other useful plants of the Aztec, Maya and Inca peoples (Martin, 1995).

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

between communities and the environment is essential for biodiversity conservation (Martin, 1995; Balick and Cox, 1996; Cotton, 1996).

2.2 Indigenous medicinal plant knowledge

Traditional people around the world possess unique knowledge of plant resources on which they depend for food, medicine and general utility including tremendous botanical expertise (Martin, 1995). People use medicinal plants for the treatment of various ailments on the basis of indigenous knowledge passed to them generation after generation.

According to Wole (2010), indigenous knowledge simply refers to health practices, approaches, knowledge and beliefs incorporating plant, animal and mineral based medicines, spiritual therapies, manual techniques and exercises, applied singly or in combination to treat, diagnose and prevent illness or maintain well-being. The immediate and intimate dependency of local people on natural resources resulted in the accumulation of indigenous knowledge that helped people to adapt to and survive in the environments in which they live. It is local knowledge that is unique to a given culture or society and the base for agriculture, healthcare, food preparation, education, environmental conservation and a host of other activities (Thomas, 1995). It is a systematic body of knowledge built up by a group of people through generation of living in close contact with nature and it is cumulative and dynamic. In most developing countries, including Ethiopia, indigenous knowledge of traditional medicinal plants and their uses has been passed from one generation to the next by word of mouth. However, many young people today have little interest in traditional knowledge of medicinal plants (Endashaw Bekele and Shigeta, 2008).

Indigenous knowledge includes time-tested practices that developed in the processes of interaction of humans with their environment (Balick and Cox, 1996). It is the main resource of all ethnobotanical investigations and is generally called as Traditional botanical Knowledge (TBK). However, the continuation of this knowledge is endangered when transmission between the older and younger generation is no longer connected (Kargioglu *et al.*, 2008). Indigenous knowledge is a result of many generations', long years' experiences, careful

observations and trial and error experiments (Martin, 1995). Thus over centuries, indigenous people of different localities have developed their own specific knowledge on plant resource use, management and conservation (Cotton, 1996). The indigenous knowledge consists of a vast array of knowledge regarding the use of plant material for health purposes (Sidhu and Pannu, 2010).

Ethnobotany is aimed at gathering and documenting indigenous botanical knowledge, cultural practice, use and management of botanical resources and discovers benefits from plants. 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 (Miollis, 1999).

2.3 Traditional medicinal plants in Ethiopia

According to Mohammed Adefa and Berhanu Abraha (2011) Ethiopia is a country characterized by a wide range of climatic and ecological conditions possessing enormous diversity of flora and fauna, including wide range of potentially useful medicinal plants. The country possesses a particularly wide range of potentially useful medicinal plants, more extensive indeed than available in many other parts of the world. Dawit Abebe (1986) estimated that 95% of traditional medical preparations in Ethiopia are of plant origin.

In Ethiopia, the long history of using traditional medicinal plants for combating various ailments can be confirmed by referring to the recent collection of medico-religious manuscripts of the Axumite kingdom (Fassil Kibebew, 2001). Pankhurst (1990) indicated that the antiquity of the traditional use of medicinal plants in Ethiopia could not be simply over looked.

In Ethiopia, it is well known that traditional medicines are widely used especially in the low income rural parts of the country (Getachew Addis *et al.*, 2002). It is reported that nearly 80% of the population in the country use plant-based traditional medicines as their healthcare system (Tilahun Teklehaymanot and Mirutse Gidey, 2007). The wide utilization of plant based traditional healthcare is mainly attributed to the fact that it makes use of locally available plant resources (Mezgebe Kassaye, 1996; WHO, 1999). The majority of medicinal plants, with few exceptions, are harvested from wild habitats, which are currently under great treat (Dawit Abebe

and Ahadu Ayehu, 1993; Iwu, 1993; Girma Deffar, 1998). Inadequate health centers and shortage of medicines and personnel in clinics could also be the reasons behind using traditional medicines as a substitute for modern medication (Nyazena and Kire, 1986; Dawit Abebe, 1996).

In Ethiopia, traditional medicine still to be the only available health service system for the majority of the population (Asfaw Debela *et al.*, 1999; WB, 2000). However, it is often postulated that modern health professionals consider it as a practice that serves no purpose and in their view its continued existence is merely because of lack of access to modern healthcare service (WHO, 1978; Dawit Abebe and Ahadu Ayehu, 1993). Such negative attitudes may possibly stem from misgivings about its biomedical values and probably from many other factors.

Ethiopian traditional medical system is characterized by variation and is shaped by the ecological diversities of the country, sociocultural background of the different ethnic groups as well as historical developments which are related to migration, introduction of foreign culture and religion (Getachew Addis *et al.*, 2002). Previous studies showed the existence of traditional medical pluralism in the country (Slikkerveer, 1990; Dawit Abebe and Ahadu Ayehu, 1993). Based on historical data, Slikkerveer (1990) identified three medical sub-sytems in the highland of Eastern Hararge Zone (Babile area), namely, Cushtic Folk Medicne, Arabic Medicine and Amaharic Medicine, which constitute the present indigenous healthcare in the area. These healthcare sub-systems have their own historical background, perception about health and illness, practices and types of healers.

2.4 The role of traditional medicinal plants in human healthcare services

Plants have played crucial role as a source of traditional medicine in Ethiopia from immemorial times to combat different ailments and human sufferings (Asfaw Debella *et al.*, 1999; Mirutse Giday, 2001). It was the only system available for healthcare prior to the introduction of modern medicine for prevention, diagnosis and treatment of social, mental and physical illness (Dawit Abebe, 1986). To date traditional medicine has become an integral part of the culture of the Ethiopian people due to its long period of practice and existence (Mirgissa Kaba, 1998).

Plants have been indispensable and the most important sources of both preventive and curative traditional preparation for human beings and livestock since time immemorial. By their capacity of photosynthesis, plants form the basis of the biological food web and producing oxygen which is the key for our lives and they are balancing the gases of our environment. Plants are also recycling essential nutrients, establishing soils and soil fertility, protecting areas of water catchments. They keep ecological and climatic balances further helping to control rainfall through the process of transpiration. And all these benefits of plants are directly or indirectly linked with healthcare (Hamilton, 2004; Kelbessa Urga *et al.*, 2004). Therefore, healthcare and botany have evolved as inseparable domains of human activities since various plant products are of paramount importance in traditional healthcare systems. Medicinal plants play typical role in the lives of many people in terms of health support, financial income and livelyhood security (Hamilton, 2003; 2004; Abdulhamid Bedri *et al.*, 2004). Ethiopian plants have shown very effective medicinal value for some ailments of humans and domestic animals. The major reasons why medicinal plants are demanded in Ethiopia are due to culturally linked traditions, the trust the communities have in medicinal values of traditional medicine and relatively low cost in using them (Endashaw Bekele, 2007). In addition to this, there is a large magnitude of use and interest in medicinal plants in Ethiopia due to acceptability, accessibility and biomedical benefits (Dawit Abebe, 2001).

Traditional medicine is deeply rooted in history and culture. It is part of the traditions of a country, employing healing practices handed down from generation to generation. At present, traditional medicine and traditional practitioners still play an important role in human healthcare, particularly for primary healthcare in many developing countries (Zhang, 1999). The term traditional medicine is used to explain the traditional medical practice that has been in existence even before the advent of modern medicine. It is still widely accepted and used in prevention and treatment of physical and mental disorders as well as social imbalance. Due to its intrinsic qualities, unique and holistic approaches as well as its accessibility and affordability, it continues to be the best alternative care available for the majority of the global population, particularly for those in the rural areas of developing countries.

Traditional medicine is an important healthcare system in Ethiopia. According to Tesfaye Hailemariam *et al.* (2009) 80% of the Ethiopian people use medicinal plants and plant remedies selected over centuries. Such a wide use of traditional medicine asserts that the contribution of this indigenous knowledge and resource to the enhancement healthcare needs of the Ethiopian population cannot be underestimated (Demel Teketay, 2001; Kanno, 2004). Therefore, a large segment of the rural population still will remain without access to modern medicine and will continue to depend on medicinal plants and traditional healthcare practices (Medhin Zewdu, 2002).

According to the World Health Organization (WHO), more than 80% of Africans rely on traditional medicine and indigenous knowledge to meet their health needs (WHO, 2002). This is due to the fact that traditional medicine is accessible, affordable, culturally and socially acceptable and most people prefer it to the 'exorbitantly priced' conventional Western medicine.

Traditional medicine has also disadvantage as various authors stated (Amare Getahun, 1976; Sofowora, 1982; Dawit Abebe, 1986) lack of precision and standardization is one drawback for the recognition of the traditional healthcare system. The main disadvantage of traditional medicine are the lack of scientific proof of its efficacy which could result in the decrement of its acceptance specially by educated and most urban dwellers who entirely depend on modern medicine (Dawit Abebe, 1986). In addition, the imprecise diagnosis given by some traditional healers and when they use several types of medicinal plants species and other types of traditional medicine in combination (without scientific proof) which could result in health damage is the other negative side of the traditional medicine. Lack of precise dosage which could lead to toxicity is also the other disadvantage of traditional medicine (Dawit Abebe, 1986). In addition to this traditional healers had no accurate value of the medicines prescribed to patients. They administered the same amounts of medicine to people who have the same disease regardless of age, body weight or sex (Gidey Yirga, 2010).)

2.5 Plants in ethnoveterinary medicine

Ethiopia is rich in its livestock population; it is one of the countries in the world with the lowest unit output. The poor health condition of its livestock has partially been responsible for the low productivity (Mirutse Giday and Gobena Ameni, 2003). Livestock disease has often been described as serious of constraints to both macro-level economic development in Africa and the well-being of millions of poor livestock keepers (Andy, 1999).

Ethnoveterinary medicine, the scientific term for traditional animal healthcare, encompasses the knowledge, skills, methods, practices, and beliefs about animal healthcare found among the members of a community (McCorkle, 1986 and Tamboura *et al.*, 2000; Maine *et al.*, 2009).

The knowledge base differs not only from region to region but also among and within communities. It has been developed through trial and error and deliberate experimentation. Therefore, it is less systematic, less formalized, and not universally recognized as a valid method of disease control in animals (Devendrakumar and Anbazhagan, 2012). Research into ethnoveterinary medicine is often undertaken as part of a community based approach that serves to improve animal health and provide basic veterinary services in rural areas (Mathius-Mundy and McCorkle, 1989).

Ethnoveterinary medicine is frequently used for treating animal by many different people around the world. It provides valuable alternatives to and complements western-style veterinary medicine. Ethnoveterinary remedies are accessible and easy to prepare and administer, at little or no cost to the farmer (Jabbar *et al.*, 2005). In many poor rural areas, ethnoveterinary medicine can play an important role in animal production and livelihood development, and often becomes the only available means for farmers treat ill animals (McCorkle, 1986; Tamboura *et al.*, 2000; Jabbar *et a*l., 2005; Maine *et al.*, 2009).

Enthnoveterinary medicinal plants are used extensively and quite effectively for primary healthcare treatment to make domestic animals productive and healthy. The indigenous knowledge of the veterinary healthcare system acquired by traditional herbal healers is orally

transferred from one generation to other (Phondani *et al.*, 2010). The importance of the traditional knowledge on ethnoveterinary practices by specialists and local healers who are knowledgeable and experienced in traditional systems of treatment, but their knowledge has not been documented, and is dwindling fast (Jain, 1999). Traditional veterinary medicine is very important in developing countries where conventional remedies for animal healthcare are inaccessible or unaffordable to poor rural farmers (McGaw *et. al.*, 2007).

According to the United Nations Food and Agricultural Organization (FAO), the lack of drugs to treat diseases and infections results in losses of 30-35% in the breeding sector of many developing countries, where poor animal health remains the major constraint to increased production (FAO, 2002). Therefore, much effort is needed in research and integration of the ethnoveterinary practices in developing countries (Mathias and McCorkl, 1997).

2.6 Ethnobotanical research on medicinal plant in Ethiopia

In Ethiopia, little emphases have been given to traditional medicinal studies over the past decade (Debella Hunde, 2001). Therefore, it can be said that ethnobotanical studies are merely at the start in Ethiopia though there have been some attempts in investigating medicinal plants uses and there is as yet no in depth study on the relation between medicinal plant and indigenous knowledge on sustainable management of such plant resources.

The study of Ethiopian medicinal plants has not been realized as fully as that of India or other traditional communities elsewhere (Iwu, 1993). In Ethiopia, though there has been some organized ethnomedicinal studies, there is limited development of therapeutic products and the indigenous knowledge on usage of medicinal plants as folk remedies are getting lost owing to migration from rural to urban areas, industrialization, rapid loss of natural habitats and changes in life style. In addition, there is a lack of ethnobotanical survey carried out in most parts of the country. In view of these, documentation of the traditional uses of medicinal plants is an urgent matter and important to preserve the knowledge (Tilahun Teklehaymanot and Mirutse Giday, 2007). Furthermore, most of the ethnomedicinal studies in northern part of Ethiopia are focused on 'Medihanit Awakie' (professional traditional medicine practitioners) and the ancient medico-

magical and/or medico-spiritual manuscripts and old Gee'z manuscripts (Dawit Abebe and Ahadu Ayehu, 1993; Abbink, 1995), and ignore the knowledge of ordinary people in the locality (Hareya Fassil, 2005). Thus, only application proper ethnobotanical methodology where general imformants and key informants can provide balanced documentation of the indigenous knowledge on medicinal plants of Ethiopia.

Recently, among the researchers conducted on ethnobotanical study of medicinal plants in Ethiopia, Ermias Lulkal *et al.* (2008) collected the highest number. Ethnomedicinal uses of 230 plants species were documented from Mana Angetu District, which is found in Bale Zone of Oromia Region. Of these, 181 (78.70%) were used as human medicine, 27 (11.74%) as livestock medicine and the remaining were 22 (9.7%) uses for treating both human and livestock ailments. Similar study by Mirutse Gidey (2001), on Zay people indicated herbs are first in which Zay people derive their medicine (55%), followed by trees and shrubs (33%). Whereas, the study conducted by Ermias Lulkal *et al.* (2008) on ethnobotanical study of medicinal plants in Mana Angetu District stated that shrubs rank first with 47.83% followed by herbs 23.91% and trees 19.13% in which indigenous people of Mana Angetu derive their and livestock remedies. In addition to the above point, ethnobotanical study of medicinal plants in Wonago Woreda by Fisseha Mesfin *et al.* (2009) revealed that shrubs were the most harvested for medicinal purpose (43.2%) followed by herbs (34.5%), trees (20.9%) and climbers (1.2%). Moreover, the study explained that the most frequently utilized plant parts were roots (35.8%), followed by leaves (24.6%). In terms of their growth location, the study showed that traditional medicinal plants were harvested mostly from natural vegetation area followed by homegardens.

Different parts of plants are being used for medicine in order to cure human or livestock diseases in Ethiopia. However, roots and leaves are the most widely utilized plant parts. According to Tizazu Gebre (2005), roots are the most used plant part (35.7%), followed by leaves (32.9%). Moreover, this study explained that 68.6% of herbal remedies were applied orally and 31.4% were applied externally. People use medicinal plant parts, to treat human or livestock ailments while they are fresh, dried or both. The study of Gidey Yirga (2010) in Central Tigray revealed that some of the medicinal preparations were used fresh or in dried state, as these plants are used in both forms, the chance of using the medicinal plants under different seasons of the year is

increased and traditional healers preserve the plant that they could not find in dry season in different ways like hanging the plant material.

In more recent years ethnobotanical studies have focused on medicinal plants in different parts of Ethiopia, some studies undertaken in Amahara Regional State are indicated in Table 1. The list shows that some of the studies are thesis by graduate students while others are journal articles.

Table 1. Ethnobotanical studies of medicinal plants conducted in some areas of Amhara Regional State

Title of the research	Zone	Wereda	Author/year
Ethnobotanical Survey of Traditional Medicinal Plants in Tehuledere District, South Wollo, Ethiopia	South Wollo	Tehuledere District	Mohammed Adefa and Berhanu Abraha (2011), *J. Medic. Plants Research*
Ethnobotanical Study of Medicinal Plants used by People in Zegie Peninsula, Northwestern Ethiopia	West Gojjam	Zegie Peninsula	Tilahun Teklehaymanot and Mirutse Giday (2007), *J. Ethnobiol. and Ethnomedic.*
Ethnomedicinal uses of *Hagenia abyssinica* (Bruce) J.F.Gmel. among Rural Communities of Ethiopia	North Gonder	Debark	Biruktayet Assefa *et al.* 2010), *J. Ethnobiol. and Ethnomedic.*
An Ethnobotanical Study of Traditional use of Medicinal Plants and their Conservation Status in Mecha Wereda, West Gojjam Zone of Amhara Region, Ethiopia	West Gojjam	Mecha	Getaneh Gebeyehu (2011), AAU, M.Sc. Thesis
An Ethnobotanical Study of Plants used in Traditional Medicine and as Wild Foods in and Around Tara Gedam and Amba Remnant Forests in Libo Kemkem Wereda, South Gonder Zone, Amhara Region, Ethiopia	South Gonder	Libo Kemkem	Getnet Chekole (2011), AAU, M.Sc. Thesis
Ethnobotanical Study on Medicinal Plants used by Local Communities	North Gondar	Debark	Eskedar Abebe (2011), AAU, M.Sc. Thesis

Table 1 cont…

in Debark Wereda, North Gondar Zone, Amhara Regional State, Ethiopia			
An Ethnobotanical Study of Medicinal Plants in Farta Wereda, South Gonder Zone, Amhara Region, Ethiopia	South Gonder	Farta	Nigussie Amsalu (2010), AAU, M.Sc. Thesis
Ethnobotanical Study on Medicinal Plants used by Indigenous Local Communities in Minjar-Shenkora Wereda, North Shewa Zone of Amhara Region, Ethiopia	North Shewa	Minjar-Shenkora	Getu Alemayehu (2010), AAU, M.Sc. Thesis
An Ethnobotanical Study of Useful Plants of the Farming Site in Gozamen Wereda, East Gojjam Zone of Amhara Region, Ethiopia	East Gojjam	Gozamen	Haimanot Reta (2010), AAU, M.Sc. Thesis

2.7 Medicinal plants as the base for development of modern drugs

According to WHO (2001) medicinal plant can be defined as herbal preparations produced by subjecting plant materials to extraction, fractionation, purification, concentration or other physical or biological processes which may be produced for immediate consumption or as a basis for herbal products. Plants have been a source of medicine and a major resource for healthcare since ancient times, with some traditional herbal medicines in use for more than 2,000 years. The modern pharmaceutical industry is paying more attention to plants as scientists re-discover that plant life is an almost infinite resource for medicine development (Thomson, 2010). One fourth of modern medicines available on prescription today owe their origins of raw material to higher plants of tropical forests. Out of these, 74% are derived from plants that have some related use in traditional herbal medicine. Increasing emphasis on the use of medicinal plants in searching for new drugs is undoubtedly a productive strategy (Liu and Yaniv, 2005).

Plants are the basis for the development of modern drugs and medicinal plants have been used for many years in daily life to treat diseases all over the world (Ates and Erzdogrul, 2003; Jimene z-Medina *et al.*, 2006). Traditional medicinal plants are a therapeutic resource used by the population of the African continent specifically for healthcare, which may also serve as starting

materials for drugs (Sofowora, 1993). A medicinal plant is one whose one or more of its organs contains substances that can be used for therapeutic purpose or which are precursors for the synthesis of useful drugs (Sofowora, 1982). However, the knowledge of medicinal plants is rapidly dwindling due to the influence of western lifestyles, and lack of interest of the younger generations to carry on the tradition (Muthu *et al.*, 2006).

Ethnobotanical studies are often significant in revealing locally important plant species especially for the discovery of crude drugs. Right from its beginning, the documentation of traditional knowledge, especially on the medicinal uses of plants, has provided many important drugs of modern day (Balick and Cox, 1996; Fabricant and Farnsworth, 2001). These most plant derived drugs were originally discovered through the study of traditional cure and folk knowledge of indigenous people (Balick and Cox, 1996). Out of the total flowering plants reported from the world, more than 50,000 are used for medicinal purposes (Govaerts, 2001).

Ethnopharmacology is the scientific study of ethnic groups and their use of drugs. It is distinctly linked to plant use, botany, as this is the main delivery of pharmaceuticals (Thomas, *et al.*, 1996). Ethnopharmacology and natural product drug discovery remains a significant hope in the improving the poor livelihoods of rural communities. Many modern pharmaceuticals have their origin in ethnomedicine and ethnoveterinary medicine, which relies upon a local pharmacopoeia (Tamboura, *et al.*, 2000). The ethnopharmacology knowledge is a holistic system approach that can serve as an innovative and powerful discovery engines for newer, safer and affordable medicines (Patwardhan, 2005).

Medicinal plants play a key role in the development and advancement of modern studies by serving as a starting point for the development of novelties in drug (Pramono, 2002; Wright, 2005). An average of 25% of modern drugs contains one or more active principles obtained from plants (Medhin Zewdu, *et al.*, 2001). Drug discovery based on ethnobotanical leads serves or is advantageous because it is clearly tested through centuries. For example, indigenous peoples experiment with the plants in their environment, often over many generations and identify those that have bioactive compounds (Balick and Cox, 1996).

Ethiopia is a rich source of medicinal plants, the knowledge and use of plant is an integral part of many ethnic rural cultures, the extent of which has not yet been studied in depth (Abbink, 1995). Indigenous knowledge systems, can guide the development of new crop varieties and medicines (Balick and Cox, 1996). Some of the indigenous plants of Ethiopia (e.g. *Phytholaca dodocandra*, commonly known as endod) can evidence this as source of Mulluscide in control of Shistosomiasis. In addition to this, Maytansine, an active principle against cancer was isolated from Maytenus species (Sebsebe Demissew and Ermias Dagne, 2001); it was collected and studied by the National Cancer Institute (NCI USA). The authors indicated that the result was hidden after 1972.

2.8 Threats to and Conservation of medicinal Plants

2.8.1 Threats to medicinal plants

Many of the threats to medicinal plant species are similar to those causing endangerment to plant diversity generally. The most serious proximate threats generally are habitat loss, land degradation and over-harvesting (Hamilton, 1997). Medicinal plants can have other uses besides as sources of medicines, and the threats from over-harvesting may be due to effects of collection for purposes other than medicinal. The majority of species of plants in traditional or herbal medical treatments are harvested in the wild rather than cultivated. As a result, many plant species have become extinct and some are endangered. It is therefore necessary that systematic cultivation of medicinal plants be introduced in order to protect threatened species. As population grows, demand for traditional medicines will increase, and pressure on medicinal plant resources will become greater than ever (Hamilton, 2003).

According to Zemede Asfaw (2001), medicinal plants are considered to be at conservation risk due to over use and destructive harvesting. Root and bark collection may kill the plant in harvest (Dawit Abebe and Ahadu Ayehu, 1993). People use many wild species of plants for food, medicine, clothing, shelter, fuel, fiber, income generation and the fulfilling of cultural and spiritual needs throughout the world (Zemede Asfaw, 2001). Like other developing countries, the loss of valuable medicinal plants in Ethiopia due to population pressure, loss of habitat,

agricultural expansion and deforestation is widely reported by different workers in Ethiopia (Zemede Asfaw, 2001; Kebu Balemie *et al.*, 2004). In addition to the above point, medicinal plants can be lost due to ecological degradation, loss of indigenous knowledge, loss of cultural assets, threat of illegal smuggling and misuse of resources to medicinal plant conservation, lack of a suitable scheme for equitable sharing of benefits arising from biological resources, and underdeveloped market may prevent cultivators from producing medicinal plants for the market and traditional healers may not participate and fully collaborate (Endashaw Bekele and Shigeta, 2008).

2.8.2 Conservation of medicinal Plants

Conservation is defined as the protection, preservation, and careful management of natural resources. Medicinal plant conservation strategies need to be understood and planned based on an understanding of indigenous knowledge and practices (Berkes and Turner, 2006). The issue of medicinal plant conservation in Ethiopia today calls for aggressive studies and documentation before the accelerated ecological and cultural transformation distort the physical entities and the associated knowledge base (Endashaw Bekele, 2007). The most serious proximate threats when extracting medicinal plants generally are habitat loss, habitat degradation, and over harvesting (Hamilton, 2003). Developing markets for natural products, particularly those that are harvested from the wild, can trigger a demand that cannot be met by available or legal supplies and demands a conservation initiative (Swanson, 1998) so the local populations are not exploited, causing more damage to their resources (Leony and Voeks, 2004).

According to Hamilton (2003), several themes consistently arise in the various sets of recommendations that have been compiled relating to the conservation of medicinal plants, such as those associated with international conferences. They include: the need for co-ordinated conservation action, based on both *in situ* and *ex situ* strategies; inclusion of community and gender perspectives in the development of policies and programmes; the need for more information on the medicinal plant trade; the establishment of systems for inventorying and monitoring the status of stocks of medicinal plants; the development of sustainable harvesting

practices; encouragement for micro-enterprise development by indigenous and rural communities; and the protection of traditional resource and intellectual property rights.

Medicinal plants can also be conserved by ensuring and encouraging their growth in special places, as they have been traditionally (Zemede Asfaw, 2001), this can be possible in places of worship (churches, mosques, grave yards, etc), scared grooves, farm margins, river banks, road sides, live fences of gardens and fields.

CHAPTER THREE

3. MATERIALS AND METHODS

3.1 Description of the study area

3.1.1 Geographical location

The study was conducted in Menz Gera Midir District, which is located 282 km northeast of Addis Ababa in North Shewa Zone of Amahara Regional State. Mehal Meda is the capital town of the District, which is located at a distance of about 152 kilometers from the zonal capital, Debre Brhan. The District is bordered on the south by Menz Lalo Midir and Menz Mama Midir District, on the west by Jamma Distric of Debub Wollo Zone, on the north by Geshe Rabel and Antsokia Gemza District and on the east by Efrata Gidim District. It has a total area of 116, 816 ha and comprises 20 kebeles. The District has an elevation ranging from 1680–3600 m a. s. l. It lies between the coordinates of 10^0 5' to $10^0$32' N and 39^0 28' to 39^0 49' E (Figure 1).

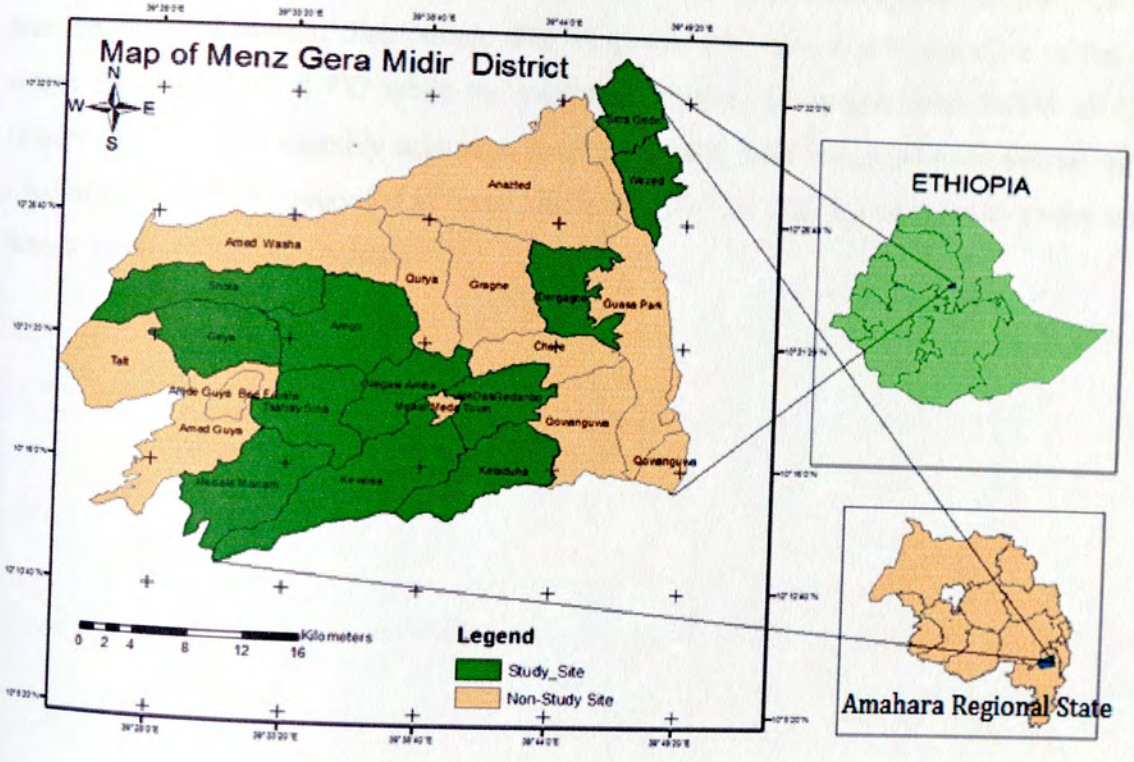

Figure 1. Map of Ethiopia and Amahara Regional State showing the study area

3.1.2 Topography and soil

According to Menz Gera Midir District Agriculture and Rural Development Office (2012) the topography of the District is 25, 699.52 ha Mountain, 33,876.64 ha undulated, 29, 062.72 ha Plain, 4,672.64 ha Marsh and 3,504.48 ha covered by water.

In the District, four soil types are there. These are Brown soil (61.8%), Clay soil (18.2%), Red soil (13%) and Gray soil (7%) (MGMDARDO, 2012).

3.1.3 Climate

Major agro-ecological zones of the District are WURCH, DEGA and WEINA-DEGA (MGMDARDO, 2012). Most of the study area was DEGA, whereas WURCH type of agro-ecological zone covers small proportion of the study area.

Climate data (2001 - 2010) taken from Addis Ababa National Meteorology Service Agency indicates that the study area obtains high rain fall between June to August and low rain fall from October to February. The annual rainfall of the area from (2001 – 2010) was 888 mm. The study area has bimodal rainfall distribution. The mean monthly minimum temperature of ten years ranges from 5.0°C to 8.7°C while the maximum temperature ranges from 16.8°C to 20.0°C (Figure 2). The mean monthly minimum temperature was 5.0°C, recorded in November and the maximum was 20.0°C, recorded in June. This means that the coldest month is November and the hottest month of the year is June.

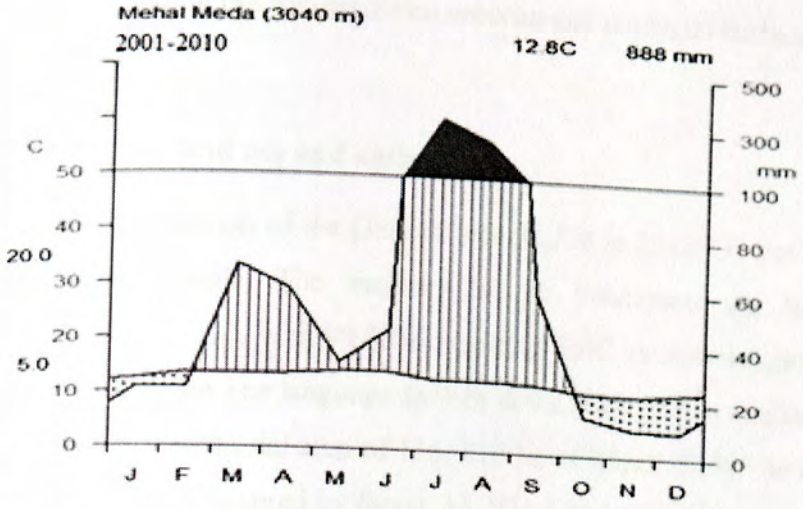

Figure 2. Climadiagram of the study area from 2001 to 2010 at Mehal Meda Weather Station
Data source- National Meteorological Service Agency of Ethiopia (NMSA, 2013)

3.1.4 Vegetation

The study area is one of the areas that were covered by dry ever green Afromontane and Afroalpine and subafroalpine ecosystem. Dry ever green Afromontane vegetation is characterized by *Olea europea* subsp. *cuspidata*, *Juniperus procera*, *Prunus africana*, *Euphorbia* spp. *Carissa spinarum*, *Rosa abyssinca* (Zerihun Woldu, 1999). Tamrat Bekele (1993) and Sebsebe Demissew and Friis (2009) also describe that the presence of tree species such as *Juniperus procera*, *Olea europaea* subsp. *cuspidata*, *Acacia abyssinica* gives good indications that a given vegetation type belongs to dry evergreen Afromontane ecosystem. Correspondingly, the vegetation of the study area is characterized by the presence of major tree species that include *Juniperus procera*, *Acacia abyssinica*, *Podocarpus falcatus*, *Olea europaea* subsp. *cuspidata*, *Hagenia abyssinica*, *Eucalyptus globulus* and different shrubs and herbs. Inaddition, the study area occurs between 1680-3600 m a.s.l. *Lobelia rhynchopetalum*, *Erica arborea* and *Helichrysum* spp are major plant species that occurs between 3200-3600 m a.s.l. in the study area. Similarly, Afroalpine and subafroalpine ecosystem includes areas, which on the average are higher than 3200 m a.s.l. altitude. The subafroalpine areas occur between 3200 and 3500 m a.s.l. altitude, while, the Afroalpine areas occurs between 3500-4620 m a.s.l. altitudes. This ecosystem is characterized by the most conspicuous gaint *Lobelia*, *Lobelia rhynchopetalum* and evergreen

shrubs including the heather *Erica arborea* and perennial herbs such as *Helichrysum* spp (Friis *et al.*, 2010).

3.1.5 People, land use and agriculture

The total population of the District was 93,738 in 2012/13. Out of this 47,994 were female and 45,744 were male. The majority of the inhabitants are follows of Ethiopian Orthodox Christianity (EOC), with 99.56% reporting EOC as their religion. The ethnicity of the District people is Amhara.The language spoken in the study area is Amharic.

The District had a total area of 116, 816 ha of which 29,385 ha is for cultivation, 33,110 ha for grazing, 4006 ha covered by forest, 15, 974.4 ha covered by bush, 22, 670.81 ha for construction, 5556.54 ha unproductive and 6113.25 ha others. The livelihoods of the local people are predominately based on subsistence cultivation of crops and livestock rearing.

In the District, agriculture cover about 85% and the rest are trade and others. The current land use is predominantly smallholder agriculture with an average landholding size of one hectare per household. The major food crops grown in the area are indicated in Table 2. The seed farming complex is a common practice in the study area where barely (*Hordeum vulgare*), wheat (*Tritrcum* spp.), bean (*Vicia faba*) and lentil (*Lens culinaris*) are widely cultivated crops (MGMDARDO, 2012).

Table 2 Major food crops growing in the District

Crop categories	**Scientific name**	**Local name (Amharic)**	**English name**
Cereals	*Hordeum vulgare*	Gebs	Barley
	Triticum spp.	Sndie	Wheat
Vegetables	*Allium cepa*	Key shenukrt	Shallot
	Allium sativum	Nech shenukrt	Garlic
	Brassica oleracea	Tikel gomen	Cabbage
	Cucurbita pepo	Duba	Pumpkin
Fruits	*Citrus aurantifolia*	Lomi	Lime
	Malus sylvestris	Apple	Apple
	Musa x *paradisiaca*	Muse	Bannana
Root crop	*Solanum tuberosum*	Dinch	Potato
	Beta vulgaris	Keyisir	Sugar beet

	Daucus carota	Karot	Carrot
Pulses	*Vicia faba*	Bakela	Bean
	Pisum sativum	Ater	Pea
	Cicer aestivum	Shinbra	Chickpea
	Lens culinaris	Msr	Lentil
Oil crops	*Linum usitatissimum*	Telba	Lin seed
Stimulants	*Catha edulis*	Chat	Khat
	Coffea arabica	Buna	Coffee

Source: Modified from MGMDARDO (2012)

3.1.6 Educational services and healthcare status

According to Menz Gera Midir District Educational Office (MGMDEO, 2012) there are 74 elementary schools (1-8), one General secondary and preparatory school (9-12) and one middle level vocational and educational training institute. About 26,133 students are attending their education in elementary and secondary and preparatory schools, and of these, 12,963 are male and 13,170 are female.

The District had one hospital, three health centres and twenty health post (MGMDHO, 2012). The ten top human diseases in the District are indicated in Table 3.

Table 3 Ten top diseases of 2012/13 seen in Menz Gera Midir District

No.	Types of Disease	No. of Patient
1	Acute febrile illness	645
2	Dyspesia	414
3	Urinary tract infection	310
4	Acute upper respiratory infections	279
5	Other or unspecified disease	274
6	Diarrhoea (non bloody)	257
7	Pneumonia	249
8	Helmenthiasis	206
9	Hypertension and other related disease	183
10	Trauma (injury, fracture etc)	171

Source: (MGMDHO, 2012/13)

3.1.7 Livestock population and their health status

Livestock population is relatively high in Menz Gera Midir District. However, their products (milk, meat, egg and honey) are not that much due poor management, inadequate and low quality feed supply and prevalence of various animal diseases.

According to Menz Gera Midir District Agricultural and Rural Development Office report (2012), the livestock population consists of cattle (79,755), sheep (22,876), goat (35,449), horse (3,595), donkey (32,719), mule (1,932), hen (57,000) and bee (3840). The most common animal diseases in the district include: endoparasite (lung worm and liver worm), ectoparasite (black leg and anthrax), pastrolosis, sheep and goat pox and rabies. Rabies mostly occurred in Dega type of agro ecological zone (MGMDVHO, 2010/11/12). The District has seven veterinary clinics.

3.2 Materials

Plant press, notebook, plastic bag, GPS and digital camera were the materials used in the field study.

3.3 Methods

3.3.1 Reconnaissance survey and selection of study sites

The reconnaissance survey was conducted from November 17 to 27, 2012 in the District in order to obtain information about medicinal plants and to identify sampling sites. Data were collected from November 28, 2012 to January 13, 2013. The study sites are selected by the guidance of culture and tourism employees based on availability of traditional healers and plant species. There are 20 kebeles were present in the District. Out of these, 12 kebeles were selected for the study. These are: Arego, Atedas-Gedanbo, Dergagn, Geya, Keladuha, Kewosa, Mesale Mariam, Negasi Amba, Shola, Sra Gedel, Tsehay Sina and Wezed.

3.3.2 Informant selection

A total of 72 informants (47 male and 25 female) with the age of 20-90 years were selected from 12 kebeles. Six informants, including 1 key informant from each kebele were selected. A total of

12 key informants were selected, following the choice of informant selection as recommended by Martin (1995) and this is commonly systematic way and based on the recommendation of elders, local authorities and local farmers.

3.3.3 Ethnobotanical data collection

Ethnobotanical techniques were employed to collect information on the use of medicinal plants by local people and their traditional knowledge in Menz Gera Midir District. The techniques are group discussion, semi-structured interviews (Appendix 8) and field observations used to obtain indigenous knowledge of the local community on local classification, use, conservation and threats of medicinal plants.

3.3.3.1 Group discussion and semi-structured interview

A brief group discussion was made at each site with all informants of the study site. Discussions were conducted with eight key informants on threats to medicinal plants (Figure 3). Semi-structured questions were employed for interviewing the informants to record and collect information on medicinal plants (local name, plant parts, condition of preparations, method of preparation and application and route of administration) and also information about the informants (Appendix 9). All of the interviews were held in Amharic, the vernacular language of the local people. The methods and techniques followed procedures recommended by Alexiades (1996).

Figure 3 Group discussion with key informants on threats to medicinal plants

3.3.3.2 Guided field walk

Field observations were performed with the help of traditional healers and local guides who were interviewed to obtain the available data in the study area. All the necessary information was recorded on status, habit, and plant communities of medicinal plants.

3.3.3.3 Informant consensus

Informants were interviewed at least twice for evaluating the reliability of information during interview, discussions and collection on the actual fieldwork with informants. Consequently, if the idea of the informant deviates from the original information, it was rejected since it is considered as unreliable. Only the response of an informant that is in harmony with each other was taken as relevant and used for data analysis. This method was adopted from Alexiades (1996).

3.3.4 Plant specimen collection and identification

The local name, habits and associated information of the plant specimens were recorded for each of the plant species, then, the plant specimens were pressed, dried and taken to the National Herbarium (ETH), Addis Ababa University. Identification of the plant specimens was done both in the field, and later at the National Herbarium (ETH) using taxonomic keys in the Flora of Ethiopia and Eritrea. Confirmation of the identification was made by the help of taxonomic experts. Then, the identified specimens were stored at the National Herbarium, Addis Ababa University.

3.3.5 Ethical consideration

Data collection was conducted after permission was obtained from Menz Gera Midir District Administrative Office and the individuals who were targeted for the research and also after the office wrote letters for selected Kebeles of the District.

Special ethical considerations were taken from the beginning to the end of data collection. In view of ethical considerations, approaching of the informants was very systematic. Informants were informed that the objective of the research was for educational purpose, compiling and

documenting of medicinal plants of the study area but not for commercial purposes. This was confirmed by showing letter from District Administrative Office. Most informants accepted the idea and gave information freely on medicinal plants used in the area.

3.3.6. Data analysis

3.3.6.1 Descriptive statistics

Both qualitative and quantitative analytical tools were used for data analysis following approaches of Martin (1995) and Cotton (1996). Ethnobotanical data were entered in to Excel spreadsheet and summarized using descriptive statistics. Descriptive statistical methods such as percentage and frequency were employed to analyze and summarize the data on medicinal plants and associated knowledge. The most useful information gathered on medicinal plants reported by local people; medicinal value, condition of preparation, application, methods of preparation, route of administration, diseases treated, dosage, plant parts used, growth forms, degree of scarcity and threatening factors were analyzed. Then, the results were presented with graphs, charts and tables as well as in texts.

3.3.6.2 Priority ranking

According to Martin (1995), priority ranking involves asking people to think of some items and request them to arrange those items according to a given criterion. Such criteria may be personal preference, or the list of plants resources that people feel are becoming increasingly rare in their communal forests. Therefore, in this study the set of eight plants were selected from the list of medicinal plants, which were reported as scarce by most informants in the study area. Then, these plants were presented to eight randomly selected key informants (out of 12) to rank according to their degree of scarcity. Each rank was given a numerical value (1, 2, 3, and so on) with the most scarce medicinal plant species being given the highest value while the least important was assigned a value of 1. Then, the numbers were summed and ranked.

3.3.6.3 Paired comparison

Paired comparison can be used for evaluating the degree of preferences or levels of importance of certain selected plants. Paired comparisons to indicate the efficacy and popularity of five medicinal plant species used to treat headache were employed as described by Martin (1995). In such a manner that eight key informants were randomly selected and allowed to show their responses independently for pairs of five medicinal plants that are noted for treating headache. A list of the pairs of selected items with all possible combinations was made and sequence of the pairs and the order within each pair was randomized before every pair is presented to selected eight key informants and their responses were recorded, total value summarized and rank made based on the report of eight key informants.

3.3.6.4 Direct matrix ranking

Direct matrix ranking was performed following Martin (1995) in order to compare multipurpose use of medicinal plants. Based on information gathered from informants, eight multipurpose tree species were selected out of the total medicinal plants and seven use diversities of these plants were listed for eight selected key informants to assign use values to each species. Each key informant was asked to assign use values: 5= excellent, 4= very good, 3 = good, 2 = less used, 1 = least used, 0 = not used, for each species. Accordingly, each key informant gave use values for the eight multipurpose medicinal plants and total values (eight key informants value) of each use diversity for species were taken and the values of each species were summed up and ranked.

3.3.6.5 Informant consensus factors

The Informant Consensus Factor (ICF) was calculated for each disease category to identify the agreements of the informants on the reported cures for eight human disease categories. The ICF was calculated as follows: number of use citations in each category (Nur) minus the number of species used (Ns), divided by the numbers of use citations in each category minus one (Heinerich *et al.*, 1998).

$$ICF = \frac{Nur - Ns}{(Nur - 1)}$$

Where,

ICF= Informants Consensus Factor

Nur= number of use citation in each category

Ns= number of species used

3.3.6.6 Fidelity level (FL)

Many medicinal plant species could be used in the same use category and due to this, it is interesting to determine the most preferred species used in treatment of a particular ailment, which can be done with the fidelity level of Friedman *et al.* (1986). The fidelity level (FL), the percentage of informants claiming the use of a certain plant species for the same major purpose, was calculated for the most frequently reported diseases or ailments as:

FL (%) = $\left(\frac{Ni}{N}\right)x100$ Where *Ni* is the number of informants that claim a use of a plant species to treat a particular disease, and *N* is the number of informants that use the plants as a medicine to treat any given disease (Alexiades, 1996).

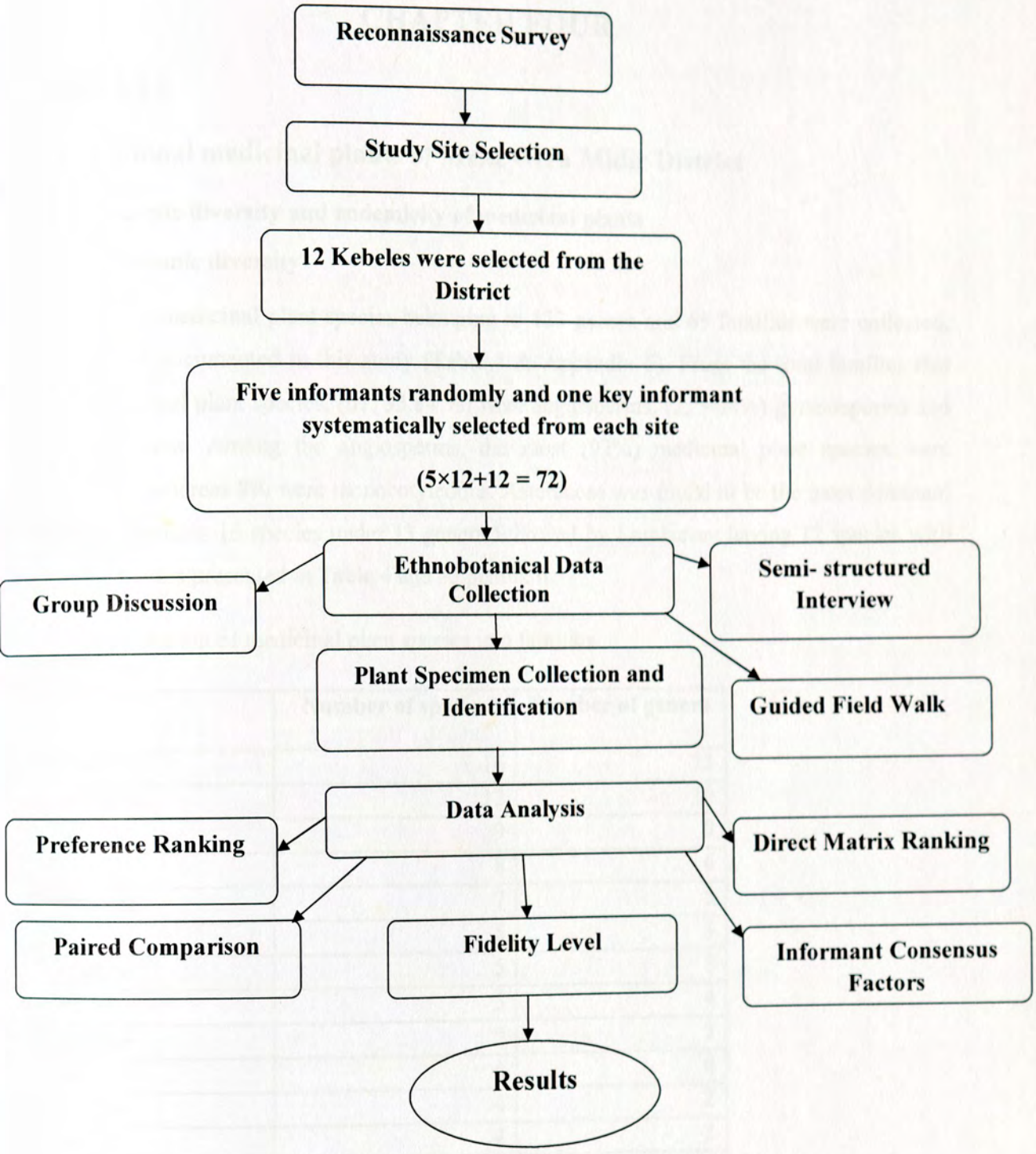

Figure 4 Summary of the research design

CHAPTER FOUR

4. RESULTS

4.1 Traditional medicinal plants of Menz Gera Midir District

4.1.1 Taxonomic diversity and endemicity of medicinal plants

4.1.1.1 Taxonomic diversity

A total of 155 medicinal plant species belonging to 133 genera and 65 families were collected, identified and documented in this study (Table 4 & Appendix 6). From the total families that contain medicinal plant species, (61, 93.84 %) were angiosperms, (2, 3.08%) gymnosperms and (2, 3.08%) ferns. Among the angiosperms, the most (92%) medicinal plant species were dicotyledons, whereas 8% were monocotyledons. Asteraceae was found to be the most dominant family that contains 16 species under 13 genera followed by Lamiaceae having 12 species with 10 genera. Others presented in Table 4 and Appendix 6.

Table 4 Distribution of medicinal plant species into families

Family	Number of species	Number of genera
Asteraceae	16	13
Lamiaceae	12	10
Fabaceae	9	9
Solanaceae	8	6
Euphorbiaceae	7	5
Apiaceae	5	5
Cucurbitaceae	5	5
Rosaceae	5	4
Anacardiaceae	5	3
Poaceae	4	4
Polygonaceae	4	2
Rutaceae	4	2
Amaranthaceae	3	2
Brassicaceae	3	2
51 families	65	61
Total = 65	155	133

4.1.1.2 Endemic medicinal plants of the study area

Out of the total medicinal plants, 13 species are endemic to Ethiopia and 5 species near endemic category since they occur both in Ethiopia and Eritrea (Table 5).

Table 5 Medicinal plants of the study area those are endemic to Ethiopia and near endemic (occurring in Ethiopia and Eritrea).

No	Scientific Name	Family
1	*Aloe pulcherrima*	Aloaceae
2	*Aloe debrana*	Aloaceae
3	*Brassica carinata*	Brassicaceae
4	*Echinops kebericho*	Asteraceae
5	*Echinops longisetus*	Asteraceae
6	*Inula confertiflora*	Asteraceae
7	*Impatiens rothii*	Balsaminaceae
8	*Laggera tomentosa*	Asteraceae
9	*Millettia ferruginea*	Fabaceae
10	*Phagnalon abyssinicum*	Asteraceae
11	*Solanecio gigas*	Asteraceae
12	*Solanum marginatum*	Solanaceae
13	*Urtica simensis*	Urticaceae
14	*Gomphocarpus purpurascens***	Asclepiadaceae
15	*Kalanchoe petitiana***	Crassulaceae
16	*Lippia adoensis***	Verbenaceae
17	*Sideryoxylom oxyacanthum***	Sapotaceae
18	*Thymus schimperi***	Lamiaceae

Key: **- Near endemic medicinal plants

4.1.2 Habit of medicinal plants

Habits of medicinal plants used for the treatment of human and livestock ailments revealed that herbs constitute the largest category with (68, 43.9%) species followed by shrubs with (47, 30.3%) species (Figure 5).

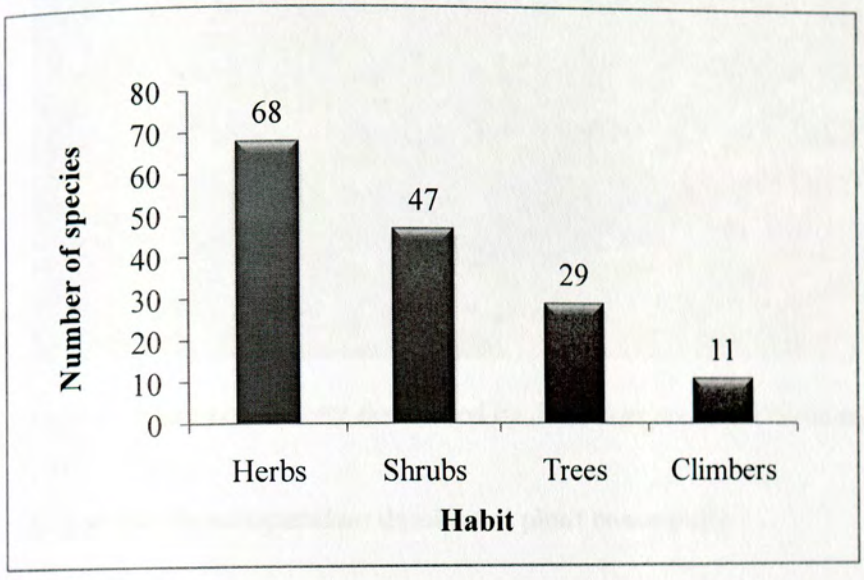

Figure 5 Habits of medicinal plants used for the treatment of human and livestock ailment

4.1.3 Visual recognition of etic plant community types in the study area

4.1.3.1 Visual recognition of etic plant community types in natural habitat

Based on dominant plant species, the natural vegetation of the study area can be categorized visually into six major groups.

A. *Juniperus procera* dominated plant community

This plant community type is predominantly found in three study sites (Kewosa, Mesale Mariam and Sra Gedel) and also found in and around few churches of the study area (Figure 6). It is located at an altitudinal range of 2700-2930 m a.s.l. *Impatiens rothii*, *Olea europaea* subsp. *cuspidata*, *Cyathula uncinulata* and *Stephania abyssinica* are medicinal plant species obtained from this community type.

Figure 6 Plant community dominated by *Juniperus procera* (Photo taken by Seble W/Yohannis, 2012)

B. *Lobelia rhynchopetalum* dominated plant community

A community dominated by single species *Lobelia rhynchopetalum*, which is among the giant rosette herb with stem (Figure 7). This plant community type is mainly found in Dergagn Kebele, which is found at the highest mountain tops (3458 m a. s. l) in the study area.

Figure 7 Plant community dominated by *Lobelia rhynchopetalum* (Photo taken by Seble W/Yohannis, 2012)

C. *Eucalyptus globulus* plantation dominated community type

This plant community type is found almost in all study sites. *Eucalyptus globulus* is the most dominant plantation tree species in the study area (Figure 8). It is one of the good income generating plants for the farmers in the study area. *Asparagus africanus* and *Pennisetum sphacelatum* are common herb medicinal plants that occur in this community type.

Figure 8 *Eucalyptus globules* plantation dominated community type (Photo taken by Seble W/Yohannis, 2012)

D. *Olinia rochetiana* and *Rhus vulgaris* dominated plant community

This plant community type is found in Sra Gedel Kebele, particularly at Gagelo forest (Figure 9). It is located at an altitudinal range of 2500-2830 m a.s.l. The major medicinal plant species include *Carissa spinarum*, *Clutia abyssinica*, *Maesa lanceolata*, *Maytenus arbutifolia*, *Podocarpus falcatus*, *Pteridium aquilinium*, *Vernonia amygdalina* and others.

Figure 9 Community type dominated by *Olinia rochetiana* and *Rhus vulgaris* at 'Gagelo' Forest (Photo taken by Seble W/Yohannis, 2012)

E. *Dodonaea angustifolia* and *Rumex nervosus dominated* plant community

This community type is mostly distributed between 2197-2860 m a.s.l. and encompasses three kebeles including Mesale Mariam, Sra Gedel and Kewosa (Figure 10). The community includes the following medicinal plants: *Croton macrostachyus*, *Cyphostemma adenocaule*, *Euclea divinorum*, *Euphorbia abyssinica*, *Myrsine Africana*, *Otostegia integrifolia*, *Premna schimperi* and others.

Figure 10 Community type dominated by *Dodonaea angustifolia* and *Rumex nervosus* (Photo taken by Seble W/Yohannis, 2012)

F. *Helichrysum* sp. dominated plant community

This plant community type is mainly found in Wezed kebele (Figure 11). It is located at an altitude range of 2850-3010 m a.s.l. Medicinal plant species obtained from this community type are *Dovyalis abyssinica*, *Hagenia abyssinica*, *Inula confertiflora*, *Laggera tomentosa* and *Vernonia bipontini*.

Figure 11 Community type dominated by *Helichrysum* sp. (Photo taken by Seble W/Yohannis, 2012)

4.1.3.2 Visual recognition of etic plant community types in homegarden

A. *Rhamnus prinoides* dominated plant community

This type of community is mainly found in some of the study sites (Figure 12). It is located at an altitude range of 2200-3090 m a.s.l. There are medicinal plant species that grow in this community. Some of these medicinal plant species are *Foeniculum vulgare, Achyranthes aspera Allium sativum, Artemisia rehan, Ruta chalepensis, Brassica oleracea, Capsicum annuum, Catha edulis, Cucurbita pepo, Daucus carota, Euphorbia ampliphylla, Kalanchoe petitiana, Leonotis ocymifolia, Lippia adoensis, Malus sylvestris, Ocimium lamiifolium, Opuntia ficus-indica, Phytolacca dodecandra, Ricinus communis, Sansevieria ehrenbergii, Urtica simensis* and *Zehneria scabra*.

Figure 12 Community type dominated by *Rhamnus prinoides* (Photo taken by Seble W/Yohannis, 2012)

B. *Coffea arabica* and *Musa* x *paradisiaca* dominated plant community

This type of community is mainly found in Mesale mariam and Kewosa kebeles. It is located at an altitude range of 2200-2500 m a.s.l. The community includes the following medicinal plants: *Allium cepa*, *Citrus aurantifolia*, *Citrus limon*, *Citrus medica*, *Lagenaria siceraria*, *Lycopersicon esculentum*,*Myrtus communis* and *Saccharum officinarum*.

4.1.4 Medicinal plant distribution in etic and emic vegetation categories

The result of the study revealed that medicinal plants are unevenly distributed in the different etic and emic plant community types. Most medicinal plants were harvested from *Rhamnus prinoides* dominated plant community type and the least from *Lobelia rhynchopetalum* dominated plant community type. This is due to the fact that the *Rhamnus prinoides* dominated plant community type is fenced and carefully protected by farmers, where as the weather condition of *Lobelia rhynchopetalum* dominated plant community type habitat is not suitable for many other medicinal plant species extremely cold area. The number of medicinal plants found from the different plant community types are summarized in Table 6.

Table 6 Distribution of medicinal plants in etic and emic vegetation categories

Plant community types		No. of medicinal plants	List of medicinal plants
Etic category	**Emic category**		
Rhamnus prinoides dominated community	Yeguaro ersha	41	*Acacia abyssinica*, *Achyranthes aspera*, *Allium sativum*, *Aloe pulcherrima*, *Artemisia rehan*, *Brassica carinata*, *Brassica oleracea*, *Buddleja polystachya*, *Capsicum annuum*, *Catha edulis*, *Chenopodium ambrosioides*, *Cucurbita pepo*, *Cymbopogon citrates*, *Datura stramonium*, *Daucus carota*, *Euphorbia ampliphylla*, *Foeniculum vulgare*, *Kalanchoe petitiana*, *Launaea petitiana*, *Leonotis ocymifolia*, *Lepidium sativum*, *Lippia adoensis*, *Lupinus albus*, *Malus sylvestris*, *Malva parviflora*, *Mentha spicata*, *Nicotiana tabacum*, *Ocimium lamiifolium*, *Opuntia ficus-indica*, *Peucedanum winkleri*, *Phytolacca dodecandra*, *Rhamnus prinoides*, *Ricinus communis*, *Rosa* x *richardii*, *Ruta chalepensis*, *Sansevieria ehrenbergii*, *Schinus molle*, *Solanecio gigas*, *Urtica simensis*, *Verbena officinalis* and *Zehneria scabra*
Dodonaea angustifolia and *Rumex nervosus* dominated community	Chaka	38	*Acokanthera schimperi*, *Bersama abyssinica*, *Caparris tomentosa*, *Cassipourea malosana*, *Clerodendrum myricoides*, *Cordia africana*, *Croton macrostachyus*, *Cucumis ficifolius*, *Cyathula polycephala*, *Cyphostemma adenocaule*, *Cyphostemma cyphopetalum*, *Dodonaea angustifolia*, *Euclea divinorum*, *Euphorbia abyssinica*, *Euphorbia tirucalli*, *Ficus sur*, *Ficus vasta*, *Heteromorpha arboresescens*, *Indigofera vohemarensis*, *Justicia schimperiana*, *Millettia ferruginea*, *Myrsine africana*, *Otostegia fruticosa*, *Otostegia integrifolia*, *Periploca linearifolia*, *Phoenix reclinata*, *Pistacia falcate*, *Premna schimperi*, *Pterolobium stellatum*, *Rhus natalensis*, *Rhus retinorrhoea*, *Rubus steudneri*, *Rumex nervosus*, *Sideryoxylom oxyacanthum*, *Sphenoslylis stenocarpa*, *Tragia cinerea*, *Viscum tuberculatum* and *Withania somnifera*

Table 6 cont…

Olinia rochetiana and Rhus vulgaris dominated community	Chaka	14	*Carissa spinarum, Clutia abyssinica, Cyathula uncinulata, Ferula communis, Jasminum abyssinicum, Maesa lanceolata, Maytenus arbutifolia, Myrica salicifolia, Olinia rochetiana, Podocarpus falcatus, Pteridium aquilinium, Rhus vulgaris, Rosa abyssinica and Vernonia amygdalina*
Coffea arabica and *Musa* x *paradisiaca* dominated community	Yeguaro ersha	10	*Allium cepa, Citrus limon, Citrus aurantifolia, Citrus medica, Coffea arabica, Lagenaria siceraria, Lycopersicon esculentum, Musa* x *paradisiaca, Myrtus communis* and *Saccharum officinarum*
Helichrysum sp. dominated community	Kutkuato	6	*Dovyalis abyssinica, Hagenia abyssinica, Helichrysum* sp., *Inula confertiflora, Laggera tomentosa* and *Vernonia bipontini*
Juniperus procera dominated community	Chaka	4	*Impatiens rothii, Juniperus procera, Olea europaea* subsp. *cuspidata* and *Stephania abyssinica*
Eucalyptus globulus plantation dominated community	Tikl den	3	*Asparagus africanus, Clematis simensis* and *Eucalyptus globulus*
Lobelia rhynchopetalum dominated	Kutkuato	1	*Lobelia rhynchopetalum*
Farmlands	Masa (yersha meriet)	14	*Artemisia abyssinica, Carthamus tinctorius, Guizotia schimperi, Haplocarpha schimperi, Hordeum vulgare, Lens culinaris, Linum usitatissimum, Plantago lanceolata, Polygonum aviculare, Rumex abyssinicus, Rumex nepalensis, Salvia nilotica, Tagetes minuta* and *Trigonella foenum-graecum*
Grazing lands	Mesk	20	*Aloe debrana, Asplenium aethopicum, Echinops kebericho, Echinops longisetus, Gomphocarpus purpurascens, Nuxia congesta, Pennisetum sphacelatum, Plectranthus puntatus, Polygala rupicola, Ranunculus stagnalis, Salvia schimperi, Satureja abyssinica, Sida schimperiana, Silene macrosolen, Solanum anguivi, Solanum benadirense, Solanum marginatum, Tephrosia bracteolate, Thymus schimperi* and *Verbascum sinaiticum*
Cliff	Gedel	4	*Berberis holstii, Osyris quadripartita, Phagnalon abyssinicum* and *Momordica foetida*
Total		**155**	

4.1.5 Distribution and habitat diversity of medicinal plants in the natural and agricultural landscapes

The present study showed that local people of the study area obtain medicinal plants from wild areas, their own homegardens and crop fields. Medicinal plants were collected from the study area either from natural (uncultivated natural) wild habitats or agricultural areas of the homegarden and crop fields. From these, (104, 67.1%) species that belong to 86 genera and 52 families were collected from the vegetation in the wild and (51, 32.9%) species that belong to 47 genera and 28 families were obtained from homegarden (Table 6).

4.2 Indigenous knowledge of local people on landscape, soil and vegetation classification

The local people of the study area are knowledgeable on classification of landscapes, soil and vegetation. They classify the landscape into four based on topography of the land and the soil into four based on its colour. In addition, vegetation was classified into four based on plant density and distribution (Table 7).

Table 7 Emic and Etic categorization of landscape, soil and vegetation

Landscape categorization		**Soil categorization**		**Vegetation categorization**	
Emic categories	**Etic Categories**	**Emic Categories**	**Etic Categories**	**Emic categories**	**Etic categories**
Wotageba	Undulating land	Tikur afer	Black soil	Chaka	Forest
Shelleko	Valley	Key afer	Red soil	Kutkuato	Bushland
Terrarama	Mountain	Ashewama	Sandy soil	Mesk (Sarama)	Grassland
Medama	Plain	Bunamma	Brown soil	Tikl den	Plantation

4.3 Sources of traditional knowledge on medicinal plants

Most of the traditional knowledge of medicinal plants is passed orally and through secret along the family line from parents. Of the total informants, 73.6% was gained medicinal plant knowledge from families, followed by observation and learning (19.4%) and (7%) from other persons.

4.4 Medicinal plants use in the study area

4.4.1 Medicinal plants used to treat human and livestock health problems

Out of the total collected and identified medicinal plants, 115 (74.2%) species belonging to 101 genera and 51 families are reported as traditional medicine for treatment of human ailments only (Appendix 2) and 10 (6.45%) species belonging to 10 genera and 9 families are reported as traditional medicine for treatment of livestock ailments only (Appendix 3). A total of 30 (19.35%) species belonging to 30 genera and 21 families are reported as traditional medicine for treatment of both livestock and human ailments (Appendix 4).

4.4.2 Plant parts used

The local people of the study area collect different plant parts for preparation of traditional medicine (e.g. leaves, roots, seeds, stem, barks, fruit, flower and latex). The most widely used plant part for the preparations of remedy for treatment of human and livestock health problems are leaves (43.9%) followed by roots (31%) (Figure 13).

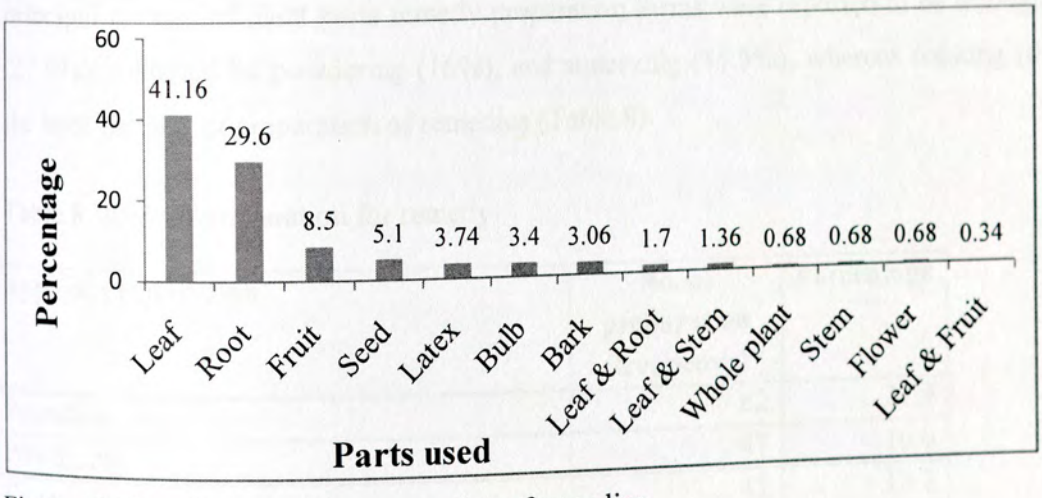

Figure 13 Plant Parts used in preparation of remedies

4.4.3 Conditions of preparation of herbal remedies

Local people of the study area prepare hebal remedy for ailments while medicinal plants are in fresh form, dried or fresh and dried. Most of medicinal plants (67, 43.2%) were reported to be used in fresh form. About (49, 31.6%) of the medicinal plants were used in dry form and (39, 25.2%) medicinal plants were reported to be used either in dry or in fresh form (Figure 14).

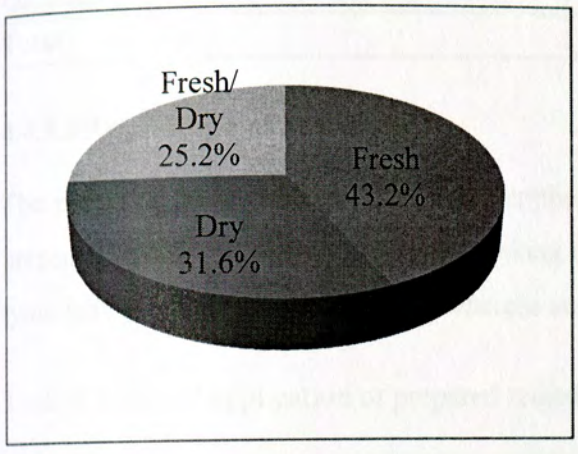

Figure 14 Condition of medicinal plants for preparation of remedy

4.4.3 Method of preparation and application of remedies from medicinal plants

4.4.3.1 Method of preparation

Regarding the preparation of medicine for human and livestock, the local people employ various methods of preparation of traditional medicines for different types of ailments. Among these, the principal method of plant parts remedy preparation forms were reported to be through pounding (27.9%), followed by powdering (16%), and squeezing (15.3%), whereas cooking (0.34%) was the least method of preparation of remedies (Table 8).

Table 8 Ways of preparation for remedy

Type of Preparation	No. of preparation (frequency)	Percentage
Pounding	82	27.9
Powdering	47	16.0
Squeezing	45	15.3

Boiling	33	11.22
Unprocessed	25	8.5
Chewing/Eating	21	7.14
Soaking	19	6.5
Crushing	11	3.74
Latex collection	10	3.4
Cooking	1	0.34
Total	**294**	**100**

4.4.3.2 Application of remedies

The prepared traditional medicines are applied in a number of methods. The largest parts of prepared remedies are applicable by drinking (33%) followed by creaming (15.7%), eating and tying which accounted 11.9% each, whereas swallowing (0.69%) was the least (Table 9).

Table 9 Types of application of prepared remedy

Type of Application	No. of application (Frequency)	Percentage
Drinking	97	33.0
Creaming	46	15.7
Eating	35	11.9
Tying	35	11.9
Inhaling	34	11.56
Bathing	13	4.4
Pasted on	12	4.08
Dropping	8	2.7
Sucking	7	2.38
Swallowing	2	0.69
Others	5	1.7
Total	**294**	**100**

4.4.4 Dosage and route of administration of medicine

Dosages were estimated using spoon ('Mankia'), cup ('Sini'), can ('Tassa' or 'Tiwa'), glass ('Birchiko') and clay plate ('Taba') for liquids to be administrated, and for powders as spoon ('Mankia'), numbers or in some cases handful ('Efeign'). This dosage could vary based on age.

The most favoured administration route was oral (47.96%) followed by dermal (28.57%) and both oral and nasal (10.2%) (Table 10).

Table 10 Route of administration of medicine

Route of administration	No. of route (Frequency)	Percentage
Oral	141	48
Dermal	84	28.6
Oral and Nasal	30	10.0
Neck	20	6.8
Nasal	8	2.72
Ocular	7	2.4
Ear	2	0.7
Tooth surface	1	0.34
Anal	1	0.34
Total	**294**	**100**

4.5 Human and livestock ailments treated by medicinal plants

In the present study, 83 ailments (68 in human, 6 in livestock and 9 in both humans and livestock) were reported to be treated by medicinal plants (Appendix 7). One species can treat a single disease or a number of diseases. These different types of health problems are categorized into two based on visual observation of disease processes. These are internal (disease process could take place inside the body (not seen by naked eye)) and external (disease process could take place on external part of the body (seen by naked eye)) health problems. From 68 human ailments 48 were internal and 20 were external. In the same way, out of 6 livestock ailments were internal and 1 was external, whereas 8 were internal and 1 was external ailments of both human and livestock.

4.6 Important medicinal plants in the study area

4.6.1 Informant consensus

In the study area some medicinal plants are popular than others. Informants frequently cited the most popular medicinal plants for treatment of certain diseases. For example, *Cucumis ficifolius*

which stood 1st was cited by 50 informants, whereas *Artemisia abyssinica* was cited by 49 informants and *Leonotis ocymifolia* by 48 informants, these and other more frequently cited medicinal plants are shown in Table 11.

Table 11. Top commonly known medicinal plant species in the study area

Medicinal plant	No. of informants	% of informants
Cucumis ficifolius	50	69.44
Artemisia abyssinica	49	68.05
Leonotis ocymifolia	48	66.66
Allium sativum	46	63.9
Clematis simensis	45	62.5
Ruta chalepensis	45	62.5
Gomphocarpus purpurascens	40	55.55
Verbascum sinaiticum	33	45.83
Vernonia bipontini	33	45.83
Withania somnifera	32	44.44

4.6.2 Priority ranking

Priority ranking was performed on eight of the major scarce medicinal plants provided by most informants during the interview. Therefore, eight medicinal plants were provided to eight key informants to show their views about scarcity of the given medicinal plant species in their environment. The results showed that *Lupinus albus* was the most scarce medicinal plant. However, this medicinal plant was brought from Bar Dar and has been cultivated in the homegarden of only one key informant and other two informants. All the eight key informants who participated in this exercise knew about the medicinal value of the plant and that it is not available in the area. The least scarce species was *Cucumis ficifolius* (Table 12).

Table 12 Ranking of scarce medicinal plants in the study area

Medicinal plant	Key Informants (R_1-R_8)								Total Score	Rank
	R1	R2	R3	R4	R5	R6	R7	R8		
Millettia ferruginea	5	2	3	4	2	2	3	3	27	6
Caparris tomentosa	5	5	4	5	3	4	3	3	32	3
Tragia cinerea	4	5	4	4	3	3	3	4	30	4
Lupinus albus	5	5	5	5	4	4	5	4	37	1

Sansevieria ehrenbergii	5	3	3	4	3	4	3	3	28	5
Cyphostemma adenocaule	4	3	2	3	2	4	3	4	25	7
Cucumis ficifolius	4	5	3	1	2	3	4	2	24	8
Withania somnifera	5	5	5	4	3	4	5	4	35	2

4.6.3 Paired comparison

A paired comparison was made to determine the most preferred medicinal plants among the five species that were used to treat headache in the study area. Eight key informants participated in this activity. The results indicated that *Cucurbita pepo* is much favoured in treating headache followed by *Myrica salicifolia*, *Silene macrosolen* and *Leonotis ocymifolia*. The least preferred one was *Mentha spicata* (Table 13).

Table 13 Paired comparison of five medicinal plants used to treat headache

Medicinal plant	**Key Informants (R_1-R_8)**								**Total Score**	**Rank**
	R1	**R2**	**R3**	**R4**	**R5**	**R6**	**R7**	**R8**		
Mentha spicata	1	1	1	2	2	1	2	1	11	5
Myrica salicifolia	4	3	2	4	2	3	2	3	23	2
Leonotis ocymifolia	3	1	1	1	2	1	2	2	13	4
Silene macrosolen	2	3	2	2	3	1	3	3	19	3
Cucurbita pepo	4	4	4	3	3	4	3	4	29	1

4.6.4 Direct matrix ranking for multipurpose medicinal plants

People of the study area reported medicinal plant species that had multiple uses. The results of the direct matrix ranking showed that *Olea europaea* subsp. *cuspidata* stood first in being the most multipurpose medicinal plant followed by *Eucalyptus globulus, Juniperus procera, Podocarpus falcatus*, *Cordia africana*, *Ficus sur* and *Ficus vasta*, *Croton macrostachyus* was the least (Table 14).

Table 14 Direct matrix ranking for eight species and main use in study area

Main uses	**Medicinal plant species**							
	Ficus sur	*Ficus vasta*	*Croton Macrostachyus*	*Podocarpus falcatus*	*Olea europaea* subsp. *cuspidata*	*Cordia africana*	*Eucalyptus globules*	*Juniperus procera*
Charcoal	3	5	30	34	39	28	27	29
Construction	17	38	18	32	12	38	39	38
Edible fruit	37	0	0	0	0	0	0	0
Fence	3	4	4	16	24	3	39	30
Firewood	10	18	12	30	37	25	37	30
Medicine	24	28	20	10	38	13	18	16
Tool	30	32	33	35	36	38	19	33
Total	124	125	117	157	186	145	179	176
Rank	7	6	8	4	1	5	2	3

4.6.5 Informant consensus factor

Informant consensus factor was calculated on the identified eight human disease categories. The highest ICF value (0.86) was obtained from diseases related to abdominal and gastrointestinal problems and the least one (0.43) was postpartum hemorrhage, retained placenta and complications of the Rh factor (Table 15).

Table 15 Informant consensus factor for eight disease categories

Category of diseases	**No. of species**	**No. of use citation**	**ICF**
Disease related to dermatology problems:- dandruff, eczema, scabies, tinea versicolor, wound, tinea pedis, snake bit, circumcision wound, boules, tinea nigra, fire burn, melasma, breast swellowing, swellowing, tumor, kunchir, ring worm, herpes zoster, small pox, skin cut, allergic dermolitia, cancer, skin disease and wart	64	382	0.83

Ailments associated with respiratory organs and throat:- common cold, cough, asthma, nasal bleeding, lung tuberculosis (TB) and bronchitis (uvulitia & tonsillitis)	20	80	0.76
Disease related to abdominal and gastrointestinal problems:- ascaris, ta pe worm, abdominal pain, intestinal parasite, stomach ache, gastritis, blotting, epidemic, constipation, loss of appetites, diarrhea, vomiting & diabetes	46	328	0.86
Organ diseases:- toothache, ear lesion, deafness, eye disease, night blindness, liver disease, jaundice, bone fracture, anal erolopi, urinary retention, kidney problem, heart failure, heart disease, headache, rheumatism, toung disease and congenital abnormality	34	123	0.73
Genitourinary problems:- orchiticl, gonorrhoea, syphilis and impotency	17	57	0.71
Acute sickness- acute sickness, emergency, stabbing pain, malaria, hypertension, epilepsy and evil eye	45	250	0.82
Delivery problems:- postpartum haemorrhage, retained placenta and Rh factor	5	8	0.43
Others:- rabies, anemia and fibril illness	10	33	0.72

4.6.6 Fidelity level (FL)

The fidelity level was calculated on those diseases frequently reported by informants. These diseases include evil eye, "eynewog", wound, eczema, stomach ache, eye disease, fibril illness and common cold. The traditional practitioners employed their indigenous knowledge to manage these frequent diseases and important medicinal plant species were identified for those diseases (Table 16).

Table 16 Fidelity value of traditional medicinal plants for the most frequently reported diseases

Disease treated	Medicinal plants	Ni	N	$\frac{Ni}{N}$	$\left(\frac{Ni}{N}\right)\times 100$ (%)
Wound	*Aloe pulcherrima*	4	5	0.8	80
	Datura stramonium	14	18	0.78	78
	Laggera tomentosa	10	15	0.67	67

Evil eye	*Capparis tomentosa*	15	15	1.00	100
	Withania somnifera	16	16	1.00	100
Eczema	*Clematis simensis*	20	25	0.8	80
	Comphocarpus purpurascens	10	30	0.3	30
	Urtica simensis	5	7	0.71	71
"Eynewog"	*Otostegia integrifolia*	8	15	0.53	53
	Verbascum sinaiticum	13	20	0.65	65
Common cold	*Thymus schimperi*	4	5	0.8	80
	Artemisia abyssinica	24	25	0.96	96
Stomach ache	*Cucumis ficifolius*	25	25	1.00	100
	Ruta chalepensis	20	25	0.8	80
	Allium sativum	21	25	0.84	84
	Lepidium sativum	12	18	0.67	67
Fibril illness	*Leonotis ocymifolia*	23	25	0.92	92
	Eucalyptus globules	3	6	0.5	50
Eye disease	*Inula confertiflora*	3	4	0.75	75
	Vernonia bipontini	10	23	0.43	43

4.7 Threats to and conservation of medicinal plants in the study area

4.7.1 Threats to medicinal plants

People need plants for their daily life activity. In Menz Gera Midir District from the interview of informants, various causes of threats to medicinal plants were recorded in the area. These causes can be generally grouped into natural and human induced factors. However, as reported in this study most of the causes for the threats to medicinal plants and the associated indigenous knowledge are the anthropogenic factors such as deforestation due to overexploitation of plants for different uses/charcoal, fire wood, wood for construction wood, overgrazing, cutting and burning of plants to create new agricultural lands and others. Informants ranked agricultural expansion as the most serious threat to the medicinal plants followed by charcoal making. The least threats to medicinal plants as perceived by informants were construction materials (Table 17). Informants reported that due to population pressure, agricultural practice was expanded to grazing lands and forests in the area.

Table 17 Ranking of threats to medicinal plants (values 1-5: 1 is the least destructive threat and 5 is the most destructive one)

Major Threats	Key Informants (R_1-R_8)								Total Score	Rank
	R1	R2	R3	R4	R5	R6	R7	R8		
Agricultural expansion	5	5	3	3	4	5	4	5	34	1
Drought	3	3	2	1	3	2	1	2	17	5
Construction material	1	3	1	2	3	1	3	2	16	6
Charcoal making	4	2	4	4	3	4	5	3	29	2
Overgrazing	4	3	1	2	2	3	1	2	18	4
Fire wood collection	3	3	4	3	5	4	3	2	27	3

4.7.2 Conservation of medicinal plants

Local people of the area have strong and actual belief on healing power of plants and they know their habitat, distribution, harvesting technique, time of harvest and the status of a plant in the area. For instance, as the informants told me, the healer or collector should not chat with other persons and should be prayed before and during collection. The healers also know the direction and site from which the plant should be harvested. Plant apex, main root and regenerating parts are not harvested. This is to keep and increase the regenerating capacity of the plant. Therefore, this harvesting technique has direct or indirect contribution to the conservation of medicinal plants, since they limit excessive harvesting of these plants in one way or another.

The other observed conservation mechanism of medicinal plants in the study area was *Olinia rochetiana* and *Rhus vulgaris* dominated plant community which is the only protected area in Sra Gedel Kebele and some of the medicinal plants are conserved for other values in church forests. These areas were protected by guards and no cutting of any plant species is allowed for charcoal making, construction material, fire wood and other purposes. This activity has an important contribution for conservation of medicinal plant species that are found in that forest. On the other hand, it was also observed that the local farmers make use of their indigenous knowledge in protecting important plant species on their farm lands, homegardens, or as live fence. In some cases, few traditional healers cultivate very rare species in their homegardens (e. g. *Lupinus albus* and *Sansevieria ehrenbergii*) that cannot easily be found within a reasonable time.

CHAPTER FIVE

5. DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 Discussion

5.1.1 Diversity and endemicity of medicinal plants in the study area

One hundred fifty five medicinal plant species distributed in 133 genera and 65 families were collected and identified. This showed that the local people are knowledgeable about traditional medicinal plants. The existence and utilization of such a large number of medicinal plants by local people in the study area indicates that the majority of the people used and continued to use indigenous medicinal practices for diverse ailments. Among the families, the leading family was Asteraceae, which contained 16 species followed by Lamiaceae 12 species. The same result was reported by Getu Alemayehu (2010) in Minjar-Shenkora District, North Shewa that concluded families Asteraceae, Lamiaceae, and Fabaceae were represented by higher number of medicinal plant species than other families. This was true that family Asteraceae was the largest families in the flora of Ethiopia and Eritrea.

A fundamental numbers of endemic medicinal plants were collected from the study area (Table 5). Most of these edemic medicinal plant species were harvested from the wild vegetation. This indicated that the existence of pressure on wild medicinal plants and hence this leads to loss of these endemic and other medicinal plants. Out of endemic medicinal plant species, *Aloe pulcherrima*, *Echinops kebericho*, *Millettia ferruginea* and *Solanecio gigas* are rare species in the study area.

5.1.2 Status of traditional medicinal plants in the study area

In the study area, the status of all the medicinal plants was recorded as common, medium and rare as per healer perception during the semi-structured interviews and group discussion. From the total medicinal plant species, 27.74% were recorded as rare in the study area. This is due to the fact that majority of these medicinal plants were distributed in the wild vegetation and hence the existence of pressure on wild medicinal plants in the study area. In addition, this is due to that some of these medicinal plants were widely utilized by the local people (e.g. *Caparris tomentosa*,

Cucumis ficifolius, *Echinops kebericho* and *Withania somnifera*). Whereas 29% of medicinal plants are recorded as common and 42.26% were medium in the study area. This is due to the fact that some of these medicinal plant species are cultivated in homegardens and farmlands by the local people mainly for other uses.

5.1.3 Acquisition and transmission of traditional knowledge on medicinal plants

In the study area, indigenous knowledge on medicinal plants was differing among age and gender. As the data showed, elder people are more knowledgeable on medicinal plants than the younger ones. Similar conclusions were reached elsewhere (Mirutse Giday, 2001; Tesfaye Hailemariam *et al.*, 2009). This is due to the younger generation is more exposed to modernization (e.g. modern education) and therefore not interested to learn and practice traditional medicine due to the belief that this is bad culture and not allowed by religion. Various studies in different parts of Ethiopia have reported that transfer of medicinal plants knowledge have been affected by modernization like access to modern education and health services (Debela Hunde *et al.*, 2004; Kebu Balemie *et al.*, 2004; Tizazu Gebre, 2005; Tesfaye Hailemariam *et al.*, 2009; Nigussie Amsalu, 2010). In addition, men are more knowledgeable on medicinal plants than women. This is due to the fact that boys are usually favored in the transfer of the knowledge. Mirutse Giday *et al.* (2009) reached similar conclusion.

The major medicinal plant knowledge was gained from parents (73.6%). This was due to the secrecy of knowledge transfer between family members. The same result was reported by Getaneh Gebeyehu (2011) in Mecha District, West Gojjam that concluded family members were the major sources of indigenous knowledge. The second main source of knowledge acquisition was observation and learning which accounted for 19.4%. This knowledge was gained from other knowledgeable persons through use of traditional medicine of those knowledgeable persons for treatment of ailments with payment and by repeatedly observing the species used and studying the practice.

During the interview, most traditional healers (75%) told their plans to transfer their medicinal plant knowledge to their sons, 16.7% of them to daughters, while 8.3% of them were positive to

transfer to any member of the community without compensation. According to most elders and healers, transferring of knowledge about medicinal plants and traditional medicine is believed to be effective if done within a family or with a close relative.

5.1.4 Sources and habits of medicinal plants

Most of the medicinal plants (104, 67.1%) were harvested from the wild in different natural ecosystems of the study area including natural forests, grazing lands, farmlands, cliff and around churches. In contrast to natural habitats, homegardens contributed less number (51, 32.9 %) of medicinal plants. This result is similar with the findings of other ethnobotanical studies elsewhere (Haile Yineger and Delenasaw Yewhalaw, 2007; Ermias Lulekal *et al.*, 2008; Tesfaye Hailemariam *et al.*, 2009; Getu Alemayehu, 2010; Nigussie Amsalu, 2010; Emiru Birhane *et al.*, 2011; Gidey Yirga *et al.*, 2011) in which wild areas are the most sources of medicinal plants. This indicates that the practitioners mostly depend on the wild sources or the natural environment rather than homegardens to obtain the medicinal plants in the study area.

The results of the study revealed that the majority of medicinal plants used by local people were herbs (68, 43.87%) followed by shrubs (47, 30.32%) (Figure 5). This result agrees with the findings of other researchers (Mirutse Giday, 2001; Mirutse Giday *et al.*, 2003; Endalew Amenu, 2007; Tilahun Teklehaymanot and Mirutse Giday, 2007; Haile Yineger *et al.*, 2008; Mirutse Giday *et al.*, 2009; Tesfaye Hailemariam *et al.*, 2009; Emiru Birhane *et al.*, 2011; Mohammed Adefa and Berhanu Abraha, 2011; Yalew Addisie *et al.*, 2011). This is due to the fact that herbs can grow everywhere (grazing land, homegarden, farmland and wild) and easily available mainly during the wet seasons in the study area compared with other species such as trees, shrubs and climbers. In addition, herbs were not exposed to various threats compared with shrubs and trees and also easily harvested and cultivated by local people in the area.

5.1.5 Medicinal plant distribution in etic and emic vegetation categories

Medicinal plants were distributed in different etic and emic plant community types. Some emic categories refer to different etic categories (Table 6). In addition, most of emic plant community types were related with emic categories of vegetation. This showed that the local people of the

study area are more knowledgeable on medicinal plant distribution and vegetation categorization. Among the plant community types, *Rhamnus prinoides* dominated plant community type (Yeguaro ersha) was the major source of medicinal plants. This community type was found at the homegardens. Therefore, these places are carefully protected and fenced by the local farmers. Most of medicinal plants found in this plant community were cultivated by the local people for other purposes such as food, ornamental and others. In addition, medicinal plants distributed in this community were mostly herbs. So these herbs were not exploited for fire wood, charcoal making and construction material and fencing purposes as compared with trees and shrubs.

Dodonaea angustifolia and *Rumex nervosus* dominated community type (Chaka) was the second most important source of medicinal plants. This is mainly due to the fact that this community covers large area and is not suitable for easily harvesting compared with other plant community types. *Lobelia rhynchopetalum* dominated plant community type had the least number of medicinal plant species. This plant community was found at the highest altitude due to this the weather condition is not suitable for many medicinal plant species as it is extremely cold area.

5.1.6 Medicinal plants used to treat human and livestock ailments

Relatively high number of medicinal plant species were collected and documented for treatment of human and livestock ailments from the study area. The number of reported medicinal plants and their uses by the local people of the District indicates the depth of the local indigenous knowledge on medicinal plants and their applications. Out of the collected medicinal plants, most species were reported as being used to treat human diseases compared with medicinal plant species used to treat livestock ailments.

Less number (6) of livestock diseases and medicinal plants (10) were reported compared with humans (68 diseases & 115 species). This showed that, the people of the study area are more knowledgeable and give great attention about their ailments as compared to livestock diseases. Local people of the study area found medicine for their ailments first and then try to search for livestock ailments. Similar findings were reported by Moa Megersa (2010) in Wayu Tuka District, East Wollega.

5.1.7 Plant parts used, conditions and mode of preparation

Leaves (43.9%) were the most widely used plant parts in preparation of remedies followed by roots (31%) (Figure 13). This is consistent with the findings of other researchers elsewhere (Mirutse Giday, 2001; Haile Yineger and Delenasaw Yewhalaw, 2007; Mirutse Giday *et al.*, 2009; Tesfaye Hailemariam *et al.*, 2009; Getnet Chekole, 2011; Mohammed Adefa and Berhanu Abraha, 2011). This is due to the fact that easy of preparation and the presence of more bioactive ingredients in leaves. Inaddition, collecting leaves does not pose a great danger to the existence of an individual plant when compared with the collection of an underground part, stem or whole plant. On the other hand, the findings of other studies in other parts of the country reported that roots are the most widely used plant parts in their study sites (Fisseha Mesfin, 2007; Ermias Lulekal *et al.*, 2008; Fisseha Mesfin *et al.*, 2009; Teferi Flatie *et al.*, 2009; Emiru Birhane *et al.*, 2011).

The majority of medicinal plants were used in fresh (43.22%) form followed by dried (31.61%) and either of the two (25.17%) for the preparation of remedy (Figure 14). This is similar with the findings reported by Endalew Amenu (2007); Haile Yineger and Delenasaw Yewhalaw (2007); Haile Yineger *et al.* (2008); Moa Megersa (2010) and Nigussie Amsalu (2010). This is related to the effectiveness of fresh materials in treatment as the contents are not lost before use compared to the dried forms.

Most of the plant remedies are prepared by pounding (27.9%) followed by powdering (16%). (Table 8). This is in line with the finding of Endalew Amenu (2007) in Chelya District indicated that pounding was dominant methods of preparation of remedy followed by Powdering. However, Getaneh Gebeyehu (2011), in a similar study on people of Mecha District reported that most of the plant remedies are prepared by squeezing.

5.1.8 Route of administration, dosage and application of medicinal plants

Route of administration depends on the nature of ailments to be treated, given both internally and externally. The most popular way of administration of traditional medicines were oral (47.96%) followed by dermal (28.57%) (Table 10). Various ethnobotanical researchers elsewhere in

Ethiopia have also indicated oral as the predominant route of administration (Mirutse Giday, 2001; Etana Tolasa, 2007; Tilahun Teklehaymanot and Mirutse Giday, 2007; Ermias Lulekal *et al.*, 2008; Fisseha Mesfin *et al.*, 2009; Tesfaye Hailemariam *et al.*, 2009; Emiru Birhane *et al.*, 2011; Gidey Yirga *et al.*, 2011). In addition, some of traditional healers reported that restrictions are imposed when certain types of remedies are taken by patients. For example, a patient who takes a remedy against impotency prepared from the root of *Millettia ferruginea* the body parts should not touch water for 24 hours. It is believed that touching water reduces the efficacy of the remedy.

The local people used cup, glass, can, clay plate and spoon for measuring the doses of traditional herbal medicines. However, the measurements used to determine the dosages are not standardized and depend on age, physical and health conditions of the patient. Thus, there is a risk of treatment failure due to under dose and also other problems would arise due to over dosage. In the same way, Amare Getahun (1976), Sofowora (1982) and Dawit Abebe (1986) concluded that lack of precision and standardization as one drawback of traditional medicines.

The prepared traditional medicines were applied in various methods. These include: drinking, creaming, eating, tying, inhaling, bathing, pasted on, dropping, sucking, swallowing and others. Of these, drinking (33%) was the most popular way of application of traditional herbal medicine followed by creaming (15.65%) in the area (Table 9). This result agrees with the work of Endalew Amenu (2007) in Chelya District which indicated that drinking was the predominant application method.

No side effects were reported by the informants as a result of the use of the different remedies except for *Euphorbia ampliphylla* species used for the expulsion of ascaris which may lead to death if milk is not drunk by the patient. As healers reported that, to reduce the adverse effects and to improve the efficacy of traditional medicine, additives are vital. These additives include: water, honey, milk, butter, tella, red teff powder, sugar and salt.

5.1.9 Top ranking medicinal plants

Priority ranking, paired comparison and direct matrix ranking were employed to assess the degree of importance of medicinal plants of the study area. Ranking of medicinal plants showed that there are some medicinal plants that are preferred by local people than the others. The local people had their own knowledge that differentiates medicinal plants that are more preferable to treat ailments than others in the area. As the informants told that, this knowledge comes from long time practice. Based on this, Priority ranking on eight scarcest medicinal plants provided by most informants during the interview was showed that, *Lupinus albus* was stood first followed by *Withania somnifera* and *Caparris tomentosa* (Table 12).

Paired comparison on five medicinal plants for treating headache was conducted based on eight key informant perceptions. According to this result *Cucurbita pepo* stood first, where as *Myrica salicifolia* ranked 2nd and *Silene macrosolen* ranked 3rd and *Leonotis ocymifolia* ranked 4th and *Mentha spicata* ranked 5th and are less preferred and believed to be less efficacious when to compared to the first and second ranked plants for treating headache (Table 13).

Direct matrix ranking was also conducted to know the various uses of eight medicinal plants. The finding indicated that *Olea europaea* subsp. *cuspidata* stood first followed by *Eucalyptus globulus* and *Juniperus procera* (Table 14). As reported by the informants, *Olea europaea* subsp. *cuspidata* was more threatened than the others in the study area due to over harvesting problems but some trees are protected around churches. Thus, conservation action is needed in the area to save species from further reduction in their number.

Informant consensus factor (ICF) was calculated on human diseases categories. The result showed that, the highest ICF value 0.86 was disease related to abdominal and gastrointestinal problems category followed by disease related to dermatology problems 0.83 due to the high incidence of the disease in the area, whereas the least ICF value was associated with delivery problems 0.43 (Table 15) .

The fidelity level (FL) was calculated on frequently reported diseases with respect to medicinal plant species. The fidelity level of *Capparis tomentosa* and *Withania somnifera* for evil eye and *Cucumis ficifolius* for stomach ache was scored 100. FL of *Artemisia abyssinica* for common cold was 96 and *Leonotis ocymifolia* for fibril illness was 92 (Table 16).

5.1.10 Threats and conservation of medicinal plants in the study area

Nowadays, the loss of biodiversity in Ethiopia in general and in the study area in particular is a serious problem. It is caused by both anthropogenic and natural factors. Environmental degradation, agricultural expansion, loss of forests and woodlands, over-harvesting, fire, cultivation of marginal lands, overgrazing and urbanization appear to be the major threats to the medicinal plants of Ethiopia (Endashaw Bekele, 2007). In the area, informants reported that several medicinal plants have already disappeared from their common habitats and some of them are at risk of extinction. The most cited threats to medicinal plants of the area were agricultural expansion in relation to population growth, charcoal making, fire wood collection, over grazing, drought and construction materials. From these, agricultural expansion was the major threat to medicinal plants followed by charcoal making in the study area (Table 17). The results of Fisseha Mesfin *et al.*, (2009) and Nigussie Amsalu (2010) indicated that agricultural expansion was the major threat on medicinal plants in Wonago and Farta districts respectively. According to Sofowara (1982) the loss of medicinal plants associates with the missing advantages gained from medicinal plants and indigenous knowledge associated with plants.

Some traditional practitioners had started to conserve medicinal plants by growing them in homegardens in the area. These are *Cymbopogon citratus*, *Lippia adoensis*, *Ocimium lamiifolium*, *Verbena officinalis* and *Solanecio gigas*. In most situations, the homegardens are fenced and protect the medicinal plants from grazing and unwise harvesting. Thus, homegardens are good places for conservation of medicinal plants and for better transfer of the indigenous knowledge to the younger generation. In addition, some of medicinal plants are conserved for other values in church forests in the area.

Olinia rochetiana and *Rhus vulgaris* dominated plant community was the only protected forest in the study area. Thus, this community type was providing important contribution for *in-situ* conservation of wild growing medicinal plants. However, this conservation practice is not sufficient and further *in-situ* conservation of other wild plant communities (e. g. *Dodonaea angustifolia* and *Rumex nervosus* dominated plant community) should be encouraged in the study area.

5.2 Conclusion and Recommendations

5.2.1 Conclusion

One hundred fifty five medicinal plant species which belong to 133 genera and 65 families were collected, identified and recorded. This indicated that, the study area was rich in medicinal plants diversity. The Asteraceae was the leading family which was represented by 16 plant species. From the total medicinal plants, 115 species were used only to treat human ailments, 10 species were used only to treat livestock ailments and 30 species were used to treat both human and livestock ailments. Eighty three human and livestock ailments were reported to be treated by traditional medicine in the study area. Most (104) of the medicinal plants were collected from wild vegetation. However, homegardens also very important, which contributed 51 species, therefore; the local people should be enhanced homegardening in their area. Knowledge of medicinal plants in the study area varies among age and gender, much of the knowledge of medicinal plants was handled by elders and men are more knowledgeable than women. The introduction of modern education to the area has partially contributed in making the younger generation undermine traditional medicinal knowledge and practices because such practices have been considered backward.

Herbs were found to be the dominant growth forms used for preparation of traditional remedies followed by shrubs and trees. Leaves were also found to be the most frequently used plant parts followed by roots for preparation of traditional medicine. Most of the herbal remedies are prepared from fresh materials and administered orally. The results revealed that many wild medicinal plant species are under growing pressures from various anthropogenic factors. The major threats to medicinal plants in this study area are agricultural expansion to forests and

grazing lands followed by charcoal making. Therefore, awareness raising movement is needed for the local community to conserve medicinal plants.

5.2.2 Recommendations

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

- The District health office should be create discussion forum for both modern and traditional medicine practitioners regarding to preparation, preservation, dosage and application of traditional medicine.
- Traditional healers and the local community should give attention to standardize measurements of the remedies to reduce side effects.
- The traditional practitioners should properly share their indigenous knowledge on medicinal plants not only for their families but also for other local communities inorder to strengthen this indigenous knowledge of medicinal plants.
- Market of medicinal plants as well as services provided by traditional practitioners should be established and practiced at the District.
- Promoting the organizational structure at District Agricultural Offices to identify and encourage the local herbal medicinal practitioners to enhance the use of traditional medicine by giving support to the herbal medicinal practitioners to prepare herbal remedies and sharing their knowledge to others local people and licensing the work of the practitioners.
- The local people should be educated about the sustainable utilization and management of medicinal plants.
- The traditional healers and local communities should be cultivating medicinal plant species in their homegardens.
- *Olinia rochetiana* and *Rhus vulgaris* dominated plant community is already protected and needs further strengthening through rehabilitation and restoration of species that were becoming rare.
- *Lupinus albus* was the most scarce medicinal plant in the study area, therefore, the District Agricultural and Rural Development Office should be brought this medicinal plant from Bar Dar and encourage the local people to cultivate this plant.

REFERENCES

Abbink, J. (1995). Medicinal and ritual plants of the Ethiopia Southwest: An account of recent research. *Indigenous Knowledge and Development Monitor* **39**: 6-8.

Abudulhamid Bedri, Sebsib Belay, Workineh Nigatu and Addisu Asmare (2004). **Survey Results: Socio Economic Study of Medicinal Plants**. Addis Ababa University, Addis Ababa.

Alexiades, M. (1996). Collecting ethnobotaincal data, an introduction to basic concepts and techniques. In: **Selected Guide line for Ethnobotanical Research: A Field Manual**, pp. 53-94 (Alexiades, M. and Sheldon, J. W.eds.). The New York Botanical Garden, U.S.A.

Amare Getahun (1976). **Some Common Medicinal and Poisonous Plants used in Ethiopia Folk Medicine**. Addis Ababa University, Addis Ababa.

Andy, C. (1999). **Methods on the Move. A Review of Veterinary uses of Participatory Approaches and Methods Focusing on Experiences in Dryland Africa**. London.

Asfaw Debella, Dawit Abebe and Kelbessa Urga (1999). An over view of traditional medicine in Ethiopia: perspective and developmental efforts. In: **Ethiopian Pharmaceutical Association** (Tamrat Ejigu, ed.). Silver Jubilee Anniversary, Addis Ababa.

Ates, D. A. and Erdogrul, O. T. (2003). Antimicrobial activities of various medicinal and commercial plant extracts. *Turk. J. Biol.* **27**: 157-162.

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

Balick, M. J. and Cox, P. A. (1996). **Plants People and Culture. The Science of Ethnobotany**. Scientific America Library, a division of HPHLP, New York.

Berkes, F. and Turner, N. J. (2006). "Knowledge, Learning and the Evolution of Conservation Practice for Social-Ecological System Resilience". *Human Ecology* **34**: 479–494.

Biruktayet Assefa ,Gerhard, G. and Christine, B. (2010). Ethnomedicinal use of *Hagenia abyssinica* (Bruce) J. F.Gmel. among Rural Communities of Ethiopia. *J. Ethnobiol. Ethnomedic.* **6**: 20.

Brown, K. (1992). **Medicinal Plants, Indigenous Medicine and Conservation of Biodiversity in Ghana**. Chichester, UK.

Cotton, C. M. (1996). **Ethnobotany: Principles and Applications**. John Willey and Sons LTD, New York.

Dawit Abebe (1986). Traditional medicine in Ethiopia: The attempts being made to promote it for effective and better utilization. *SINET Ethiop. J. Sci.* ***9***: 61-69.

Dawit Abebe (1996). The development of drug research. *Ethiopian Health and Nutrition Res. Inst. News Lett.* **1**: 5-6.

Dawit Abebe, (2001). The Role of Medicinal Plants in Healthcare Coverage of Ethiopia, the Possible Integration. In: **Conservation and Sustainable Use of Medicinal Plants in Ethiopia Proceeding of The National Workshop on Biodiversity Conservation and Sustainable Use of Medicinal Plants in Ethiopia**, (Medhin Zewdu and Dawit Abebe, eds.). Pp. 6-21. IBCR, Addis Ababa.

Dawit Abebe and Ahadu Ayehu (1993). **Medicinal Plants and Enigmatic Health Practices of Northern Ethiopia.** B.S.P.E., Addis Ababa.

Debela Hunde, Zemede Asfaw and Enzsermu Kelbessa (2004). Use and management of ethnoveternary medicinal plants of indigenous people in `Boosat`, welenchiti area, *Ethiop. J. Biol. Sci.* **3**: 113-132.

Demel Teketay (2001). Deforestation, Wood Famine, and Environmental Degradation in Ethiopia's Highland Ecosystems: Urgent Need for Action Northeast African Studies *New Series* **8**: 53-76.

Devendrakumar, D. and Anbazhagan, M. (2012). Ethnoveterinary medicinal plants used in Perambalur District, Tamil Nadu. *Research in Plant Biol.* **2**: 24-30.

Emiru Birhane, Ermias Aynekulu, Wolde Mekuria and Degitu Endale (2011). Management, use and ecology of medicinal plants in the degraded drylands of Tigray, Northern Ethiopia. *J. Horticul. Forestry* **3**: 32-41.

Endalew Amenu (2007). Use and management of medicinal Plants by indigenous people of Ejaji area (chelya woreda) West Shoa, Ethiopia: An ethnobotanical approach. M.Sc. Thesis, AAU.

Endashaw Bekele (2007). Study on Actual Situation of Medicinal Plants in Ethiopia http://www.endashaw.com.

Endashaw Bekele and Shigeta, M. (2008). Status of utilization of medicinal plants in Ethiopia. In: **"Medicinal Crops" in Ethiopia: Current Status and Future Potentials**, (Maki, H. ed.). Pp. 7-14. Japan Association for International Collaboration of Agriculture and Forestry. Kyoto University and Addis Ababa University, Kyoto and Addis Ababa.

Ermias Lulekal, Ensermu Kelbessa, Tamrat Bekele and Haile Yineger (2008). An ethnobotanical study of medicinal plants in Mana Angetu Wereda, southeastern Ethiopia. *J. Ethnobiol. Ethnomedic.* **4**: 10.

Eskedar Abebe (2011). Ethnobotanical Study on Medicinal Plants used by Local Communities in Debark Wereda, North Gonder Zone, Amhara Regional State, Ethiopia. M.Sc. Thesis, AAU.

Etana Tolasa (2007). Use and Conservation of Traditional Medicinal Plants by Indigenous People in Gimbi Woreda, Western Wellega, Ethiopia. M.Sc. Thesis, AAU.

Fabricant, D. S. and Farnsworth, N. R. (2001). The value of plants used in traditional medicine for drug discovery. *Environ. Health Perspect* **109**: 69-75.

FAO (2002). **Genetics and Animal Health Spotlight**. FAO, Rome.

Farnsworth, N. R. (1994). **Ethnopharmacology and Drug Development in Ethnobotany and the Search for New Drugs**. Ciba foundation symposium 185 chic ester, UK John Wiley and Sons.

Fassil Kibebew (2001). The Status and Availability of Oral and Written Knowledge on Traditional Health Care in Ethiopia. In: **Conservation and Sustainable Use of Medicinal Plants in Ethiopia, Proceeding of The National Work Shop on Biodiversity and Sustainable USE OF Medicinal Plants In Ethiopia**, (Medhin Zewdu and Abebe Demissei eds.). Pp. 168-175. IBCR, AA.

Fisseha Mesfin, Sebsebe Demissew and Tilahun Teklehaymanot (2009). An ethnobotanical study of medicinal plants in Wonago Woreda, SNNPR, Ethiopia. *J. Ethnobiol. Ethnomedic.* **5**: 28.

Ford, R. I. (1978). The Nature and status of Ethnobontany. In: **Anthropological Papers**, (Arbor, A. ed.). Museum of Anthropology University of Michigan, Michigan.

Friedman, J., Yaniv, Z., Dafni, A. and Palewitch, D. (1986). A preliminary classification of the healing potential of medicinal plants, based on a rational analysis of an ethnopharmacological field survey among Bedouins in the Negev desert, Israel. *J. Ethnopharmacol.* **16**: 275-287.

Friis Ib, Sebsebe Demissew and Paulo van Breugel (2010). **Atlas of the Potential Vegetation of Ethiopia**. Det Kangelige Danske Videnskabernes Selskab.

Getachew Addis, Dawit Abebe, Timotewos Genebo, Kelbessa Urga (2002). Perceptions and practices of modern and traditional health practitioners about traditional medicine in Shirka District, Arsi Zone, Ethiopia. *Ethio. J. Health Dev.* **16**: 19-29.

Getnet Chekole (2011). An Ethnobotanical Study of Plants used in Traditional Medicine and as Wild Foods in and Around Tara Gedam and Amba Remnant Forests in Libo Kemkem Wereda, South Gonder Zone, Amhara Region, Ethiopia. M.Sc. Thesis, AAU.

Getu Alemayehu (2010). Ethnobotanical Study on Medicinal Plants used by Indigenous Local Communities in Minjar-Shenkora Wereda, North Shewa Zone of Amhara Region, Ethiopia. M.Sc. Thesis, AAU.

Gidey Yirga (2010). Assessment of indigenous knowledge of medicinal plants in Central Zone of Tigray, Northern Ethiopia. *African J. Plant Sci.* **4**: 6-11.

Gidey Yirga, Mekonen Teferi and Mezgebe Kasaye (2011). Survey of medicinal plants used to treat human ailments in Hawzen district, Northern Ethiopia. *Inter. J. Biodiver. Conser.* **3**: 709-714.

Girma Deffar (1998). **Non-Wood Forest Products in Ethiopia, FAO and European Commission Directorate**. General VIII Development. Addis Ababa, Ethiopia.

Govaerts, R. (2001). How many species of seed plants are there? *Taxon* **50**:1085-1090.

Haile Yineger and Delenasaw Yewhalaw (2007). Traditional medicinal plant knowledge and use by local healers in Sekoru District, Jimma Zone, Southwestern Ethiopia. *J. Ethnobiol. Ethnomedic.* **3**: 24.

Haile Yineger, Delenasaw Yewhalaw and Demel Teketay (2008). Ethnomedicinal plant knowledge and practice of the Oromo ethnic group in southwestern Ethiopia. *J. Ethnobiol. Ethnomedic.* **4**: 11.

Haile Yineger, Ensermu Kelbessa, Ermias Lulekal and Tamrat Bekele (2008). Plants used in traditional management of human ailments at Bale Mountains National Park, South eastern Ethiopia. *J. Medicinal Plants Research* **2**: 132-153.

Haimanot Reta (2010). An Ethnobotanical Study of Useful Plants of the Farming Site in Gozamen Wereda, East Gojjam Zone of Amhara Region, Ethiopia. M.Sc. Thesis, AAU.

Hamilton, A. C. (1997). Threats to plants: an analysis of Centres of Plant Diversity. In: **Conservation into the 21st Century, Proc. 4th International Botanic Gardens Conservation Congress,** (Touchell, D. H. and Dixon, K. W. eds.). Pp. 309-322. Kings Park and Botanic Garden, Perth, Australia.

Hamilton, A. C. (2003). **Medicinal Plants and Conservation: Issues and Approches**. Panda House, Catteshall Lane, Londone.

Hamilton, A. C. (2004). **Medicinal Plants, Conservation and Livelihood**. International Plants Conservation Unit, WWF-UK, Panda House, Catteshall Lane, Godalming.

Hamilton, A.C., Shengji, P., Kessy, J., Khan, A.A., Lagoss-Witte, S. and Shinwari Z.K. (2003). **The Purpose and Teaching of Applied Ethnobotany**. People and plants working paper WWF, UK.

Hareya Fassil (2005). **Beyond Plants, Professionals & Parchments: The role of home-based medicinal plant use and traditional health knowledge in primary healthcare in Ethiopia.** *Ethnobotany Research & Applications* **3**: 037-049.

Heinrich, M., Ankli, A., Frei, B., Weimann, C. and Sticher, O. (1998). Medicinal plants in Mexico: Healer's consensus and cultural, importance. *Social Sci. and Medic.* **47**: 1863-1875.

Hill, A. F. (1989). **Economic Botany**. TATA McGRAW-HILL Publishing Campany LTD, New Delhi.

Iwu, M. M. (1993). **Handbook of African Medicinal Plants**. Boca Raton, CRC press, London.

Jabbar, A., Akhtar, M. S., Muhammad, G. and Lateef, M. (2005). Possible role of ethnoveterinary medicine in poverty reduction in Pakistan: Use of botanical Anthelmintics as an example. *J. Agri. Soc. Sci.* **1**: 187-195.

Jain, S. K. (1999). **Dictionary of Ethnoveterinary Plants of India**. Deep Publications, New Delhi.

Jimenez-Medina, E., Garcia-lora, A., Paco, L., Algarra, I., collado, A. and Garrido, F. (2006). A new extract of the plant calendula officinalis produces a dual invitro effect: cyto & toxic anti-tumor activity and lymphocyte activiation. *BMC* **6**: 119-132.

Kanno, B. (2004). Integration of traditional medicine with modern medicine. In: **Traditional Medicine in Ethiopia,** (Kelbessa Urga, Ayele Assefa and Mulugeta Guta, eds.). Pp. 32-35. Ethiopian Health and Nutrition Research Institute, Addis Ababa.

Kargioglu, M., Cenkci, S., Serteser, A., Evliyaoglu, N., Konuk, M., Kok, M. S. and Bagci, Y. (2008). An Ethnobotanical Survey of Inner-West Anatolia, Turkey. *Human Ecology* **36**: 763-777.

Kebede Deribe, Alemayehu Amberbir, Binyam Getachew and Yunis Mussema (2006). A historical overview of traditional medicine practices and policy in Ethiopia. *Ethiop. J. Health Dev.* **20**: 127-134.

Kebu Balemie, Ensermu Kelbesa and Zemede Asfaw (2004). Indigenous medicinal plant utilization, management and threats in fentalle area, Eastern Shewa, *Ethiopia. Ethiop. J. Biol. Sci.* **3**: 37-58.

Kelbessa Urga, Asefa Ayale and Guta Merga (2004). **Traditional Medicine in Ethiopia Proceedings of a National Work Shop held in Addis Ababa, Ethiopia**. Addis Ababa, Ethiopia.

Leony, A. and Voeks, R. (2004). "Forgetting the Forest: Assessing Medicinal Plant Erosion in Eastern Brazil". *Economic Botany* **58**: 294–306

Liu, C-X. and Yaniv, Z. (2005). Research and development of new drugs originating fromChinese plants. In: **Handbook of Medicinal Plants**, (Yaniv, Z. and Bachrach, U., eds.). Pp 61-96. Pub- Food Products Press-Haworth Press.

Maine, V. A. C., Livia, E. T. M., Jose, S. M. and Romulo, R. N. A. (2009). Animals to heal animals: ethnoveterinary practices in semiarid region, Northeastern Brazil. *J. Ethnobiol. Ethnomedic.* **5**: 37.

Makonnen Bishaw (1991). Promoting traditional medicine in Ethiopia: A brief historical overview of government Policy. *Soc. Sci. Medic.* **33**: 193-200.

Martin, G. J. (1995). **Ethnobotany: A Method Manual**. Chapman and Hall, London.

Mathias, E. and McCorkle, C. M. (1997). Animal health. In: **Biotechnology: Building on Farmers' Knowledge**, (Bunders, J., Haverkort, B. and Hiemstra, W. eds.). Pp. 22–51. Basingstoke, UK.

Mathius-Mundy, E. and McCorkle, C. M. (1989). **Ethnoveterinary medicine: an Annotated Bibliography. Bibliographies in Technology and Social Change**. Iowa State University, USA.

McCorkle, C. M. (1986). An introduction to ethnoveterinary research and development. *J. Ethnobiol.* **6**: 129–149.

McGaw, L. J., Van der Merwe, D. and Eloff, J. N. (2007). In vitro anthelmintic, antibacterial and cytotoxic effects of extracts from plants used in South African ethnoveterinary medicine. *Vet. J.* **173**: 366–372.

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

Medhin Zewdu, Tsige Gebre-Mariam and Kaleab Asres (2001). Global perspectives of medicinal Plants. **In: Conservation and Sustainable Use of Medicinal Plants in Ethiopia, Proceeding of The National Work Shop on Biodiversity and Sustainable use of Medicinal Plants in Ethiopia**, (Medhin Zewdu and Abebe Demissei, eds.). Pp. 198-203. Institute of Biodiversity conservation and Research, Addis Ababa.

Mezgebe Kassaye (1996). Integration of traditional medicine with modern care services. In: **Proceedings of the Workshop on Development and Utilization of Herbal Remedies in Ethiopia**, (Dawit Abebe, ed.). Pp. 10-14. EHNRI, Addis Ababa.

Miollis, R. (1999). Medicinal plants: a re-emerging health aid. *Electronic J. Biotechno.* **2**: 2.

Mirgissa Kaba (1998). Utilization of plant medicine for the treatment of health problems. The case of Oromo of Chora District, Illubabor Zone, Western Ethiopia. *Ethio. J. Health Dev.* **10**: 161- 166.

Mirutse Giday (2001). An ethnobotanical study of medicinal plants used by the Zay people in Ethiopia. *CBM:s skriftserie* **3**: 81–99.

Mirutse Giday and Gobena Ameni (2003). An ethnobotanical survey on plants of veterinary importance in two Weredas of Southern Tigray, Northern Ethiopia, *SINET: Ethiop. J. Sci.* **26**: 123-136.

Mirutse Giday, Zemede Asfaw, Zerihun Woldu and Tilahun Teklehaymanot (2009). Medicinal plant knowledge of the Bench ethnic group of Ethiopia: an ethnobotanical investigation. *J. Ethnobiol. Ethnomedic.* **5**: 34

Moa Megersa (2010). Ethnobotanical Study of Medicinal Plants in Wayu Tuka District, East Wollega Zone of Oromia Region, Ethiopia. M. Sc. Thesis, AAU.

Mohammed Adefa and Berhanu Abraha (2011). Ethnobotanical survey of traditional medicinal plants in Tehuledere district, South Wollo, Ethiopia. *J. Medic. Plants Research* **5**: 6233-6242.

Muthu, C., Ayyanar, M., Raja, N. and Ignacimuthu, S. (2006). Medicinal plants used by traditional healers in Kancheepuram District of Tamil Nadu, India. *J. Ethnobiol. Ethnomedic.* **2**: 43.

Birgit Negussie (1988). Traditional wisdom and modern development: A case study of traditional peri-natal knowledge among women in southern Shewa, Ethiopia. Doctoral dissertation, University of Stockholm, Stockholm.

Nigussie Amsalu (2010). An Ethnobotanical Study of Medicinal Plants in Farta Wereda, South Gonder Zone, Amhara Region, Ethiopia. M.Sc. Thesis, AAU.

Nyazena, Z. N. and Kire, F. C. (1986). The interaction between traditional medicine remedies used for gastrointestinal diseases as conventional drugs. *East Afr. Medic. J.* **63**: 258-262.

Pankhurst, R. (1990). **An Introduction to Medicinal History of Ethiopia**. The red sea press Inc, Newjersey.

Patwardhan, B. (2005). **Ethnopharmacology and drug discovery.** *J. Ethnopharmacol.* **100**: 50-52.

Phondani, P. C., Maikhuri, R. K. and Kal, C. P. (2010). Ethnoveterinary Uses of Medicinal Plants among Traditional Herbal Healers in Alaknanda Catchment of Uttarakhand. *India. Afr. J. Tradit. Complement. Altern. Medic.* **7**: 195–206.

Pramono, E. (2002). **The Commercial use of Traditional Knowledge and Medicinal Plants in Indonesia**. Multistakeholder dialogue on trade, intellectual property and biological resources in Asia, BRAC center for development management, Rajendrapur, Bangladesh.

Schultes, R.E., (1992). Ethnobotany and technology in the Northwest Amazon: A partnership. In: **Sustainable Harvest and Marketing of Rain Forest Products,** (Plotkin and Famolare eds.). Pp. 45-76. Island Press, CA.

Sebsebe Demissew and Ermias Dagne (2001). Basic and applied research on medicinal plants of Ethiopia. **In: Conservation and Sustainable Use of Medicinal Plants in Ethiopia, Proceeding of The National Work Shop on Biodiversity and Sustainable Use of Medicinal Plants in Ethiopia**, (Medhin Zewdu and Abebe Demissei, eds.). Pp. 29–33. IBCR, Addis Ababa.

Sebsebe Demissew and Friis, I. (2009). Natural Vegetation of the Flora area. In: **Flora of Ethiopia and Ertirea, vol. 8,** (Hedberg, I., Friis, I., and Persson, E. eds.). Pp. 27-38. Uppsala University, Sweden.

Seyoum Getaneh (2009). Ethnobotanical studies of medicinal plants in Debre Libanos Wreda, North Shewa Zone of Oromia Region, Ethiopia. M.Sc. Thesis, AAU.

Sidhu, K. and Pannu, K. (2010). Indigenous Use of Medicinal Plants for Health Care. *Ethnomedic*. **4**: 145-148.

Slikkerveer, L. J. (1990). **Plural Medical Systems in the Horn of Africa**. Kegan Paul International, London and New York.

Sofowora, A. (1982). **Medicinal Plants and Traditional Medicine in Africa**. Spectrum Books Limited, Ibadan, Nigria.

Sofowora, A. (1993). **Medicinal Plants and Traditional Medicines in Africa**, 2nd edition, Spectrum Books, Ibadan, Nigeria.

Swanson, T. M. (1998). **Intellectual Property Rights and Biodiversity Conservation: An Interdisciplinary Analysis of the Values of Medicinal Plants**. Cambridge University Press, Cambridge.

Tamboura, H. H., Sawadogo, L. L., Kabore, H. and Yameogo, S. M. (2000). Ethnoveterinary medicine and indigenous pharmacopoeia of Passore Province in Burkina Faso. *Annals of the New York Academy of Sc.* **916**: 259-264.

Tamrat Bekele (1993). **Vegetation Ecology of the Remnant Afromontane Forests on the Central Plateau of Shoa, Ethiopia**. Acta Phytogeor, Uppsala.

Teferi Flatie, Teferi Gedif, Kaleab Asres and Tsige Gebre-Mariam (2009). Ethnomedical survey of Berta ethnic group Assosa Zone, Benishangul-Gumuz regional state, mid-west Ethiopia. *J. Ethnobiol. Ethnomedic.* **5**: 14.

Tesfaye Hailemariam, Sebsebe Demissew and Zemede Asfaw (2009). An ethnobotanical study of medicinal plants used by local people in the lowlands of Konta Special Wereda, Southern Nations, Nationalities and Peoples Regional State, Ethiopia. *J. Ethnobiol. Ethnomedic.* **5**: 26.

Thomas, H. (1995). Indigenous Knowledge, Emanicipation and Alination. *J. knowledge Transfer and Utilization* **8**: 63-73.

Thomas, M., Johnson, C. and Sargent, F. (1996). "Ethnopharmacology: The Conjunction of Medical Ethnography and the Biology of Therapeutic Action". *Medical Anthropology: Contemporary Theory and Method.* **151**: 132–133.

Thomson, G. M. (2010). Further consideration of Asian medicinal plants in treating common chronic diseases in the West. *J. Medicinal Plants Research* **4**: 125-130.

Tilahun Teklehaymanot and Mirutse Gidey (2007). Ethnobotanical study of medicinal plants used by people in Zegie Peninsula, Northwestern Ethiopia. *J. Ethnobiol. Ethnomedic.* **3**: 12.

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

WB (2000). **Project Appraisal Document on Conservation and Sustainable Use of Medicinal Plants**. The World Bank, New York.

WHO (1978). **The Promotion and Development of Traditional Medicine**. WHO, Geneva.

WHO (1990). **Traditional Medicine Program and Global Program on AIDS. Report on the Consultation on AIDS and Traditional Medicine on WHO Meeting (Unpublished WHO/TRM/GPA/90.1)**. Francis Town, Botswana.

WHO (1999). **Practical Handbook for Anti-malarial Drug Therapeutic Efficacy Testing for the District Health Workers**. WHO/AFRO, Harare.

WHO (2001). **Legal Status of Traditional Medicine and Complementary/ Alternative Medicine: A World Wide Review**. WHO Publishing, Geneva.

WHO (2002). **Traditional Medicine Strategy 2002-2005.** WHO, Geneva.

Wole, M. O. (2010). Indigenous knowledge of traditional medicinal practitioners in the treatment of sickle cell anemia. *Indian J. Traditional Knowledge* **9**: 119-125.

Wright, C. W. (2005). Plant derived antimalarial agents: new leads and challenges. *Phytochemistry* **4:** 55-61.

Yalew Addisie, Debebe Yared, Ashok Kumar, Zewdneh Tomas and Assefa Awol (2011). Traditional Medicinal Plants used by People in Libo-Kemkem District, South Gondar, Ethiopia. *Asian J. Agricultural Research* **4**: 171-176.

Zemede Asfaw (2001). The Role of Home Garden in Production and Conservation of Medicinal plants. In: **Coservation and Sustainable Use of Medicinal plants in Ethiopia**. (Medhin Zewdu and Abebe Demissie eds.). Pp. 76-91. IBCR, Addis Ababa.

Zerihun Woldu (1999). Forests in the vegetation types of Ethiopia and their status in the geographical context. In: **Forest Genetic Resource Conservation: Principles, Strategies and Actions; Proceedings of The National Forest Genetic Resources Conservation Strategy;** (Edwards, S., Abebe Demissie, Taye Bekele and Haase, G. eds.). Addis Ababa, Ethiopia.

Zhang, X. (1999). Traditional Medicine Worldwide: The Role of World Health Organization. *Drug Information J.* **33**: 321–326.

APPENDICES

Appendix 1 Medicinal plants used by local people in the study area with scientific Name, Family, Local Name, Habit (Climber-Cl, Herb-H, Shrub-S, Tree-T), Habitat (Wild- W, Homegarden- HG), Geographical Location, Altitude, Status (Common, Medium, Rare) and Collection number.

No	Scientific Name	Family	Local Name (Amaharic)	Habit	Habitat	Geographical Location		Altitude (m)	Status (Abundance)	Collection no.
						Longitude (N)	Latitude (E)			
1	*Acacia abyssinica* Hochst. ex Benth.	Fabaceae	Girar	T	HG	10^0 13'15.4"	039^0 32' 47.3	2433	Medium	SW101
2	*Achyranthes aspera* L.	Amaranthaceae	Telengz	H	HG	10^0 17'52.7"	039^0 34' 54.8	2933	Common	SW017
3	*Acokanthera schimperi* Schweinf.	Apocynaceae	Mirienz	T	W	10^0 12'44"	039^0 32' 23.2	2371	Medium	SW108
4	*Allium cepa** L.	Alliaceae	Key shinkurt	H	HG	10^0 13'22.2	039^0 31' 47.8	2310	Common	SW055
5	*Allium sativum** L.	Alliaceae	Nech shinkurt	H	HG	10^0 21'05.1	039^0 34' 42.6	2956	Common	SW030
6	*Aloe pulcherrima*** Gilbert and sebsebe	Aloaceae	Setie - Iret	H	HG	10^0 17'59.5	039^0 34' 52.4	2960	Rare	SW075
7	*Aloe debrana*** Christian	Aloaceae	Wondie – Iret	H	W	10^0 18'05.6	039^0 39' 53.9	2972	Common	SW078
8	*Artemisia abyssinica* Sch.Bip.	Asteraceae	Chikugn	H	W	10^0 17'40.9	039^0 35' 04.8	2894	Common	SW018
9	*Artemisia rehan** Chiov.	Asteraceae	Arti	H	HG	10^0 17'50.2	039^0 34'55.6	2921	Common	SW132
10	*Asparagus africanus* Lam.	Asparagaceae	Kestencha	S	W	10^0 21'05.8	039^0 34'31.8	2946	Medium	SW034

Appendix 1 cont…

11	*Asplenium aethopicum* (Burm.f.) Bech.	Aspleniaceae	-	H	W	10^0 17'53.4	039^0 34'53.3	2917	Common	SW064
12	*Berberis holstii* Engl.	Berberidaceae	Zinkela	S	W	10^0 18'04.4	039^0 34'53.5	2961	Medium	SW131
13	*Bersama abyssinica* Fresen.	Melianthaceae	Azamir	S	W	10^0 13'34.6	039^0 33'29.9	2490	Medium	SW125
14	*Brassica carinata*** A. Br.	Brassicaceae	Gomenzer	H	HG	10^0 18'31.2	039^0 39'22.7	3074	Common	SW153
15	*Brassica oleracea** L.	Brassicaceae	Tql gomen	H	HG	10^0 18'31.2	039^0 39'22.7	2884	Common	SW135
16	*Buddleja polystachya** Fresen.	Loganiaceae	Anfar	T	HG	10^0 17'53.4	039^0 34'54.1	2927	Medium	SW071
17	*Caparris tomentosa* Lam.	Capparidaceae	Gumero	S	W	10^0 12'31.2	039^0 391'44.7	2197	Rare	SW096
18	*Capsicum annuum** L.	Solanaceae	Karia	H	HG	10^0 23'27.3	$039^0$29'45.3	2801	Medium	SW152
19	*Carissa spinarum* L.	Apocynaceae	Agam	S	W	10^0 14'02.4	039^0 30'42.7	2798	Medium	SW050
20	*Carthamus tinctorius* L.	Asteraceae	Suf	H	W	10^0 12'31.4	039^0 31'48.8	2207	Rare	SW090
21	*Cassipourea malosana* Aubl.	Rhizophoraceae	Werer	T	W	10^0 13'22.3	039^0 31'48	2320	Rare	SW087
22	*Catha edulis** (Vahl) Forssk. ex Endl.	Celastraceae	Chat	T	HG	10^0 17'52.4	039^0 34'55.6	2936	Common	SW083
23	*Chenopodium ambrosioides* L.	Chenopodiaceae	Amedmado	H	HG	10^0 18'31.4	039^0 39'22.6	3077	Medium	SW141
24	*Citrus limon** (L.) Burm.f.	Rutaceae	Betre lomi	T	HG	10^0 12'31.2	039^0 31'49.8	2277	Rare	SW150

Appendix I cont…

25	*Citrus aurantifolia** (Christm.) Swingle	Rutaceae	Lomi	T	HG	10^0 13'22.3	039^0 31'48	2320	Rare	SW053
26	*Citrus medica** L.	Rutaceae	Tringo	T	HG	10^0 12'32.2	039^0 31'49.7	2278	Rare	SW147
27	*Clematis simensis* Fresen.	Ranunculaceae	Yeazo areg	Cl	W	10^0 17'45.3	039^0 35'13.3	2856	Medium	SW020
28	*Clerodendrum myricoides* (Hochst.) Vatke	Lamiaceae	Misrich	S	W	10^0 13'17.1	039^0 32'49.6	2432	Medium	SW094
29	*Clutia abyssinica* Jaub. & Spach.	Euphorbiaceae	Fyelefeg	S	W	10^0 14'12.3	039^0 30'38.3	2830	Medium	SW044
30	*Coffea arabica** L.	Rubiaceae	Bunna	T	HG	10^0 13'18.5	039^0 31'48.9	2275	Medium	SW063
31	*Cordia africana* Lam.	Boraginaceae	Wanza	T	W	10^0 13'0.86	039^0 32'52.2	2435	Medium	SW137
32	*Croton macrostachyus* Del.	Euphorbiaceae	Bisana	T	W	10^0 13'26.6	039^0 31'48.9	2363	Medium	SW060
33	*Cucumis ficifolius* A. Rich.	Cucurbitaceae	Yemdir embway	H	W	10^0 13'22.2	039^0 31'47.8	2299	Rare	SW057
34	*Cucurbita pepo** L.	Cucurbitaceae	Duba	Cl	HG	10^0 30'07.2	039^0 46'48.4	2800	Medium	SW161
35	*Cyathula polycephala* Bak.	Amaranthaceae	Chegogote	H	W	10^0 12'39.6	039^0 31'58.3	2289	Rare	SW099
36	*Cyathula uncinulata* (Schrad.) Schinz	Amaranthaceae	Yekil fikir	H	W	10^0 14'12.5	039^0 30'38.7	2830	Common	SW046
37	*Cymbopogon citrates** (DC.) Stapf.	Poaceae	Tejesar	H	HG	10^0 18'25.5	039^0 39'20.4	3069	Rare	SW129

Appendix I cont…

38	*Cyphostemma adenocaule* (Steud. exA. Rich.) Descoings ex Wild & Drummond	Vitaceae	Aserkush tebetebkush	Cl	W	10^0 13'18.1	039^0 31'49.1	2273	Rare	SW085
39	*Cyphostemma cyphopetalum* (Fresen.) Descoings ex Wild& Drummond	Vitaceae	Gindosh	Cl	W	10^0 13'20.5	039^0 33'05.8	2437	Rare	SW151
40	*Datura stramonium* L.	Solanaceae	Astenager	H	HG	10^0 17'40.6	039^0 34'59.3	2909	Medium	SW022
41	*Daucus carota** L.	Apiaceae	Karrot	H	HG	10^0 18'25.9	039^0 39'21.6	3071	Medium	SW128
42	*Dodonaea angustifolia* L.f.	Sapindaceae	Kitkta	S	W	10^0 14'12.2	039^0 30'38.6	2832	Medium	SW045
43	*Dovyalis abyssinica* (A. Rich.) Warb.	Flacourtiaceae	Koshim	S	W	10^0 31'10.5	039^0 46'57.7	2813	Medium	SW126
44	*Echinops kebericho*** Mesfin	Asteraceae	Kebericho	H	W	10^0 17'42.1	039^0 35'07.9	2890	Rare	SW019
45	*Echinops longisetus*** A. Rich.	Asteraceae	Koshelie	S	W	10^0 17'54.5	039^0 34'51.6	2928	Common	SW142
46	*Eucalyptus globulus** Labill.	Myrtaceae	Nech bahirzaf	T	W	10^0 31'11.3	039^0 47'09.6	2718	Common	SW005
47	*Euclea divinorum* Hiern.	Ebenaceae	Dedho	S	W	10^0 12'56.9	039^0 32'32.3	2411	Medium	SW107
48	*Euphorbia abyssinica* Gmel.	Euphobiaceae	Yebereha kulkual	T	W	10^0 12'32	039^0 31'48.7	2270	Medium	SW114

Appendix 1 cont…

49	*Euphorbia ampliphylla** Pax	Euphorbiaceae	Kulkual	T	HG	10^0 17'53.3	039^0 34'52.8	2927	Common	SW065
50	*Euphorbia tirucalli* L.	Euphorbiaceae	Kinchib	S	W	10^0 13'22.2	039^0 31'47.8	2299	Rare	SW086
51	*Ferula communis* L.	Apiaceae	Dog	H	W	10^0 14'05.8	039^0 30'42	2800	Rare	SW049
52	*Ficus sur* Forssk.	Moraceae	Shola	T	W	10^0 12'56.9	039^0 32'38.8	2407	Rare	SW106
53	*Ficus vasta* Forssk.	Moraceae	Warka	T	W	10^0 12'39.7	039^0 32'07	2300	Rare	SW117
54	*Foeniculum vulgare* Mill.	Apiaceae	Ensillal	H	HG	10^0 18'01.9	039^0 34'36.6	2930	Medium	SW039
55	*Gomphocarpus purpurascens*** A. Rich.	Asclepiadaceae	Tifrndo	S	W	10^0 18'52.7	039^0 40'18	3081	Common	SW011
56	*Guizotia schimperi* Sch. Bip. ex Walp.	Asteraceae	Mech	H	W	10^0 20'58.9	039^0 34'42.7	2989	Common	SW031
57	*Hagenia abyssinica* (Bruce) J.F. Gmel.	Rosaceae	Kosso	T	W	10^0 30'26.3	039^0 46'49.2	2912	Medium	SW016
58	*Haplocarpha schimperi* (Sch. Bip. Beauv.)	Asteraceae	Getin	H	W	10^0 18'55	039^0 40'00.4	3095	Common	SW163
59	*Helichrysum* sp.	Asteraceae	Nechilo	S	W	10^0 30'18.7	039^0 46'49.6	2906	Common	SW134
60	*Heteromorpha arboresescens* (Spreng.) Cham & Schltdl.	Apiaceae	Yegib-mirkuz	S	W	10^0 13'11.7	039^0 32'43.8	2445	Rare	SW104
61	*Hordeum vulgare** L.	Poaceae	Gebs	H	W	10^0 31'07.6	039^0 46'54.8	2809	Common	SW159

62	*Impatiens rothii*** Hook.f.	Balsaminaceae	Gishilt	H	W	10^0 15'09.1	039^0 30'35.9	2773	Medium	SW061
63	*Indigofera vohemarensis* Baill.	Fabaceae	Kuakucha	H	W	10^0 13'13.9	039^0 32'55.9	2434	Medium	SW121
64	*Inula confertiflora*** A. Rich.	Asteraceae	Woynagift (Ega)	S	W	10^0 20'59.4	039^0 34'48.9	2987	Common	SW028
65	*Jasminum abyssinicum* Hochst. ex DC.	Oleaceae	Tembelel	Cl	W	10^0 14'16.1	039^0 30'42.1	2817	Medium	SW047
66	*Juniperus procera** Hochst. ex. Endl.	Cupressaceae	Yabesha tid	T	W	10^0 31'02.9	039^0 47'06	2775	Common	SW067
67	*Justicia schimperiana* (Hochst.ex Nees) T. Anders.	Acanthaceae	Sensel	S	W	10^0 13'34.9	039^0 33'31.8	2456	Medium	SW081
68	*Kalanchoe petitiana**** A. Rich.	Crassulaceae	Endahahula	H	HG	10^0 17'51.6	039^0 34'54.4	2925	Common	SW066
69	*Lagenaria siceraria** (Molina) Standl.	Cucurbitaceae	Qil	Cl	HG	10^0 13'34.7	039^0 33'32.6	2446	Medium	SW133
70	*Laggera tomentosa*** (Sch. Bip. ex A. Rich.) Oliv.& Hiern	Asteraceae	Keskeso	H	W	10^0 20'59.4	039^0 34'49.2	2978	Common	SW027
71	*Launaea petitiana* (A. Rich.) N. Kilian	Asteraceae	Yebeg wotet	H	HG	10^0 21'47.1	$039^0$34'53.4	2902	Medium	SW024
72	*Lens culinaris** Medik	Fabaceae	Msr	H	W	10^0 18'44.4	039^0 40'28.8	3083	Common	SW010

73	*Leonotis ocymifolia* (Burm. F.) Iwarsson	Lamiaceae	Ras kmr	S	HG	10^0 18'44.3	039^0 40'32.2	3084	Common	SW014
74	*Lepidium sativum** L.	Brassicaceae	Feto	H	HG	10^0 18'25.5	039^0 39'20.5	3075	Common	SW012
75	*Linum usitatissimum** L.	Linaceae	Telba	H	W	10^0 18'53.6	039^0 40'16.3	3080	Common	SW015
76	*Lippia adoensis**** Hochst. ex Walp.	Verbenaceae	Kessie	H	HG	10^0 17'54.4	039^0 34'50.9	2957	Common	SW098
77	*Lobelia rhynchopetalum* Hemsl.	Lobeliaceae	Jibra	H	W	$10^0$25'31	039^0 47'49.5	3458	Medium	SW146
78	*Lupinus albus* * L.	Fabaceae	Gbto	H	HG	10^0 18'26.7	039^0 39'20	3073	Rare	SW158
79	*Lycopersicon esculentum** Mill.	Solanaceae	Timatim	H	HG	10^0 13'23.1	039^0 31'48.7	2317	Medium	SW056
80	*Maesa lanceolata* Forssk.	Myrsinaceae	Kelawa	S	W	10^0 31'02.4	039^0 47'07	2773	Medium	SW084
81	*Malus sylvestris** Miller	Rosaceae	Apple	T	HG	10^0 17'51.5	039^0 34'47.9	2891	Medium	SW156
82	*Malva parviflora* Hojer	Malvaceae	Alenkuata	H	HG	10^0 1753.4	039^0 34'53.3	2926	Common	SW072
83	*Maytenus arbutifolia* (A. Rich.) Wilczek	Celastraceae	Atat	S	W	10^0 30'03.4	039^0 47'06	2776	Medium	SW139
84	*Mentha spicata** L.	Lamiaceae	Nana	H	HG	10^0 18'26	039^0 39'21.7	3062	Rare	SW136
85	*Millettia ferruginea*** (Hochst.) Bak.	Fabaceae	Birbira	T	W	10^0 12'32.2	039^0 31'45.6	2228	Rare	SW032
86	*Momordica foetida* Schumach.	Cucurbitaceae	Kura harg	Cl	W	10^0 13'31.9	039^0 33'21.7	2439	Rare	SW123
87	*Musa* x *paradisiaca** L.	Musaceae	Muse	H	HG	10^0 12'32.2	039^0 31'45.9	2240	Medium	SW145

88	*Myrica salicifolia* A. Rich.	Myricaceae	Shinet	T	W	10^0 14'20.3	039^0 30'46.5	2822	Medium	SW051
89	*Myrtus communis** L.	Myrtaceae	Ades	S	HG	10^0 13'22	039^0 31'48.8	2283	Rare	SW089
90	*Myrsine africana* L.	Myrsinaceae	Qechemo	S	W	10^0 13'12.2	039^0 32'44.5	2456	Medium	SW103
91	*Nicotiana tabacum** L.	Solanaceae	Tinbaho	H	HG	10^0 17'52.7	039^0 34'34.2	2923	Medium	SW009
92	*Nuxia congesta* RBr. ex Fresen.	Loganiceae	Atquar	T	W	10^0 17'54.5	039^0 34'53.9	2924	Medium	SW155
93	*Ocimium lamiifolium** Hochst. ex Benth.	Lamiaceae	Dama kessie	S	HG	10^0 18'26	039^0 39'23.7	3068	Medium	SW154
94	*Olea europaea* subsp. *cuspidata* (Wall. ex G. Don) Cif.	Oleaceae	Weyra	T	W	10^0 17'52	039^0 34'53.9	2921	Medium	SW040
95	*Olinia rochetiana* A. Juss.	Oliniaceae	Tifie	S	W	10^0 14'13.7	039^0 30'38.9	2830	Medium	SW042
96	*Opuntia ficus-indica** (L.) Miller	Cactaceae	Beles	S	HG	10^0 17'53	039^0 34'55.1	2933	Rare	SW130
97	*Osyris quadripartita* Decn.	Santalaceae	Keret	S	W	10^0 17'47.6	039^0 35'05.5	2963	Medium	SW021
98	*Otostegia fruticosa* (frossk.) ex Penzig	Lamiaceae	Barianatra	S	W	10^0 13'15.2	039^0 32'47.3	2437	Medium	SW102
99	*Otostegia integrifolia** Benth.	Lamiaceae	Tnjut	S	W	10^0 13'25.9	039^0 31'47.7	2358	Medium	SW059

100	*Pennisetum sphacelatum* (Nees) Th. Dur. & Schinz	Poaceae	Sindedo	H	W	10^0 18'03.6	039^0 34'52.4	2974	Common	SW077
101	*Periploca linearifolia* Quant. Dill. & A. Rich.	Asclepiadaceae	Moider	Cl	W	10^0 13'33.6	039^0 33'24.4	2446	Rare	SW124
102	*Peucedanum winkleri* Wolff	Apiaceae	Qershashiba	H	HG	10^0 17'51.8	039^0 34'54.3	2928	Medium	SW140
103	*Phagnalon abyssinicum*** Sch. Bip. ex A. Rich.	Asteraceae	Nibasel	H	W	10^0 19'17.8	039^0 35'05	2987	Medium	SW079
104	*Phoenix reclinata** Jacq.	Arecaceae	Seniel	T	W	10^0 13'01.9	039^0 32'41.7	2455	Rare	SW144
105	*Phytolacca dodecandra** L'Hérit	Phytolaccacae	Mehan Endod	S	HG	10^0 17'53.7	039^0 34'53.7	2927	Common	SW004
106	*Pistacia falcata* Mart.	Anacardiaceae	Tana gebez	T	W	10^0 12'42.1	039^0 33'44.4	2303	Rare	SW112
107	*Plantago lanceolata* L.	Plantaginaceae	Gorteb	H	W	10^0 17'35	039^0 35'03	2855	Common	SW041
108	*Plectranthus punctatus* (L. f.) L ' Herit.	Lamiaceae	Tibtibo	H	W	10^0 21'19.1	039^0 32'06.6	2940	Medium	SW026
109	*Podocarpus falcatus* (Thunb.) Mirb.	Podocarpaceae	Zgba	T	W	10^0 31'11.3	039^0 47'09.6	2718	Medium	SW082
110	*Polygala rupicola* A. Rich.	Polygalaceae	Etse lbona	H	W	10^0 13'23.4	039^0 31'47.2	2331	Medium	SW058

Appendix 1 cont...

111	*Polygonum aviculare* L.	Polygonaceae	Kechkech	H	W	$10^0$23'27.6	039^0 29'43.9	2798	Common	SW069
112	*Premna schimperi* Engl.	Lamiaceae	Chocho	S	W	10^0 12'42.1	039^0 32'15	2333	Medium	SW118
113	*Pteridium aquilinum* L.	Pteridaceae	Emse fer	H	W	10^0 31'11.4	039^0 47'06.8	2750	Rare	SW160
114	*Ranunculus stagnalis* Hochst. Ex A. Rich.	Ranunculaceae	Gudgn	H	W	10^0 21'07.1	039^0 34'42.9	2951	Common	SW029
115	*Pterolobium stellatum* (Forssk.) Brenan	Fabaceae	Kentefa	S	W	10^0 12'32.4	039^0 31'46.1	2248	Medium	SW080
116	*Rhamnus prinoides** L'Herit	Rhamnaceae	Gesho	S	HG	10^0 17'52.2	039^0 34'54.2	2937	Common	SW007
117	*Rhus natalensis* Krauss	Anacardiaceae	Chakma	S	W	10^0 13'28.1	039^0 33'11.8	2451	Rare	SW100
118	*Rhus retinorrhoea* Oliv.	Anacardiaceae	Tlem	S	W	10^0 12'43.4	039^0 32'02.2	2292	Medium	SW116
119	*Rhus vulgaris* Oliv.	Anacardiaceae	Embis	T	W	10^0 23'28	039^0 29' 44.9	2800	Common	SW068
120	*Ricinus communis** L.	Euphorbiaceae	Gulo	H	HG	10^0 17'53.4	039^0 34'53.8	2922	Medium	SW038
121	*Rosa abyssinica* Lindley	Rosaceae	Kega	S	W	10^0 30'53.4	039^0 46'57.7	2815	Medium	SW127
122	*Rosa* x *richardii** Rehd.	Rosaceae	Tigiereda	S	HG	10^0 17'53.6	039^0 34'48.2	2923	Rare	SW138
123	*Rubus steudneri* Schweinf.	Rosaceae	Engory	S	W	10^0 12'31.9	039^0 31'47.8	2265	Rare	SW093

124	*Rumex abyssinicus* Jacq.	Polygonaceae	Mekmeko	H	W	10^0 18'28.7	039^0 34'52.1	2961	Medium	SW006
125	*Rumex nepalensis* Spreng.	Polygonaceae	Tult	H	W	10^0 18'56.4	039^0 40'57.6	3121	Common	SW013
126	*Rumex nervosus* Vahl	Polygonaceae	Embacho	S	W	10^0 15'00.8	039^0 31'03.2	2836	Medium	SW052
127	*Ruta chalepensis** L.	Rutaceae	Tenadam	H	HG	10^0 18'56.5	039^0 40'08.3	3098	Common	SW002
128	*Saccharum officinarum** L.	Poaceae	Shenkora Ageda	H	HG	10^0 13'18.4	039^0 31'48.7	2266	Rare	SW088
129	*Salvia nilotica* Juss. ex Jacq.	Lamiaceae	Hulegeb	H	W	10^0 20'58.9	039^0 34'30.6	2973	Common	SW033
130	*Salvia schimperi* Benth.	Lamiaceae	Dibreq	H	W	10^0 17'40.9	039^0 35'05	2881	Medium	SW001
131	*Sansevieria ehrenbergii** Schweinf. ex Baker	Dracaenaceae	Wondie-kacha	H	HG	10^0 21'46.2	039^0 33'17.9	2900	Rare	SW025
132	*Satureja abyssinica* (Benth.) Brig.	Lamiaceae	Tatmot koygn	H	W	10^0 13'16.4	039^0 32'57.4	2432	Medium	SW122
133	*Schinus molle** L.	Anacardiaceae	Kundo berbere	T	HG	10^0 23'28	039^0 29'44.6	2806	Medium	SW070
134	*Sida schimperiana* Hochst. ex A.Rich.	Malvaceae	Chifreg	S	W	10^0 17'53.8	039^0 34'50.8	2984	Medium	SW008
135	*Sideryoxylom oxyacanthum*** Baill.	Sapotaceae	Damza	S	W	10^0 12'53.2	039^0 32'36.1	2432	Medium	SW120
136	*Silene macrosolen* A. Rich.	Caryophyllaceae	Wogert	H	W	10^0 21'09.6	039^0 34'28.4	2924	Medium	SW035

137	*Solanecio gigas**** (Vatke) C. Jeffrey	Asteraceae	Ye shekoko gomen	T	HG	10^0 18'54.6	039^0 39'58.3	3090	Rare	SW076
138	*Solanum anguivi* Lam.	Solanaceae	Zerch embouy	S	W	10^0 21'03.1	039^0 34'39.4	2963	Medium	SW074
139	*Solanum benadirense* Chiov.	Solanaceae	Terekus enchet	S	W	10^0 13'15.7	039^0 32'47.7	2436	Rare	SW095
140	*Solanum marginatum*** L.f.	Solanaceae	Gebre embouy	S	W	10^0 20'59.1	039^0 34'28	2965	Medium	SW036
141	*Sphenoslylis Stenocarpa* (Hochst. exA. Rich.) Harms	Fabaceae	Yayt hareg	H	W	10^0 12'39.6	039^0 31'58.3	2289	Rare	SW091
142	*Stephania abyssinica* (Dillon. & A. Rich.) Walp.	Menispermaceae	Engochit	Cl	W	10^0 14'12.8	039^0 30'38.3	2834	Medium	SW043
143	*Tagetes minuta* L.	Asteraceae	Gimie	H	W	10^0 12'43.9	039^0 32'00.3	2293	Rare	SW115
144	*Tephrosia bracteolata* Guill. & Perr.	Fabaceae	Gerengerie	H	W	10^0 12'43.2	039^0 32'16.7	2344	Rare	SW119
145	*Thymus schimperi**** Ronniger	Lamiaceae	Tosign	H	W	10^0 14'06	039^0 40'42.2	2809	Common	SW048
146	*Tragia cinerea* (pax) Gilbert & Radcl.-Smith	Euphorbiaceae	Aleblabit	Cl	W	10^0 13'18.7	039^0 31'49.2	2279	Rare	SW092
147	*Trigonella foenum-graecum** L.	Fabaceae	Abish	H	W	10^0 17'52.7	039^0 34'52	2906	Common	SW062

Appendix 1 cont…

148	*Urtica simensis*** Steudel	Urticaceae	Sama	H	HG	10^0 29'03.4	039^0 46'56.5	3006	Common	SW003
149	*Verbascum sinaiticum* Benth.	Scrophulariaceae	Ye'ahiya Joro	H	W	10^0 17'52.4	039^0 34'53	2924	Common	SW037
150	*Verbena officinalis* L.	Verbenaceae	Atuch	H	HG	10^0 21'45.9	039^0 33'16.3	2888	Rare	SW023
151	*Vernonia amygdalina* Del.	Asteraceae	Girawa	S	W	10^0 31'11.5	039^0 47'07.8	2744	Rare	SW097
152	*Vernonia bipontini* Vatke	Asteraceae	Muzign	H	W	10^0 21'47	039^0 33'16.6	2895	Common	SW149
153	*Viscum tuberculatum* A.Rich.	Viscaceae	Yemrenz teketsla	S	W	10^0 12'42.1	039^0 32'05.6	2299	Rare	SW113
154	*Withania somnifera** (L.) Dunal in DC.	Solanaceae	Giziewa	S	W	10^0 13'23.2	039^0 31'49	2315	Rare	SW054
155	*Zehneria scabra* (Linn. f.) Sond.	Cucurbitaceae	Buhareg	Cl	HG	10^0 17'53.5	039^0 34'53.3	2928	Common	SW073

Key: *- Cultivated medicinal plants

**- Endemic medicinal plants

***- Both cultivated & endemic medicinal plants

6	*Artemisia rehan*	Asteraceae	Arti	H	R	F	Abdominal pain & Stomach ache	The root is chewed and sucked the juice.	Oral
7	*Asplenium aethopicum*	Aspleniaceae	-	H	L	D	Uvulitia	The leaf is powdered, mixed with butter and tied on the head.	Dermal
8	*Berberis holstii*	Berberidaceae	Zinkela	S	R	D	Heart disease	The dried root of *Berberis holstii* with seed of *Salvia schimperi* are crushed, powdered, mixed with butter or special honey and drunk.	Oral
9	*Bersama abyssinica*	Melianthaceae	Azamir	S	L & R	D	Hypertension	The leaf and root are powdered, mixed with water and drunk.	Oral
					L & R	D	Cough & Ascaries	The leaf and root are crushed, powdered, boiled with milk and drunk.	Oral
10	*Brassica carinata*	Brassicaceae	Gomenzer	H	L	F	Jaundice	The leaf is boiled and the water drank.	Oral
11	*Brassica oleracea*	Brassicaceae	Tql gomen	H	L	F	Gastritis	The leaf is boiled and the water drunk repeatedly.	Oral
12	*Capsicum annuum*	Solanaceae	Karia	H	Fr	F	Malaria	The *Capsicum annuum* with bulb of *Allium sativum* are wittled, soaked with water and eaten by injera after once a day.	Oral
13	*Carthamus tinctorius*	Asteraceae	Suf	H	Se	D	Cough	The seed is pounded with bulb of *Allium sativum*, boiled with honey and then drunk.	Oral

14	*Catha edulis*	Celastraceae	Chat	T	L	F	Asthma	The leaf of *Catha edulis* with leaf of *coffea arabica* are boiled with special honey and drunk.	Oral
15	*Chenopodium ambrosioides*	Chenopodiaceae	Amedmado	H	Fr	F/ D	Wound	The fruit is pounded, mixed with butter and creamed on affected part.	Dermal
16	*Citrus limon*	Rutaceae	Betre lomi	T	Fr	F	Liver disease	The fruit is squeezed and drank the juice.	Oral
17	*Citrus aurantifolia*	Rutaceae	Lomi	T	Fr	F	Tinea versicolor	The fruit of *Citrus aurantifolia* is squeezed, mixed with pounded bulb of *Allium cepa*, root of *Rumex abyssinicus* and salt and then creamed on affected part.	Dermal
					Fr	F	Cancer	The fruit of *Citrus aurantifolia* is squeezed, mixed with latex of *Euphorbia tirucalii*, heated in the sun and then creamed on affected part.	Dermal
18	*Citrus medica*	Rutaceae	Trngo	T	Br	F	Loss of appetites	The fruit wall is ate.	Oral
19	*Clematis simensis*	Ranunculaceae	Yeazo areg	Cl	R	D	Wart	The root of *Clematis simensis* with leaf of *Olinia rochetiana* are dried, crushed, powdered, mixed with special honey and creamed on affected part.	Dermal
					L	D	Eczema	The leaf of *Clematis simensis* with root of *Urtica simensis* are dried, crushed, powdered, mixed with butter and creamed on affected part.	Dermal
					L	F	Retained placenta	The leaf is squeezed and the juice drunk.	Oral

					L	F	"Kunchir"	The leaf is squeezed and the sap creamed on affected part.	Dermal
20	*Clerodendrum myricoides*	Lamiaceae	Misrich	S	R	D	Evil eye	The root of *Clerodendrum myricoides* with root of *Peucedanum winkleri* are pounded, dried, put on fire and the smoke is inhaled.	Oral & Nasal
					L	F	Jaundice	The leaf is boiled and the water drunk.	Oral
21	*Coffea arabica*	Rubiaceae	Bunna	T	L	F	Common cold	The leaf is boiled and the water drunk.	Oral
22	*Cordia africana*	Boraginaceae	Wanza	T	Br	D	Tumor & Wart	The root is pounded, mixed with butter or honey and creamed on affected part.	Dermal
23	*Croton macrostachyus*	Euphorbiaceae	Bisana	T	L	F	Jaundice	The leaf of *Croton macrostachyus* with leaf of *Clutia lanceolata* are squeezed and one glass of the juice with milk or tela drunk for three days.	Oral
					R	D	Evil eye	The root of *Croton macrostachyus* with root of *Cymbopogon citratus* are pounded, dried, put on fire and the smoke is inhaled.	Oral & Nasal
					L	F	Eye disease	The leaf is squeezed and drops added through the eye.	Ocular
24	*Cucurbita pepo*	Cucurbitaceae	Duba	Cl	Fr	F	Headache	The fruit is pounded and tied on the head.	Dermal
25	*Cyathula polycephala*	Amaranthaceae	Chegogote	H	L	F	Fibril illness	The leaf is squeezed and the juice drunk.	Oral

26	*Cyathula uncinulata*	Amaranthaceae	Yekil fikir	H	R	F	Stabbing pain	The root is tied around the waist.	Dermal
27	*Cymbopogon citratus*	Poaceae	Tejesar	H	R	D	Evil eye	The root of *Cymbopogon citratus* with root of *Croton macrostachyus* are pounded, dried, put on fire and the smoke is inhaled.	Oral & Nasal
28	*Cyphostemma adenocaule*	Vitaceae	Aserkush tebetebkush	Cl	R	D	Rabies	The root of *Cyphostemma adenocaule* with root of *Cucumis ficifolius* are crushed, powdered and swallowed with honey.	Oral
					L	F	Congenital abnormality	The leaf of *Cyphostemma adenocaule* with leaf of *Rhus retinorrhoae* are pounded, soaked with water and bathed the whole body for seven days.	Dermal
29	*Cyphostemma cyphopetalum*	Vitaceae	Gindosh	Cl	R	D	Cancer	The root of *Cyphostemma cyphopetalum* with fruit of *Ricinus communis* are pounded and creamed on affected part.	Dermal
30	*Daucus carota*	Apiaceae	Karrot	H	R	F	Kidney problem & Night blindness	Eating of the root repeatedly.	Oral
31	*Dodonaea angustifolia*	Sapindaceae	Kitkta	S	L	D	Eczema	The leaf of *Dodonaea angustifolia* with leaf of *Polygonum aviculare* are highly roasted, powdered, mixed with butter and creamed on affected part.	Dermal

32	*Dovyalis abyssinica*	Flacourtiaceae	Koshim	S	L & Fr	F	Fibril illness	The leaf and fruit of *Dovyalus abyssinica* with leaf of *Satureja abyssinica* are pounded mixed with water and then use for washing the body.	Dermal
					L	D	Boules	The leaf is powdered and sprinkled on affected part.	Dermal
33	*Echinops kebericho*	Asteraceae	Kebericho	H	R	D	Evil eye	The dried root is pounded, put on fire and the smoke is inhaled.	Oral & Nasal
34	*Echinops longisetus*	Asteraceae	Koshelie	S	L	D	Wound	The leaf of *Echinops longisetus* with leaf of *Hagenia abyssinica* are dried, highly roasted, powdered, mixed with butter and creamed on affected part.	Dermal
35	*Euclea divinorum*	Ebenaceae	Dedho	S	Br	D	Intestinal parasite	The bark is powdered, mixed milk and drunk.	Oral
					L	F	Skin disease	The leaf *Euclea divinorum* root of *Caparris tomentosa* are boiled for long time and drunk.	Oral
36	*Euphorbia abyssinica*	Euphobiaceae	Yebereha kulkual	T	Lt	F	"Kunchir"	The latex is creamed on affected part by cotton.	Dermal
37	*Euphorbia ampliphylla*	Euphorbiaceae	Kulkual	T	Lt	F	Ascaries	Ten drop of latex is eaten by hot injera.	Oral
					Lt	F	Syphilis	The latex is mixed with powder of red tef, baked, ate and then whey drunk.	Oral
38	*Euphorbia tirucalli*	Euphorbiaceae	Kinchib	S	Lt	F	Cancer	The latex of *Euphorbia tirucalii* is mixed with juice of *Citrus aurantifolia*, hot by sun and then creamed on affected part.	Dermal
					Lt	F	"Kunchir"	The latex is creamed on affected part by cotton.	Dermal

39	*Ferula communis*	Apiaceae	Dog	H	R	D	Impotency	The root of *Ferula communis* with root of *Tragia cinerea* are powdered, soaked with honey and water for three days and drunk.	Oral
40	*Ficus sur*	Moraceae	Shola	T	Fr	F	Constipation	Eating the fruit, after eating the milk drunk.	Oral
41	*Foeniculum vulgare*	Apiaceae	Ensillal	H	L	F	Urinary retention	The leaf is boiled for long time and drunk.	Oral
					L	D	Tonsillitis	The leaf is crushed, boiled with water and drunk.	Oral
					L & St	F	Gonorrhoea	The leaf and stem of *Foeniculum vulgare* with leaf and stem of *Lycopersicon esculentum* are boiled and drunk.	Oral
					The whole plant	F	Wart	All parts of the plant is pounded and tied on affected part.	Dermal
42	*Guizotia schimperi*	Asteraceae	Mech	H	L	F	Tape worm	The leaf of *Guizotia schimperi* with leaf of *Verbascum sinaiticum* are pounded mixed with water and drunk.	Oral
43	*Hagenia abyssinica*	Rosaceae	Kosso	T	L	D	Allergic dermolitia	The leaf is highly roasted, powdered, mixed with butter and creamed on affected part.	Dermal
					L	D	Wound	The leaf of *Hagenia abyssinica* with leaf of *Echinops longisetus* are dried, highly roasted, powdered, mixed with butter and creamed on affected part.	Dermal

Appendix 2 cont...

					Fl	D	Tape worm	The flower is powdered, mixed with milk and drunk for three days.	Oral
44	*Haplocarpha schimperi*	Asteraceae	Getin	H	L	F	Skin cut	The fresh leaf is put on bleeding part.	Dermal
45	*Helichrysum* sp.	Asteraceae	Nechilo	S	L	F	Impotency	The leaf is pounded and then creamed the penis.	Dermal
46	*Heteromorpha arboresescens*	Apiaceae	Yegib-mirkuz	S	L	F	Congenital abnormality	The leaf *Heteromorpha arboresescens* with leaf of *Podocarpus falcatus* are pounded, soaked with water and then bathed the whole body for seven days.	Dermal
47	*Hordeum vulgare*	Poaceae	Gebs	H	Se	D	Diarrhoea	The seed is roasted, powdered, mixed with little hot water, salt and sugar and then ate.	Oral
48	*Impatiens rothii*	Balsaminaceae	Gishilt	H	R	F	Fire burn	The root is pounded and tied on affected part.	Dermal
49	*Jasminum abyssinicum*	Oleaceae	Tembelel	Cl	L	F	Tape worm	The leaf is crushed, squeezed and two glass of juice drunk.	Oral
					L	F	Blotting	The pounded leaf of *Jasminum abyssinica* with leaf of *Cucumis ficifolius* are boiled and then one glass of boiled water drunk.	Oral
50	*Justicia schimperiana*	Acanthaceae	Sensel	S	L	F	Jaundice	The leaf is pounded, mixed with tella and drunk.	Oral
51	*Lagenaria siceraria*	Cucurbitaceae	Qil	Cl	L	F	Ear lesion	The leaf is squeezed and added through the ear.	Ear

52	*Laggera tomentosa*	Asteraceae	Keskeso	H	L	D	Typhus	The leaf of *Laggera tomentosa* with leaf of *Artemisia abyssinica* are pounded, and put on red-hot charcoal is used to fumigate.	Oral & Nasal
					L	F	Wound	The leaf is pounded and tied on affected part.	Dermal
					L	F	Common cold	Inhaling the fresh leaves through nostril.	Nasal
53	*Lens culinaris*	Fabaceae	Msr	H	Se	D	Herpes zoster	The seed is chewed and put on affected part.	Dermal
54	*Linum usitatissimum*	Linaceae	Telba	H	Se	D	Gastric	The seed of *Linum usitatissimum* is boiled with water and mixed with sugar and then drunk during feeling pain.	Oral
55	*Lippia adoensis*	Vervenaceae	Kessie	H	R	D	Smallpox	The root is pounded, put on fire and the smoke is inhaled.	Oral & Nasal
56	*Lupinus albus*	Fabaceae	Gbto	H	Se	F/ D	Hypertension	The seed is ate.	Oral
57	*Lycopersicon esculentum*	Solanaceae	Timatim	H	L & St	F	Gonorrhoea	The leaf and stem of *Lycopersicon esculentum* with leaf and stem of *Foeniculum vulgare* are boiled and drunk.	Oral
58	*Maesa lanceolata*	Myrsinaceae	Kelawa	S	L	F	Tape worm	The leaf is crushed, squeezed, the juice mixed with water and drunk.	Oral
59	*Malus sylvestris*	Rosaceae	Apple	S	Fr	F	Diabetes	Eating of the fruit.	Oral

60	*Malva parviflora*	Malvaceae	Alenkuata	H	L	F	Wound	The leaf of *Malva parviflora* is squeezed and creamed on affected part.	Dermal
61	*Maytenus arbutifolia*	Celastraceae	Atat	S	R	D	Kidney problem	The root is crushed, powdered, mixed with water and one cup drunk every day.	Oral
62	*Mentha spicata*	Lamiaceae	Nana	H	L	D	Headache	The leaf is crushed, boiled with water and drunk every day as tea.	Oral
63	*Millettia ferruginea*	Fabaceae	Brbra	T	R	D	Impotency	The root of *Millettia ferruginea* with root *Withania somnifera* are pounded mixed with honey and then ate in empty house and the body parts of the patient are free from water for twenty four hours.	Oral
64	*Momordica foetida*	Cucurbitaceae	Yekura areg	Cl	L & R	D	Intestinal parasite	The root and leaf of *Momordica foetida* with root of *Acokanthera schimperi* are powdered, mixed with water and drunk.	Oral
					L	D	Syphilis	The leaf is pounded, mixed with butter and creamed on affected part.	Dermal
65	*Musa* x *paradisiaca*	Musaceae	Muse	H	Fr	F	Eczema	The fruit is creamed on affected part.	Dermal
66	*Myrica salicifolia*	Myricaceae	Shinet	T	Br	D	Headache	The bark is powdered, mixed with butter and tied on the head.	Dermal
					Br	F	Intestinal parasite	The bark is crushed, boiled with water and one glass each drunk for three days.	Oral
					L	F	Congenital abnormality	The leaf of *Myrica salicifolia* is pounded, soaked with water and then bathed the whole body for seven days.	Dermal

67	*Myrtus communis*	Myrtaceae	Ades	S	L	D	Dandruff	The leaf of *Myrtus communis* is crushed, powdered, mixed with butter and creamed on affected part.	Dermal
68	*Mysine africana*	Myrsinaceae	Qechemo	S	Fr	F	Tape worm	The fruit is pounded, squeezed and the juice drunk.	Oral
69	*Nuxia congesta*	Loganiceae	Atquar	T	R	D	Evil eye	The root is pounded, dried, put on fire and the smoke is inhaled.	Oral & Nasal
70	*Ocimium lamiifolium*	Lamiaceae	Dama kessie	S	L	F	Fibril illness	The leaf is squeezed and the juice drunk.	Oral
71	*Olea europaea* subsp. *cuspidata*	Oleaceae	Weyra	T	L	D	Eye disease	The leaf of *Olea europaea* subsp. *Cuspidata* with leaf of *Vernonia bipontini* are crushed, powdered and added through the eye.	Ocular
72	*Olinia rochetiana*	Oliniaceae	Tifie	S	L	D	Wart	The leaf of *Olinia rochetiana* with root of *Clematis simensis* are dried, pounded, mixed with special honey and tied on affected part.	Dermal
					L	D	Eczema	The leaf is crushed, powdered, mixed with honey and creamed on affected part.	Dermal
73	*Opuntia ficus-indica*	Cactaceae	Beles	S	Fr	F	Heart failure	Eating of fruit by empty stomach in the morning repeatedly.	Oral
74	*Osyris quadripartita*	Santalaceae	Keret	S	L	F	Circumcision wound	The leaf is pounded, squeezed and creamed on affected part.	Dermal

					L	F	Congenital abnormality	The leaf of *Osyris quadripartita* with leaf of *Rhamnus prinoides* are pounded soaked with water and then bathed the whole body for seven days.	Dermal
					L	F	Toothache	The leaf is boiled and the boiled water is caught on feeling parts of teeth.	Tooth surface
75	*Otostegia fruticosa*	Lamiaceae	Barianatra	S	R	D	Evil eye	The root of *Otostegia fruticosa* with root of *Clutia lanceolata* are pounded, dried, put on fire and the smoke is inhaled.	Oral & Nasal
76	*Periploca linearifolia*	Asclepiadaceae	Moider	Cl	R	D	Evil eye	The root is dried, pounded, put on fire and the smoke is inhaled.	Oral & Nasal
77	*Peucedanum winkleri*	Apiaceae	Qershashiba	H	R	D	Evil eye	The root of *Peucedanum winkleri* with root of *Clerodendrum myricoides* are pounded, dried, put on fire and the smoke is inhaled.	Oral & Nasal
78	*Phagnalon abyssinicum*	Asteraceae	Nibasel	H	L	F	Blotting & Urinary retention	The leaf is boiled for long time, mixed with honey and then drunk as tea.	Oral
79	*Phoenix reclinata*	Arecaceae	Seniel	T	R	F	Impotency	The root is pounded, boiled with milk and then drunk.	Oral
80	*Phytolacca dodecandra*	Phytolaccacae	Mehan Endod	S	L	F	Jaundice	The leaf is squeezed; the juice is mixed with fresh milk and then drunk.	Oral
81	*Pistacia falcata*	Anacardiaceae	Tana gebez	T	R	D	Evil eye	The root is pounded, put on fire and the smoke is inhaled.	Oral & Nasal

82	*Plantago lanceolata*	Plantagniaceae	Gorteb	H	L	F	Wound	The leaf is pounded, tied on affected part.	Dermal
83	*Podocarpus falcatus*	Podocarpaceae	Zgba	T	L	F	Congenital abnormality	The leaf of *Podocarpus falcatus* with leaf of *Heteromorpha arboresescens* are pounded, soaked with water and then bathed the whole body for seven days.	Dermal
					Br	D	Eye disease	The bark is highly roasted, powdered and then creamed every night.	Ocular
					Fr	F/ D	Melasma	The fruit is pounded and creamed on affected part.	Dermal
					Br	D	Evil eye	The bark is pounded, put on fire and the smoke is inhaled.	Oral & Nasal
84	*Polygonum aviculare*	Polygonaceae	Kechkech	H	L	D	Eczema	The leaf of *Polygonum aviculare* with leaf of *Dodonaea angustifolia* are highly roasted, powdered, mixed with butter and creamed on affected part.	Dermal
85	*Pteridium aquilinum*	Pteridaceae	Emse fer	H	L	D	Fire burn	The leaf is highly roasted, powdered, mixed with butter and creamed on affected part.	Dermal
86	*Pterolobium stellatum*	Fabaceae	Kentefa	S	R	D	Evil eye	The root is pounded, put on fire and the smoke is inhaled.	Oral & Nasal
87	*Ranunculus stagnalis*	Ranunculaceae	Gudgn	H	L	F/ D	Wart & "Kunchir"	The leaf is squeezed and creamed on affected part.	Dermal
					L	D	Eczema	The leaf is dried, powdered, mixed with butter and creamed on affected part.	Dermal

88	*Rhamnus prinoides*	Rhamnaceae	Gesho	S	Fr	D	Scabies	The fruit is dried, powdered, mixed with butter and the creamed on affected part.	Dermal
					L	F	Uvulitia	The apex part of leaf is pounded, mixed with water and drunk with residue.	Oral
					L	F	Congenital abnormality	The leaf of *Rhamnus prinoides* with leaf of *Osyris quadripartita* are pounded, soaked with water and then bathed the whole body for seven days.	Dermal
89	*Rhus natalensis*	Anacardiaceae	Chakma	S	L	F	Tape worm	The leaf of *Rhus natalensis* with leaf of *Silene macrosolen are* pounded, mixed with water and drunk.	Oral
90	*Rhus retinorrhoea*	Anacardiaceae	Tlem	S	L	F	Congenital abnormality	The leaf of *Rhus retinorrhoae* with leaf of *Cyphostemma adenocaule* are pounded, soaked with water and bathing the whole body for seven days.	Dermal
91	*Rhus vulgaris*	Anacardiaceae	Embis	T	R	D	Evil eye	The root is dried, pounded and tied with a piece of cloth around neck.	Neck
92	*Ricinus communis*	Euphorbiaceae	Gulo	H	Fr	D	Cancer	The fruit of *Ricinus communis* with root of *Cyphostemma cyphopetalum* are pounded and creamed on affected part.	Dermal
					L	F	Anal erolopi	The fresh leaf is creamed by butter and pushed the affected part.	Anal
93	*Rosa abyssinica*	Rosaceae	Kega	S	Fr	F	Ascaries	The fruit is ate.	Oral
94	*Rubus steudneri*	Rosaceae	Engory	S	L	F	Anemia	The leaf is boiled, mixed with honey and then drunk.	Oral

95	*Rumex nepalensis*	Polygonaceae	Tult	H	R	F	Acute sickness & Stomach ache	The root is chewed and then sucked.	Oral
					R	F	Postpartum haemorrhage	The root is tied around the waist.	Dermal
					R	F	Bone fracture	The root is pounded and then tied on affected part.	Dermal
96	*Rumex abyssinicus*	Polygonaceae	Mekmeko	H	R	F	Tinea versicolor	The root of *Rumex abyssinicus* with bulb of *Allium cepa* are pounded, mixed with juice of *Citrus aurantifolia* and salt and then creamed on affected part.	Dermal
					R	F/ D	Hypertension	The root is boiled for long time and the water drunk.	Oral
97	*Ruta chalepensis*	Rutaceae	Tenadam	H	Fr	F	Hypertension Abdominal pain, Acute sickness & Stomach ache	Eating of the fruit.	Oral
					Fr	F	Diabetes	The fruit is pounded, boiled with water and then drunk.	Oral
					Fr	F	Ascaries	The fruit of *Ruta chelepensis* with bulb of *Allium sativum* and seed of *Lepidium sativum* are pounded, soaked and then eaten by injera after three days.	Oral
					Fr	F	Tinea nigra	The fruit of *Ruta chelepensis* with bulb of *Allium sativum* are pounded, and mixed with butter and then creamed on affected part.	Dermal

98	*Saccharum officinarum*	Poaceae	Shenkora Ageda	H	St	F	Cough	The stem bark is peeled and removed; the peeled stem is chopped, boiled with water for long time and then the boiled water drank.	Oral
99	*Salvia nilotica*	Lamiaceae	Hulegeb	H	L	F	Fibril illness	The leaf is squeezed and the juice drunk.	Oral
100	*Salvia schimperi*	Lamiaceae	Dibreq	H	Se	D	Diarrhoea	The seed is powdered, baked with powder of red tef and then ate.	Oral
101	*Sansevieria ehrenbergii*	Dracaenaceae	Wondie-kacha	H	R	D	Impotency	The root of *Sansevieria ehrenbergii* with root of *Verbascum sinaiticum* are powdered, mixed with water and drunk.	Oral
102	*Satureja abyssinica*	Lamiaceae	Tatmot koygn	H	L	F	Fibril illness	The leaf of *Satureja abyssinica* with leaf and fruit of *Dovyalus abyssinica* are pounded, mixed with water and then washed the boy by this.	Dermal
103	*Schinus molle*	Anacardiaceae	Kundo berbere	T	Fr	D	Abdominal pain	Eating of the fruit.	Oral
104	*Sideryoxylon oxyacanthum*	Sapotaceae	Damza	S	R	D	Evil eye	The root is pounded, dried, put on fire and the smoke is inhaled.	Oral & Nasals
105	*Silene macrosolen*	Caryophyllaceae	Wogert	H	L	F	Tape worm	The leaf of *Silene macrosolen* with leaf of *Rhus natalensis* are pounded, mixed with water and drunk.	Oral
					R	D	Headache	The root is dried, pounded placed on fire and the smoke is inhaled.	Oral & Nasal
106	*Solanum anguivi*	Solanaceae	Zerch embouy	S	Fr	F	Scabies	The fruit is creamed on affected part.	Dermal

Appendix 2 cont...

					R	F	Diarrhoea	The root is chewed and sucked.	Oral
					R	D	Syphilis	The root is pounded, mixed with whey, filtered and one cup drunk.	Oral
					Fr	F	Syphilis	Eating of seven fruits.	Oral
107	*Solanum benadirense*	Solanaceae	Terekus enchet	S	The whole plant	D	Evil eye	All parts of *Solanum benadirense* with root of *Lobelia rhynchopetalum* are pounded, put on fire and the smoke is inhaled.	Oral & Nasal
108	*Sphenoslylis stenocarpa*	Fabaceae	Yayt hareg	H	R	D	Ascaries	The root is dried, crushed, soaked with tela and then drunk.	Oral
109	*Stephania abyssinica*	Menispermaceae	Engochit	Cl	L	D	Tinea nigra	The leaf is powdered, mixed with special honey and then creamed on affected part.	Dermal
					L	F	Emergency	The leaf of *Stephania abyssinica* with leaf of *Zehneria scabra* are crushed, mixed with honey and then ate.	Oral
110	*Thymus schimperi*	Lamiaceae	Tosign	H	Fl	D	Common cold	The flower is boiled with water & sugar and drank in the form of tea every morning.	Oral
					L	D	Lung tuberculosis (TB)	The leaf is pounded, mixed with honey and then ate.	Oral
					L & R	D	Vomiting	The leaf and root are pounded, mixed with honey and ate.	Oral
111	*Trigonella foenum-graecum*	Fabaceae	Abish	H	Se	D	Melasma	The seed is powdered, mixed with self urine and then creamed on affected part.	Dermal

					Se	D	Gastritis	The powder of *Trigonella foenum-graecum* is soaked with water, water is decanted, then mixed with other water and sugar and then drunk.	Oral
112	*Urtica simensis*	Urticaceae	Sama	H	L	F	Gastritis & Heart failure	Eat in the form of stew ('wot') by injera against gastritis.	Oral
					R	D	Eczema	The root of *Urtica simensis* with leaf of *Clematis simensis* are dried, pounded, mixed with butter and creamed on affected part.	Dermal
113	*Verbena officinalis*	Verbenaceae	Atuch	H	L	F	Uvulitia	The leaf is squeezed and the juice drunk.	Oral
					L	F	Toung disease	The leaf is pounded, boiled with water and the water drunk for three days.	Oral
114	*Vernonia amygdalina*	Asteraceae	Girawa	S	L	F	Acute sickness & Abdominal pain	The leaf is squeezed and the juice drunk.	Oral
115	*Zehneria scabra*	Cucurbitaceae	Buhareg	Cl	L	F	Emergency	The leaf of *Zehneria scabra* with leaf of *Stephania abyssinica* are pounded, mixed with honey and then ate.	Oral
					L	F	Eye disease	The leaf is boiled and the evaporate is steamed.	Oral & Nasal
					R	F	Wart	The root is pounded and tied on affected part.	Dermal

Appendix 3 List of medicinal plants used for treating only livestock ailments in the study area, with scientific name, family, local name, habit, parts used, condition of preparations (fresh- F, dried- D and fresh or dried- F/D), disease treated, preparation and application and route of administration.

No	Scientific Name	Family	Local Name	Habit	Parts used	CP	Diseases Treated	Preparation and Application	Route
1	*Buddleja polystachya*	Loganiaceae	Anfar	Tree	Leaf	F	Leech	The leaf of *Buddleja polystachya* is pounded, squeezed and the juice runk.	Oral
2	*Cassipourea malosana*	Rhizophoraceae	Werer	Tree	Leaf & Stem	F	Leech	The leaf and stem is pounded, soaked with water and added through the nose.	Nasal
					Bark	F	Leech	The bark is boiled and added the boiled water through the nose.	Nasal
3	*Ficus vasta*	Moraceae	Warka	Tree	Leaf	F	Emergency	The leaf of *Ficus vasta* is pounded, soaked with water and then drunk with residue.	Oral
					Bark	D	Eye disease	The bark of *Ficus vasta* is crushed, powdered and added through the eye.	Ocular
4	*Juniperus procera*	Cupressaceae	Yabesha tid	Tree	Leaf	F	"Goleba"	The leaf of *Juniperus procera* with leaf of *Leonotiso cymifolia* and *Eucalyptus globulus* are pounded, squeezed and the juice drunk.	Oral
5	*Launaea petitiana*	Asteraceae	Yebeg wotet	Herb	Root	F	Stomach ache	Eating of the root.	Oral
6	*Nicotiana tabacum*	Solanaceae	Tinbaho	Herb	Leaf	F	Leech	The leaf of *Nicotiana tabacum* is pounded, squeezed and the juice is added through the left nose.	Nasal

Appendix 3 cont...

7	*Pennisetum sphacelatum*	Poaecae	Sindedo	Herb	Root	D	Rh factor	The root of *Pennisetum sphacelatum* with root of *Gomphocarpus purpurascens* are tied with a piece of cloth around the neck.	Neck
8	*Rosa* x *richardii*	Rosaceae	Tsigiereda	Shrub	Root	F/ D	Eye disease	The root of *Rosa x richardii* is warped and tied around the neck.	Neck
9	*Tagetes minuta*	Asteraceae	Gimie	Herb	Leaf	F	Black leg	The leaf of *Tagetes minuta* is pounded, mixed with water and one "Taba" drunk.	Oral
10	*Tephrosia bracteolata*	Fabaceae	Gerengerie	Herb	Leaf	F	Body lice	The leaf is pounded, soaked with water and washed the affected part by this.	Dermal

Appendix 4 List of medicinal plants used for treating both human and livestock ailments in the study area; with scientific name, family, local name, habit (climber- Cl, herb- H, shrub- Sh and tree- T), parts used (leaf- L, root- R, stem- St, bark- Br, bulb- Bu, latex- Lt, seed- Se, fruit- Fr and flower- Fl), use (Hu- Human, Livestock- Ls), condition of preparations (fresh- F, dried- D and fresh or dried- F/D), disease treated, preparation and application and route of administration.

No	Scientific name	Family	Local name	Habit	Parts used	Use	CP	Diseases treated	Preparation and Application	Route
1	*Allium sativum*	Alliaceae	Nech shinkurt	H	Bu	Hu	F	Abdominal pain	The bulb of *Allium sativum* is peeled and ate.	Oral
					Bu		F	Jaundice	The bulb of *Allium sativum* with *Capsicum annuum* are whittled and eaten by injera.	Oral
					Bu		F	Malaria	The bulb of *Allium sativum* with *Capsicum annuum* are whittled, soaked with water and eaten by injera after once a day.	Oral
					Bu		D	Emergency	The bulb of *Allium sativum* with *Lepidium sativum* are powdered and mixed water and drunk before eating.	Oral
					Bu		F	Ascaries	The bulb of *Allium sativum* with *Lepidium sativum* and fruit of *Ruta chelepensis* are pounded, soaked with little water and then eaten by injera after three days.	Oral
					Bu		F	Tinea nigra	The bulb of *Allium sativum* with fruit of *Ruta chelepensis* are pounded, dried, powdered and mixed with butter and then creamed on affected part.	Dermal

Appendix 4 cont...

					Bu		D	Stomach ache	The bulb of *Allium sativum* with seed of *Lepidium sativum* is crushed, powdered, mixed with coffee and then drunk.	Oral
					Bu	Ls	D	"Eeynewog"	The bulb of *Allium sativum* with root of *Cucumis ficifolus, Datura stramonium* and *Capparis tomentosa* are pounded, dried, put on fire and the smoke is inhaled.	Oral & Nasal
					Bu	Ls	F	Coccoides	The bulb of *Allium sativum* is crushed, mixed with powdered seed of *Lepidium sativum* and water and then drunk.	Oral
2	*Aloe pulcherrima*	Aloaceae	Setie - Iret	H	Lt	Hu	F	Wound	The sap (latex) of this plant is put on wound and then cover by piece of cloth.	Dermal
					Lt	Ls	F	Diarrhoea	Eating of the sap (latex) of the leaf.	Oral
3	*Artemisia abyssinica*	Asteraceae	Chikugn	H	L	Hu	F	Common cold	Inhaling the fresh leaves through the nose.	Nasal
					L		D	Evil eye	The leaf of *Artemisia abyssinica* is pounded and tied with a piece of cloth around the neck.	Neck

					L		D	Typhus	The leaf of *Artemisia abyssinica* with leaf of *Laggera tomentosa* are pounded and put on fire and the smoke is inhaled.	Oral & Nasal
					L	Ls	D	"Eyenewog"	The leaf of *Artemisia abyssinica* with root of *Cucumis ficifolus* and *Datura stramonium* are ponded and tied with a piece of cloth around the neck.	Neck
4	*Asparagus africanus*	Asparagaceae	Kestencha	S	R	Hu	D	Evil eye	The root of *Asparagus africanus* with root of *Clutia lanceolata* and *Otostegia integrifolia* are pounded, and then tied with a piece of cloth around the neck.	Neck
					R		D	Impotency	The root of *Asparagus africanus* with root of *Laggera tomentosa* are ponded, soaked with honey for three days and then ate.	Oral
					R	Ls	D	"Eyenewog"	The root of *Asparagus africanus* with root of *Clutia lanceolata* and *Otostegia integrifolia* are pounded and then tied with a piece of cloth around the neck.	Neck

5	*Caparris tomentosa*	Capparidaceae	Gumero	S	R	Hu	D	Evil eye	The root of *Caparris tomentosa* with root of *Ocimium lamifplia* and *Carrisa spinarum* are pounded and then tied with a piece of cloth around the neck.	Neck
					R		F	Skin disease	The roots of *Caparris tomentosa* with leaf *Euclea divinorum* are crushed, boiled for long time and the water drunk.	Oral
					R	Ls	D	"Eyenewog"	The root of *Caparris tomentosa* with root of *Clutia lanceolata* and *Otostegia integrifolia* are dried and pounded and then tied with a piece of cloth around the neck.	Neck
6	*Carissa spinarum*	Apocynaceae	Agam	S	R	Hu	D	Evil eye	The root of *Carissa spinarum* with rootof *Ocimium lamiflia* and *Caparris tomentosa* are dried, pounded, put on fire and the smoke is inhaled.	Oral & Nasal
					R		F	Wound	The root of *Carissa spinarum* with leaf of *Solanum anguvi* are crushed then put on wound.	Dermal
					R	Ls	F	"Eyenewog"	The root of *Carissa spinarum* with root of *Withania somnifera* are crushed, mixed with water and then drunk.	Oral

Appendix 4 cont…

7	*Clutia abyssinica*	Euphorbiaceae	Fyelefeg	S	R	Hu	D	Evil eye	The root of *Clutia lanceolata* with root of *Otostegia fruticosa* are dried, pounded, put on fire and the smoke is inhaled.	Oral & Nasal
					L		F	Jaundice	The leaf of *Clutia lanceolata* with leaf of *Croton macrostachyus* are squeezed, the juice mixed with milk or tela and one glass drunk for three days.	Oral
					R	Ls	D	"Eyenewog"	The root of *Clutia lanceolata* with root of *Asparagus africanus* are dried, crushed and then tied with a piece of cloth around the neck.	Neck
8	*Cucumis ficifolius*	Cucurbitaceae	Yemdir embway	H	R	Hu	F/ D	Stomach ache	The root of *Cucumis ficifolius* is chewing and sucked during the feeling of ache.	Oral
					R		D	Gonorrhoea	The root of *Cucumis ficifolius* with root of *Phytolacca dodecandra* are powdered, mixed with water and then drunk.	Oral
					R		F	Abdominal pain	The root of *Cucumis ficifolius* with leaf of *Vernonia amygdalina* are crushed, mixed with water and then drunk.	Oral
					R		D	Rabies	The root of *Cucumis ficifolius* with root of *Cyphostemma adenocaule* are pounded, powdered and swallowed with honey.	Oral

					L		F	Blotting	The leaf of *Cucumis ficifolius* with pounded leaf of *Jasminium abyssinica* is boiled and one glass of water drunk.	Oral
					R		D	Evil eye	The root of *Cucumis ficifolius* with root of *Withania somnifera* 2 are pounded and tied with a piece of cloth around the neck.	Neck
					R		D	Acute sickness	The root of *Cucumis ficifolius* are chewed and sucked.	Oral
					R	Ls	D	"Eyenewog"	The root of *Cucumis ficifolius* with leaf of *Artemisia abyssinica* are pounded and tied with a piece of cloth around the neck.	Neck
9	*Datura stramonium*	Solanaceae	Astenager	H	Se	Hu	D	Toothache	The seed of this plant is powdered, mixed with butter, put in metal container, then put on burnt metal and then steamed.	Oral
					L		F	Wound	The leaf is squeezed and creamed on infected part.	Dermal
					L		F	Deafness	The leaf is squeezed and the juice is added through the ear.	Ear
					Se		D	Tumor	The seed of *Datura stramonium* with leaf of *Clematis simensis* are powdered, mixed with goat urea, bolus by cotton and pasted on the injured part.	Dermal

					L		F	Scabies	Squeezed the leaf and creamed on affected part.	Dermal
					R	Ls	D	"Eyenewog"	The root of *Datura stramonium* with root of *Cucumis ficifolus* and le af of *Artemisia abyssinica* are pounded and tied with a piece of cloth around the neck.	Neck
10	*Eucalyptus globulus*	Myrtaceae	Nech bahir zaf	T	L	Hu	F	Common cold	The leaf is boiled and fumigate with vapour.	Oral & Nasal
					L		F	Fibril illness	The leaf is boiled and steamed the vapour.	Oral & Nasal
					L	Ls	F	"Goleba"	The leaf of *Eucalyptus globulus* with leaf of *Leonotiso cymifolia* and *Juniperus procera* are pounded, squeezed and drank one cup of juice.	Oral
11	*Gomphocarpus purpurascens*	Asclepiadaceae	Tifrndo	H	Lt	Hu	F	Ring worms	The fresh leaf and stem latex of this plant is creamed on affected part.	Dermal
					R		F	Rh factor	The root of this plant is tied with a piece of cloth around the neck.	Neck
					Lt		F	Melasma	The fresh leaf and stem latex of this plant is creamed on affected part	Dermal
					Lt		F	Eczema	The fresh leaf and stem latex of this plant is creamed on affected part.	Dermal

					R	Ls	F	Rh factor	The root of this plant with root of *Pennisetum sphacelatum* is tied with a piece of cloth around the neck.	Neck
12	*Indigofera vohemarensis*	Fabaceae	Kuakucha	H	R	Hu & Ls	F	Rh factor	The root of this plant is tied with a piece of cloth around the neck.	Neck
13	*Inula confertiflora*	Asteraceae	Woynagift (Ega)	S	L	Hu	D	Eye disease	The leaf is powdered, put on fire and then the smoke is inhaled.	Ocular
					L		F	Uvulitia	The leaf of *Inula confertiflora* with leaf of *Rhamnus prenoides* are squeezed and the juice drunk.	Oral
					L	Ls	D	Eye disease	The leaf is powdered and added through the eye.	Ocular
14	*Kalanchoe petitiana*	Crassulaceae	Endahahula	H	L	Hu	F	Tape worm	The leaf of *Kalancheo petitiana* with leaf of *Solanum marginatum* are crushed, mixed with water and drunk.	Oral
					R		D	Swellowing	The root is pwdered and put on the injured part.	Dermal
					L		F	Breast swellowing	The fresh leaf put fire and heated the affected part.	Dermal
					L		F	Eczema	The leaf is squeezed and creamed on affected part.	Dermal
					L		F	Bone fracture	The affected part is tied by fresh leaf.	Dermal
					R	Ls	F	Rabies	The root is crushed, mixed with milk and then drunk.	Oral

15	*Leonotis ocymifolia*	Lamiaceae	Ras kmr	S	L	Hu	F	Acute sickness	The leaf of *Leonotis ocymifolia* with leaf of *Otostegia integrifolia* are squeezed and the juice drunk.	Oral
					L		F	Stomach ache	The leaf is squeezed and the juice drunk.	Oral
					L		F	Fibril illness	The leaf is squeezed and the juice drunk.	Oral
					L		F	Headache	The leaf is crushed, added in water and washed the body.	Derma
					L		F	Uvulitia	The leaf is squeezed and the juice drunk.	Oral
					L	Ls	F	"Goleba"	The leaf of *Leonotiso cymifolia* with le af of *Juniperus procera* and *Eucalyptus globulus* are pounded, squeezed and the juice drunk.	Oral
16	*Lepidium sativum.*	Brassicaceae	Feto	H	Se	Hu	D	Abdominal pain	The seed is powdered, mixed with water and drunk.	Oral
					Se		D	Stomach ache	The seed of *Lepidium sativum* with bulb of *Allium sativum* are powdered, mixed with coffee and then drunk.	Oral
					Se		D	Ascaries	The powdered seed of *Lepidium sativum* with pounded bulb of *Allium sativum* and fruit of *Ruta chelepensis* are soaked with little water and then eaten by injera after three days.	Oral

					Se	Ls	D	Coccoides	The seed is powdered, mixed with pounded bulb of *Allium sativum* and water and then drunk.	Oral
					Se		D	"Goleba"	The seed of *Alliumsativum* with leaf of *Leonotiso cymifolia* and *Juniperus procera* are pounded, squeezed and drank one cup.	Oral
17	*Lobelia rhynchopetalum*	Lobeliaceae	Jibra	H	R	Hu	D	Evil eye	The root of *Lobelia rhynchopetalum* with all parts of *Solanum benadirense* is pounded, put on fire and the smoke is inhaled.	Oral & Nasal
					R	Ls	D	"Eyenewog"	The root of *Lobella rhynchopetalum* with root of *Solanecio gigas* and *Plectranthus puntatus* are dried, pounded and ate with forage.	Oral
18	*Otostegia integrifolia*	Lamiaceae	Tnjut	S	L	Hu	F	Blotting	The leaf is squeezed and the juice drunk.	Oral
					L		F	Acute sickness	The leaf of *Otostegia integrifolia* with leaf of *Leonotis ocymifolia* are squeezed and the juice drunk.	Oral
					L		F	Abdominal pain	The leaf is squeezed and the juice drunk.	Oral
					R	Ls	D	"Eyenewog"	The root of *Otostegia integrifolia* with root of *Asparagus africanus* are pounded and then tied with a piece of cloth around the neck.	Neck

Appendix 4 cont…

19	*Plectranthus puntatus*	Lamiaceae	Tibtibo	H	L	Hu	F	Uvulitia	The leaf is squeezed and the juice drunk.	Oral
					L		F	Diarrhoea	The leaf is squeezed and the juice drunk.	Oral
					L		F	Common cold	Inhaling the fresh leaves through the nose.	Nasal
					R	Ls	D	"Eyenewog"	The root of *Plectranthus puntatus* with root of *Solanecio gigas* and *Lobella rhynchopetalum* are pounded and eat with forage.	Oral
20	*Polygala rupicola*	Polygalaceae	Etse lbona	H	R	Hu	F/ D	Snake bit	The root is chewed and sucked.	Oral
					L & St	Ls	F	Snake bit	The leaf and stem is crushed, squeezed and the juice drunk.	Oral
21	*Premna schimperi*	Lamiaceae	Chocho	S	L	Hu & Ls	F	Tinea pedis	The leaf is pounded, soaked with water and then washed the affected part.	Dermal
22	*Rumex nervosus*	Polygonaceae	Embacho	S	L	Hu	F	Circumcision wound	The leaf is soaked in boiled water and heated the wounds.	Dermal
					L	Ls	F	Leech	The leaf is crushed, squeezed and then drunk.	Oral
23	*Sida schimperiana*	Malvaceae	Chifreg	S	R	Hu	D	Evil eye	The root of *Sida schimperi* with root of *Solanum marginatum* is pounded, put on fire and the smoke is inhaled.	Oral & Nasal

					R	Ls	F	Rh factor	The root is tied with a piece of cloth around the neck.	Neck
24	*Solanecio gigas*	Asteraceae	Shekoko gomen	T	L & R	Hu	D	Cough & Ascaries	The root and leaf of *Solanecio gigas* are pounded, boiled with milk and then drunk.	Oral
					R	Ls	D	"Eyenewog"	The root of *Solanecio gigas* with root of *Lobella rhynchopetalum* and *Plectranthus puntatus* are pounded and ate with forage.	Oral
25	*Solanum marginatum*	Solanaceae	Gebre embouy	S	L	Hu	F	Tape worm	The leaf of *Solanum marignatum* with leaf of *Kalancheo petitiana* are pounded, mixed with water and then drunk.	Oral
					Fr	Hu	F	''Kunchir''	The fruit water of *Solanum marignatum* with latex of *Euphorbia ampliphylla* are creamed on affected part.	Dermal
					R		D	Evil eye	The root of *Solanum marignatum* with root of *Sida schimperi* are pounded, put on fire and the smoke is inhaled.	Oral & Nasal
					Fr	Ls	F	Body lice	The fruit water is mixed with ash and creamed on affected part.	Dermal
26	*Tragia cinerea*	Euphorbiaceae	Aleblabit	H	R	Hu	D	Impotency	The root of *Tragia cinerea* with root of *Ferula communis* are pounded, soaked with honey and water for three days and then drunk.	Oral

Appendix 4 cont...

					R		F/D	Epilepsy	The root is chewed and sucked.	Oral
					R	Ls	D	"Eyenewog"	The root is dried, pounded, put on fire and the smoke is inhaled.	Oral & Nasal
27	*Verbascum sinaiticum*	Scrophulariaceae	Ye'ahiya joro	H	L	Hu	F	Tape worm	The leaf of *Verbascum sinaiticum* with leaf of *Guizotia schimperi* are pounded, mixed with water and then drunk.	Oral
					R		F	Allergic dermolitia	The root is pounded and put on affected part.	Derma
					R		F	Diarrhoea	The root is pounded, mixed with water and then drunk.	Oral
					R	Hu & Ls	F	Retained placenta	The pounded root of *Verbascum sinaiticum* with powdered *Linum usitatissimum* are mixed with water and then drunk.	Oral
					R	Ls	D	"Eyenewog"	The root is dried, pounded and ate with forage.	Oral
28	*Vernxonia bipontini*	Asteraceae	Muzign	H	L	Hu	D	Eye disease	The leaf of *Vernonia bipontini* with leaf of *Olea europaea* subsp. *cuspidata* are powdered and added through the eye.	Ocular
					L		F	Congenital abnormality	The leaf is pounded, soaked with water and bathed the whole body for seven days.	Dermal
					L		F	Nasal bleeding	The leaf is squeezed and added through the nose.	Nasal

Appendix 4 cont…

					L		F	Skin cut	The fresh leaf is put on affected part (on bleeding part).	Dermal
					L	Ls	F	Diarrhoea	The leaf is pounded, mixed with water and then drunk.	Oral
29	*Viscum tuberculatum*	Viscaceae	Yemrenz teketsla	S	L	Hu	D	Evil eye	The leaf of *Viscum tuberculatum* is pounded, put on fire and the smoke is inhaled.	Oral & Nasal
					L	Ls	D	"Eyenewog"	The leaf of *Viscum tuberculatum* is pounded, put on fire and the smoke is inhaled.	Oral & Nasal
30	*Withania somnifera*	Solanaceae	Giziewa	S	R	Hu	D	Impotency	The root of *Withania somnifera* with root of *Millettia ferruginea* are powdered, mixed with honey and then ate in vacant house and the body parts of the patient are free from water for twenty four hours.	Oral
					R	Hu	D	Evil eye	The root is tied with a piece of cloth around the neck.	Neck
					R	Ls	D	"Eyenewog"	The root is tied with a piece of cloth around the neck.	Neck

Scientific Name	Family	Local Name	Habit	Other uses
Acacia abyssinica	Fabaceae	Girar	Tree	Traditional agriculture tools making, traditional house tools making, charcoal, firewood
Achyranthes aspera	Amaranthaceae	Telengz	Herb	-
Acokanthera schimperi	Apocynaceae	Mirienz	Tree	Firewood, charcoal
Allium cepa	Alliaceae	Key shinkurt	Herb	Food as spice
Allium sativum	Alliaceae	Nech shinkurt	Herb	Food as spice
Aloe pulcherrima	Aloaceae	Setie - Iret	Herb	Leaves for forage
Aloe Debrana	Aloaceae	Wondie – Iret	Herb	Leaves for forage
Artemisia abyssinica	Asteraceae	Chikugn	Herb	-
Artemisia rehan	Asteraceae	Arti	Herb	Used as aromatic
Asparagus africanus	Asparagaceae	Kestencha	Shrub	Traditional agricultural tool (used as cleaning)
Asplenium aethopicum	Aspleniaceae	-	Herb	-
Berberis holstii	Berberidaceae	Zinkela	Shrub	Fences, edible fruit
Bersama abyssinica	Melianthaceae	Azamir	Shrub	Firewood, fences, edible fruits
Brassica carinata	Brassicaceae	Gomenzer	Herb	Leaves for food
Brassica oleracea	Brassicaceae	Tql gomen	Herb	Leaves for food
Buddleja polystachya	Loganiaceae	Anfar	Tree	Firewood , fences
Caparris tomentosa	Capparidaceae	Gumero	Shrub	Firewood, fences
Capsicum annuum	Solanaceae	Karia	Herb	Edible fruit
Carissa spinarum	Apocynaceae	Agam	Shrub	Fences, firewood, edible fruit

Carthamus tinctorius	Asteraceae	Suf	Herb	Food
Cassipourea malosana	Rhizophoraceae	Werer	Shrub	Firewood, charcoal
Catha edulis	Celastraceae	Chat	Tree	Leaves for stimulant
Chenopodium ambrosioides	Chenopodiaceae	Amedmado	Herb	-
Citrus limon	Rutaceae	Betre lomi	Tree	Edible fruit
Citrus aurantifolia	Rutaceae	Lomi	Tree	Edible fruit
Citrus medica	Rutaceae	Tringo	Tree	Edible fruit
Clematis simensis	Ranunculaceae	Yeazo areg	Climber	Firewood
Clerodendrum myricoides	Lamiaceae	Misrich	Shrub	Fences, firewood
Clutia abyssinica	Euphorbiaceae	Fyelefeg	Shrub	Firewood
Coffea arabica	Rubiaceae	Bunna	Tree	Fruits for stimulant
Cordia africana	Boraginaceae	Wanza	Tree	Firewood,traditional house construction, furniture making, traditional agriculture tool making, charcoal, household tool making, spiritual tool making
Croton macrostachyus	Euphorbiaceae	Bisana	Tree	Traditional agriculture tool making, charcoal, firewood
Cucumis ficifolius	Cucurbitaceae	Yemdir embway	Herb	Forage
Cucurbita pepo	Cucurbitaceae	Duba	Climber	Fruits for food
Cyathula polycephala	Amaranthaceae	Chegogote	Herb	-
Cyathula uncinulata	Amaranthaceae	Yekil fikir	Herb	-
Cymbopogon citratus	Poaceae	Tejesar	Herb	Forage
Cyphostemma adenocaule	Vitaceae	Aserkush tebetebkush	Climber	-

Cyphostemma cyphopetalum	Vitaceae	Gindosh	Climber	-
Datura stramonium	Solanaceae	Astenager	Herb	-
Daucus carota	Apiaceae	Karrot	Herb	Edible root
Dodonaea angustifolia	Sapindaceae	Kitkta	Shrub	Firewood, fences, charcoal
Dovyalis abyssinica	Flacourtiaceae	Koshim	Shrub	Edible fruit, firewood
Echinops kebericho	Asteraceae	Kebericho	Herb	-
Echinops longisetus	Asteraceae	Koshelie	Shrub	Firewood, fences, charcoal
Eucalyptus globulus	Myrtaceae	Nech bahir zaf	Tree	Firewood, charcoal ,fences, traditional house construction, traditional agriculture tool making, household tool making
Euclea divinorum	Ebenaceae	Dedho	Shrub	Firewood
Euphorbia abyssinica	Euphobiaceae	Yebereha kulkual	Tree	
Euphorbia ampliphylla	Euphorbiaceae	Kulkual	Tree	Fences
Euphorbia tirucalli	Euphorbiaceae	Kinchib	Shrub	Traditional house construction
Ferula communis	Apiaceae	Dog	Herb	Firewood
Ficus sur	Moraceae	Shola	Tree	Edible fruit, furniture making, traditional house construction, traditional agriculture tool making
Ficus vasta	Moraceae	Warka	Tree	Charcoal, firewood, furniture making, traditional house construction, traditional agriculture tool making, spiritual tool making
Foeniculum vulgare	Apiaceae	Ensillal	Herb	-

Gomphocarpus purpurascens	Asclepiadaceae	Tifrndo	Shrub	-
Guizotia schimperi	Asteraceae	Mech	Herb	Forage, ornamental purpose during holyday
Hagenia abyssinica	Rosaceae	Kosso	Tree	Firewood, traditional agriculture tool making, household tool making
Haplocarpha schimperi	Asteraceae	Getin	Herb	Forage
Helichrysum sp.	Asteraceae	Nechilo	Shrub	Firewood
Heteromorpha arboresescens	Apiaceae	Yegib-mirkuz	Shrub	Firewood
Hordeum vulgare	Poaceae	Gebs	Herb	Food, forage
Impatiens rothii	Balsaminaceae	Gishilt	Herb	Roots for finger colour
Indigofera vohemarensis	Fabaceae	Kuakucha	Herb	-
Inula Confertiflora	Asteraceae	Woynagift (Ega)	Shrub	Leaves for washing milk utensils, firewood
Jasminum abyssinicum	Oleaceae	Tembelel	Climber	Traditional house construction, firewood
Juniperus procera	Cupressaceae	Yabesha Tid	Tree	Fences, firewood, traditional agriculture tool making, traditional house construction, Shade
Justicia schimperiana	Acanthaceae	Sensel	Shrub	Firewood
Kalanchoe petitiana	Crassulaceae	Endahahula	Herb	The fleshy leaves are used in baking local bread
Lagenaria siceraria	Cucurbitaceae	Qil	Climber	Household utensils
Laggera tomentosa	Asteraceae	Keskeso	Herb	Firewood,
Launaea petitiana	Asteraceae	Yebeg wotet	Herb	Forage
Lens culinaris	Fabaceae	Msr	Herb	Food, forage

Appendix 3 cont'd

Leonotis ocymifolia	Lamiaceae	Ras kmr	Shrub	Firewood
Lepidium sativum	Brassicaceae	Feto	Herb	Forage
Linum usitatissimum	Linaceae	Telba	Herb	Food, forage
Lippia adoensis	Verbenaceae	Kessie	Herb	Leaves for spice and washing milk container
Lobelia rhynchopetalum	Lobeliaceae	Jibra	Herb	Forage
Lupinus albus	Fabaceae	Gbto	Herb	Food, forage
Lycopersicon esculentum	Solanaceae	Timatim	Herb	Fruits for food
Maesa lanceolata	Myrsinaceae	Kelawa	Shrub	Firewood, fruits for fish poisoning
Malus sylvestris	Rosaceae	Apple	Tree	Edible fruit
Malva parviflora	Malvaceae	Alenkuata	Herb	-
Maytenus arbutifolia	Celastraceae	Atat	Shrub	Fences
Mentha spicata	Lamiaceae	Nana	Herb	Spice
Millettia ferruginea	Fabaceae	Birbira	Tree	Firewood, fruits for fish poisoning
Momordica foetida	Cucurbitaceae	Kura harg	Climber	-
Musa x paradisiaca	Musaceae	Muse	Herb	Edible fruit
Myrica salicifolia	Myricaceae	Shinet	Tree	Firewood, charcoal, traditional house construction
Myrtus communis	Myrtaceae	Ades	Shrub	Leaves for spice
Mysine africana	Myrsinaceae	Qechemo	Shrub	Firewood, fences, traditional house construction
Nicotiana tabacum	Solanaceae	Tinbaho	Herb	-
Nuxia congesta	Loganiceae	Atquar	Tree	Firewood, forage

Ocimium lamiifolium	Lamiaceae	Dama kessie	Shrub	Firewood
Olea europaea subsp. *cuspidata*	Oleaceae	Weyra	Tree	Charcoal, firewood, furniture making, traditional agriculture tool making, spiritual purpose, fumigate of traditional household utensil, tooth brushing
Olinia rochetiana	Oliniaceae	Tifie	Shrub	Firewood
Opuntia ficus-indica	Cactaceae	Beles	Shrub	Edible fruit
Osyris quadripartita	Santalaceae	Keret	Shrub	Firewood
Otostegia fruticosa	Lamiaceae	Barianatra	Shrub	firewood
Otostegia integrifoli	Lamiaceae	Tnjut	Shrub	For fumigate of traditional alcohol container
Pennisetum sphacelatum	Poaceae	Sindedo	Herb	Traditional household tool making, traditional house construction, forage
Periploca linearifolia	Asclepiadaceae	Moider	Climber	Forage
Peucedanum winkleri	Apiaceae	Qershashiba	Herb	Firewood
Phagnalon abyssinicum	Asteraceae	Nibasel	Herb	Forage
Phoenix reclinata	Arecaceae	Seniel	Tree	Traditional household tool making, traditional house construction
Phytolacca dodecandra	Phytolaccacae	Mehan Endod	Shrub	Firewood, washing of cloth
Pistacia falcata	Anacardiaceae	Tana gebez	Tree	Firewood, traditional household tool making, charcoal
Plantago lanceolata	Plantaginaceae	Gorteb	Herb	Forage

Plectranthus puntatus	Lamiaceae	Tibtibo	Herb	-
Podocarpus falcatus	Podocarpaceae	Zgba	Tree	Traditional house construction, traditional household tool making, firewood, charcoal
Polygala rupicola	Polygalaceae	Etse lbona	Herb	Forage
Polygonum aviculare	Polygonaceae	Kechkech	Herb	Forage
Premna schimperi	Lamiaceae	Chocho	Shrub	Firewood
Pteridium aquilinum	Pteridaceae	Emse fer	H	-
Pterolobium stellatum	Fabaceae	Kentefa	Shrub	Firewood, fences
Ranunculus stagnalis	Ranunculaceae	Gudgn	Herb	Forage
Rhamnus prinoides	Rhamnaceae	Gesho	Shrub	Leaves used for traditional alcohol making, tooth brushing
Rhus natalensis	Anacardiaceae	Chakma	Shrub	Firewood, traditional agriculture tool making
Rhus retinorrhoea	Ancardiaceae	Tlem	Shrub	Traditional agriculture tool making, firewood, charcoal
Rhus vulgaris	Anacardiaceae	Embis	Tree	Firewood, charcoal, traditional agriculture tools making
Ricinus communis	Euphorbiaceae	Gulo	Herb	Fruits used for making leather soft traditionally, firewood
Rosa abyssinica	Rosaceae	Kega	Shrub	Edible fruit, fences
Rosa x richardii	Rosaceae	Tigiereda	Shrub	Ornament
Rubus steudneri	Rosaceae	Engory	Shrub	Edible fruit, fences
Rumex abyssinicus	Polygonaceae	Mekmeko	Herb	Rhizomes for food spices, forage
Rumex nepalensis	Polygonaceae	Tult	Herb	Forage

Rumex nervosus	Polygonaceae	Embacho	Shrub	Firewood, charcoal
Ruta chalepensis	Rutaceae	Tenadam	Herb	Food spice
Saccharum officinarum	Poaceae	Shenkora Ageda	Herb	Stem for food
Salvia nilotica	Lamiaceae	Hulegeb	Herb	-
Salvia schimperi	Lamiaceae	Dibreq	Herb	-
Sansevieria ehrenbergii	Dracaenaceae	Wondie-kacha	Herb	-
Satureja abyssinica	Lamiaceae	Tatmot koygn	Herb	-
Schinus molle	Anacardiaceae	Kundo berbere	Tree	Firewood, fences, traditional agriculture tool making
Sida schimperiana	Malvaceae	Chifreg	Shrub	Cleaning for houses of waste materials
Sideryoxylom oxyacanthum	Sapotaceae	Damza	Shrub	Fences, firewood, charcoal, traditional agriculture tool making
Silene macrosolen	Caryophyllaceae	Wogert	Herb	Forage, household fumigation during coffee ceremony
Solanecio gigas	Asteraceae	Ye shekoko gomen	Tree	Firewood
Solanum anguivi	Solanaceae	Zerch embouy	Shrub	-
Solanum benadirense	Solanaceae	Terekus enchet	Shrub	Firewood
Solanum marginatum	Solanaceae	Gebre Embouy	Shrub	-
Sphenoslylis stenocarpa	Fabaceae	Yayt hareg	Herb	-
Stephania abyssinica	Menispermaceae	Engochit	Climber	Forage
Tagetes minuta	Asteraceae	Gimie	Herb	-
Tephrosia bracteolata	Fabaceae	Gerengerie	Herb	-
Thymus schimperi	Lamiaceae	Tosign	Herb	Food spice, forage

Appendix 5 cont…

Tragia cinerea	Euphorbiaceae	Aleblabit	Climber	Forage
Trigonella foenum- graecum	Fabaceae	Abish	Herb	Food, forage
Urtica simensis	Urticaceae	Sama	Herb	Food, forage
Verbascum sinaiticum	Scrophulariaceae	Ye'ahiya Joro	Herb	Firewood
Verbena officinalis	Verbenaceae	Atuch	Herb	Forage
Vernonia amygdalina	Asteraceae	Girawa	Shrub	Firewood, fences, leaves used for washing of traditional alcohol container
Vernonia bipontini	Asteraceae	Muzign	Herb	Firewood
Viscum tuberculatum	Viscaceae	Yemrenz teketsla	Shrub	Firewood
Withania somnifera	Solanaceae	Giziewa	Shrub	Firewood
Zehneria scabra	Cucurbitaceae	Buhareg	Climber	-

Appendix 6 Number of medicinal plant species and genera in each family

Number	Family	Number of genera	Number of plant species	Percentage of plant species (%)
1	Asteraceae	13	16	10.32
2	Lamiaceae	10	12	7.74
3	Fabaceae	9	9	5.81
4	Solanaceae	6	8	5.16
5	Euphorbiaceae	5	7	4.52
6	Apiaceae	5	5	3.22
7	Cucurbitaceae	5	5	3.22
8	Rosaceae	4	5	3.22
9	Anacardiaceae	3	5	3.22
10	Poaceae	4	4	2.60
11	Polygonaceae	2	4	2.60
12	Rutaceae	2	4	2.60
13	Amaranthaceae	2	3	1.93
14	Brassicaceae	2	3	1.93
15	Verbenaceae	2	2	1.30
16	Myrsinaceae	2	2	1.30
17	Malvaceae	2	2	1.30
18	Loganiaceae	2	2	1.30
19	Oleaceae	2	2	1.30
20	Apocynaceae	2	2	1.30
21	Alliaceae	1	2	1.30
22	Aloaceae	1	2	1.30
23	Celastraceae	2	2	1.30
24	Asclepidaceae	2	2	1.30
25	Myrtaceae	2	2	1.30
26	Vitaceae	1	2	1.30
27	Moraceae	1	2	1.30
28	Ranunculaceae	2	2	1.30
29	37 families	37	37	23.68
Total	**65**	**133**	**155**	**100**

Appendix 7 Human and livestock diseases which are treated by medicinal plants in the study area (Key: NMP- Number of medicinal plants)

No	Disease treated	Local name	Human		Livestock		Both Human & Livestock	
			NMP	%	NMP	%	NMP	%
1	Abdominal pain	Yehod beshta	7	4.52	---	---	---	---
2	Acute sickness	Dngetegna	6	3.87	---	---	---	---
3	Allergic dermolitia*	Yegr megagna	2	1.3	---	---	---	---
4	Anal erolopi	Yefintita mewtat	1	0.64	---	---	---	---
5	Anemia	Dem manes	1	0.64	---	---	---	---
6	Ascaries	Wosfat	7	4.52	---	---	---	---
7	Asthma	Asm	1	0.64	---	---	---	---
8	Black leg	Aba gorba	---	---	1	0.64	---	---
9	Blotting	Hod menfat	4	2.58	---	---	---	---
10	Body lice*	Kicham	---	---	2	1.3	---	---
11	Bone fracture	Sbrat	2	1.3	---	---	---	---
12	Boules*	Bgunj	1	0.64	---	---	---	---
13	Breast swellowing	Yetut ebtet	1	0.64	---	---	---	---
14	Cancer*	Lemt	2	1.3	---	---	---	---
15	Circumcision wound*	Yegrzat kusil	2	1.3	---	---	---	---

16	Coccoides	Yedoro fengl	---	---	2	1.3	---	---
17	Common cold	Gunfan	6	3.87	---	---	---	---
18	Congenital abnormality	Meshabat (for children)	7	4.52	---	---	---	---
19	Constipation	Yehod drket	1	0.64	---	---	---	---
20	Cough	Sal	3	1.93	---	---	---	---
21	Dandruff*	Forefor	1	0.64	---	---	---	---
22	Deafness	Dinkurna	1	0.64	---	---	---	---
23	Diabetes	Yeskuar beshta	3	1.93	---	---	---	---
24	Diarrhoea	Tekmat	6	3.87	1	0.64	---	---
25	Ear lesion	Yegoro memgel	1	0.64	---	---	---	---
26	Eczema*	Chifie	9	5.82	---	---	---	---
27	Eynewog	Eynewog	---	---	16	10.32	---	---
28	Emergency	Moybagegn	2	1.3	1	0.64	---	---
29	Typhus	Tesbo	2	1.3	---	---	---	---
30	Epilepsy	Yemitil beshta	1	0.64	---	---	---	---
31	Evil eye	Buda	27	17.42	---	---	---	---
32	Eye disease	Aynebesheta	5	3.22	3	1.93	---	---
33	Fibril illness	Mich	7	4.52	---	---	---	---

34	Fire burn*	Yesat katelo	2	1.3	---	---	---	---
35	Gastritis	Cheguara	3	1.93	---	---	---	---
36	'Goleba'	Goleba	---	---	4	2.58	---	---
37	Gonorrhoea	Chebt	3	1.93	---	---	---	---
38	Headache	Rasmtat	5	3.22	---	---	---	---
39	Heart disease	Yelb beshta	1	0.64	---	---	---	---
40	Heart failure	Lib dkam	2	1.3	---	---	---	---
41	Herpes zoster*	Shererit meshnat	1	0.64	---	---	---	---
42	Hypertension	Dem gfit	4	2.58	---	---	---	---
43	Impotency	Yeblit dikam (in men)	7	4.52	---	---	---	---
44	Intestinal parasite	Yeanjet besheta	4	2.58	---	---	---	---
45	Jaundice	Yewof beshta	7	4.52	---	---	---	---
46	Kidney problem	Kulalite besheta	2	1.3	---	---	---	---
47	'Kunchir'*	Kunchir	5	3.22	---	---	---	---
48	Leech	Alkit	---	---	4	2.58	---	---
49	Liver disease	Gubet	2	1.3	---	---	---	---
50	Loss of appetites	Yemgb flagot mekenes	1	0.64	---	---	---	---

51	Lung tuberculosis (TB)	Samba nekersa	1	0.64	---	---	---	---
52	Malaria	Woba	2	1.3	---	---	---	---
53	Melasma*	Madiat	3	1.93	---	---	---	---
54	Nasal bleeding	Nesr	1	0.64	---	---	---	---
55	Night blindness	Dafnt	1	0.64	---	---	---	---
55	Orchiticl	Yeblt ebtet (in men)	1	0.64	---	---	---	---
56	Postpartum haemorrhage	Bewolid gizie dem mebzat	1	0.64	---	---	---	---
57	Rabies	Yewsha besheta	2	1.3	1	0.64	---	---
58	Retained placenta	Yegdelg mekret	1	0.64	---	---	1	0.64
59	Rh factor	Shotellay	---	---	2	1.3	2	1.3
60	Rheumatism	Kurtmat	1	0.64	---	---	---	---
61	Ring worms*	Chirt	1	0.64	---	---	---	---
62	Scabies*	Ekek	3	1.93	---	---	---	---
63	Skin cut*	Silet mekuret	2	1.3	---	---	---	---
64	Skin disease*	Yekoda beshta	2	1.3	---	---	---	---
65	Smallpox*	Fentata	1	0.64	---	---	---	---
66	Snake bit	Yebab nksha	---	---	---	---	1	0.64

67	Stabbing pain	Wugat	2	1.3	---	---	---	---
68	Stomach ache	Hod kurtet	7	4.52	1	0.64	---	---
69	Swellowing	Ebtet	1	0.64	---	---	---	---
70	Syphilis	Kitgn	3	1.93	---	---	---	---
71	Tape worm	Kosso	10	6.45	---	---	---	---
72	Tinea nigra*	Lash	3	1.93	---	---	---	---
73	Tinea pedis*	Chok	---	---	---	---	1	0.64
74	Tinea versicolor*	Qukucha	3	1.93	---	---	---	---
75	Tonsillitis	Yegurero beshta	1	0.64	---	---	---	---
76	Toothache	Yetrs kurtmat	2	1.3	---	---	---	---
77	Toung disease	Yemlas beshta	1	0.64	---	---	---	---
78	Tumor*	Nekersa	2	1.3	---	---	---	---
79	Urinary retention	Shint meklat	2	1.3	---	---	---	---
80	Uvulitia	Etil mewred	7	4.52	---	---	---	---
81	Vomiting	Twket	2	1.3	---	---	---	---
82	Wart*	Kintarot	7	4.52	---	---	---	---
83	Wound*	Kusl	9	5.8	---	---	---	---

Key *- External human and livestock health problems

Appendix 8

Cheklist of semi-structured questions used for discussion and interview for the collection of ethnobotanical data

I. General Information on Respondents

1. Kebeles_____Village (Specific locality) _____Date_____.
2. Name _____Age __ Sex _____, Marital status (single or Marid)_____, Educational level _____, Occupation_____, Religion _____

II. Ethnobotanical Information

3. What is the most common disease of humans in your area?
4. What are the most common diseases of animals in your area?
5. How do member of the local community prevent, control and cure a given disease in your area?
6. Can you tell me the traditional ways of classifying vegetation, landscape and soil in your area?

   Vegetation _____

   Landscape _____

   Soil _____
7. Mention plant species used to treat a given disease in the area (give local names)
   a. Plants used to treat human diseases
   b. Plants used to treat animal diseases
   c. Plants used to treat both human and animal disease
8. From where do you collect medicinal plants? Wild, home garden, etc.
9. What part/parts of the medicinal plants are collected for medicinal use?
10. What are the methods of preparation?
    a. Preparation forms: crushed, powder, chewed etc.
    b. Used alone, mixed with water or other etc.
    c. Condition: dried, fresh, both.
11. How is it taken? Route of administration (Oral, nasal, dermal)
12. Could you tell me the amount used or dosage that are used for various disease treatments?

13. Does the dosage vary? For instance, age group, sex etc.
14. Are there nutraceutical plants (used as medicine and food)?
15. Is there any noticeable side effect of the medicine? If yes, how can you overcome the effect?
16. Are the medicinal plants marketable?
17. Are medicinal plants easily accessible? If not why?
18. Are there members of the community who frequently use the medicinal plants?
19. How does modernization interfere with traditional medicinal system?
20. How is the knowledge passed from elders to younger people in the study area?
21. Are there threats to the medicinal plants? List out the main threats
22. Mention medicinal plants that become rare in recent years in your area?
23. Are there economic groups who mostly or occasionally use these medicinal plants?
24. How do the local people preserve medicinal plants?
25. Are there traditional medicinal plants conservation methods in the area? Include the management practices by indigenous people
26. Is the plant currently cultivated in the study area?
27. Are there conditions that forbid taking the medicine such as pregnancy and others?
28. Is there any effort made to conserve the medicinal plants in the area?
29. Are there limitations in utilization of some medicinal plants in the locality?

Appendix 9 List of Informants in the Study Area

No.	Name	Sex	Age	Marital Status	Educational Status	Kebele	Occupation
1	Mulu Tilahun*	M	53	Married	3	kewosa (02)	Farmer
2	Atilie Shewa	M	57	Married	4	kewosa (02)	Farmer
3	Tadese Debebe	M	50	Married	6	kewosa (02)	Farmer
4	Agulala W/ges	M	78	Married	Illiterate	kewosa (02)	Farmer
5	Yeshimebet Awgchew	F	50	Divorced	Illiterate	kewosa (02)	Housewife
6	Derbew Kelemu	M	30	Married	10	kewosa (02)	Farmer
7	Begasaw Merineh*	M	50	Married	8	Atedas-Gedanbo (03)	Farmer
8	Manalebsh Hailegna	F	64	Divorced	Illiterate	Atedas-Gedanbo (03)	Housewife
9	Abebe W/gebrael	M	40	Married	10	Atedas-Gedanbo (03)	Farmer
10	Ngata Mekonn	F	27	Single	10	Atedas-Gedanbo (03)	Housewife
11	Worka Mnalkulet	F	45	Married	Illiterate	Atedas-Gedanbo (03)	Housewife
12	Kefelegn Eshetie	M	45	Married	Read & write	Atedas-Gedanbo (03)	Farmer
13	Tesfaye Asefa*	M	47	Married	5	Keladuha (04)	Farmer
14	Tafesech Aragaw	F	40	Divorced	Illiterate	Keladuha (04)	Housewife
15	Alamaw Abebe	M	35	Married	11	Keladuha (04)	Farmer
16	Tazezew Damtew	M	30	Married	6	Keladuha (04)	Farmer
17	Tekletsadik Getaneh	M	29	Single	10	Keladuha (04)	Farmer
18	Asrate Yrga	M	50	Married	Illiterate	Keladuha (04)	Farmer
19	Priest Eshetie Ayalkbet*	M	62	Married	Read & write	Negasi Amba (07)	Farmer
20	Belhu W/medikn	M	57	Married	Read & write	Negasi Amba (07)	Farmer
21	Zewdnesh Eshetie	F	45	Married	Illiterate	Negasi Amba (07)	Housewife
22	Shumetie Zkale	M	85	Married	3	Negasi Amba (07)	Farmer
23	Priest Wochefo W/Michael	M	60	Married	10	Negasi Amba (07)	Farmer
24	Sinye Shumetie	F	35	Married	Illiterate	Negasi Amba (07)	Housewife
25	Aschalew Belete *	M	69	Married	Illiterate	Tsehay Sina (08)	Farmer
26	Asegedech Mnalkulet	F	50	Married	Illiterate	Tsehay Sina (08)	Housewife

Appendix 9 cont…

27	Yemru Zewoldemariam	M	90	Married	Illiterate	Tsehay Sina (08)	Farmer
28	Etalemahu Yradu	F	38	Married	8	Tsehay Sina (08)	Housewife
29	Hailu Ymam	M	74	Married	Illiterate	Tsehay Sina (08)	Farmer
30	Tewabech Aschalew	F	30	Single	Illiterate	Tsehay Sina (08)	Housewife
31	Priest Tena W/rufael*	M	52	Married	6	Mesale Mariam (09)	Farmer
32	Zewdinesh G/tsadik	F	38	Married	6	Mesale Mariam (09)	Housewife
33	Priest Shewangzaw W/rufael	M	60	Married	7	Mesale Mariam (09)	Farmer
34	Etagegn H/mariam	F	50	Married	Illiterate	Mesale Mariam (09)	Housewife
35	Aytenew Zergaw	M	27	Married	5	Mesale Mariam (09)	Farmer
36	Mulualem Anagaw	M	35	Married	6	Mesale Mariam (09)	Farmer
37	Ashine Legese*	M	67	Married	Illiterate	Geya (010)	Farmer
38	Priest Tale G/wold	M	66	Married	4	Geya (010)	Farmer
39	Zmargie Andargie	M	65	Divorced	Illiterate	Geya (010)	Farmer
40	Kebede Lema	M	24	Single	10	Geya (010)	Teacher
41	Talefu Mnalkulet	F	33	Married	Illiterate	Geya (010)	Housewife
42	Belaynesh W/amanuael	F	64	Married	Illiterate	Geya (010)	Housewife
43	Demis Wondaferew*	M	30	Married	10	Arego (011)	Farmer
44	Adanech Manaye	F	32	Single	3	Arego (011)	Housewife
45	Alemu Adenagr	M	55	Married	6	Arego (011)	Farmer
46	Priest Befekadu Zewdie	M	35	Married	Read & write	Arego (011)	Farmer
47	Zenebu Getaneh	F	43	Married	Read & write	Arego (011)	Housewife
48	Beyenech Zenebe	F	45	Married	Illiterate	Arego (011)	Housewife
49	Edashaw Mamo*	M	57	Married	Illiterate	Shola (012)	Farmer
50	Achamie Mekonn	F	48	Married	Illiterate	Shola (012)	Housewife
51	Geto Yrga	M	30	Married	6	Shola (012)	Farmer
52	Etagegn Deyas	F	54	Divorced	Illiterate	Shola (012)	Housewife
53	Ayele Mekonn	M	52	Married	Illiterate	Shola (012)	Farmer

Appendix 9 cont…

54	Yektie H/mariam	F	48	Married	Illiterate	Shola (012)	Housewife
55	Priest Girma Belayneh*	M	59	Married	3	Dergagn (016)	Farmer
56	Beletech Workneh	F	45	Married	Illiterate	Dergagn (016)	Housewife
57	Beshash Abebe	F	50	Married	Illiterate	Dergagn (016)	Housewife
58	Asnaku Demissew	F	20	Single	10	Dergagn (016)	Health extension
59	Shawlie Sebsebe	M	72	Married	5	Dergagn (016)	Farmer
60	Priest Belay Zewdie	M	30	Married	7	Dergagn (016)	Farmer
61	Engda Shewaye*	M	50	Married	12	Wezed (017)	Traditional healer and nurse
62	Priest Tesfaye Azene	M	45	Married	5	Wezed (017)	Farmer
63	Endale Beyene	M	55	Married	4	Wezed (017)	Farmer
64	Meshesha Wodmeneh	M	60	Married	Illiterate	Wezed (017)	Farmer
65	Ngusse Enawgaw	M	48	Married	4	Wezed (017)	Farmer
66	Trunesh Enawgaw	F	56	Married	Illiterate	Wezed (017)	Housewife
67	Demssew Temtmie*	M	43	Married	7	Sra Gedel (018)	Farmer
68	Getachew W/ges	M	58	Married	10	Sra Gedel (018)	Farmer
69	Nigus Azene	M	47	Married	7	Sra Gedel (018)	Farmer
70	Priest Girma Zwdie	M	52	Married	8	Sra Gedel (018)	Farmer
71	Abebe Mulatu	M	48	Married	Read & write	Sra Gedel (018)	Farmer
72	Bizuwork Mulatu	F	39	Married	4	Sra Gedel (018)	Housewife

Key: *- key informants