# Ethnobotanical study of Medicinal Plants in Menz Keya Gebreal Woreda, North Shewa Zone, Amhara Regional State, Ethiopia

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# Ethnobotanical study of Medicinal Plants in Menz Keya Gebreal Woreda, North Shewa Zone, Amhara Regional State, Ethiopia

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**This is to certify that the Thesis prepared by Getabalew Tefera Desta, entitled: *Ethnobotanical studyof Medicinal Plants in Menz Keya Gebreal Woreda, North Shewa Zone, Amhara Regional State, Ethiopia* and submitted in Partial Fulfillment of the Requirements for the Degree of Master of Science in (Biology) complies with the regulations of the University and meets theaccepted standards with respect to originality and quality.**

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## Abstract

*Ethnobotanical study of Medicinal Plants in Menz keya Gebreal Woreda, North Shewa zone, Amhara Regional State, Ethiopia*

*Getabalew Tefera Desta MSc Thesis*

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*Ethnobotanical study of medicinal plants was conducted to investigate and document medicinal plants in Menz Keya Gebreal Woreda Amhara Regional State Ethiopia. Atotal of 90 informants (age beteween19-94) were selected to collect information on medicinal plant use from eight sampled kebeles. Of these, 6 key informants were selected purposively based on recommendation by local elders and authorities. A total of 70 medicinal plant species distributed in 64 genera and 40 families were collected and identified. Out of, 54 species (77.1%) were used against human ailments, 6 species (8.6%) were used against livestock ailments and the remaining 10 species (14.3%) were used to treat both human and livestock ailments. From the total medicinal plant species, 32 were shrubs, followed by 20 species of trees, 14 species of herbs, and 4 species of climbers. The most frequently used plant parts were leaves 38 (54.3%) followed by roots 22 (31.4%), fruit 4 (5.7%), bark 2 (2.8%), and whole parts 2(2.8%). The most widely used method of preparation was creaming accounted for the largest 35(28.68%) followed by drinking 30(24.59%), swishing, 17(13.93%), eating 11(9.01%), sniffing 11(9.01), tie on10 (8.19%) and smoking 8 (6.55%). The common route of administration recorded was oral way which is equal to 37(52.8%) followed by dermal 31(44.2%). Nasal routes of administration ranked third represented by 6(8.5%) and the other routes of administration were both dermal/oral 3(4.3%), oral/nasal 3 (4.3%), optical 2(2.8%) and ears 1(1.4%).Most of the remedy preparation in Menz Keya Gebreal Woreda used by the local community were prepared from fresh condition which accounts 59(84.3%) followed by fresh/dried which represents 8(11.4%) and the last one was*

*dried condition which represents 3(4.3%).Agricultural land expansion, deforestation, charcoal production and firewood collection were reported as major threats to plants of the study area.*

*The Menz keya Gebreal people possess rich ethnomedicinal knowledge. This study can be used as a basis for developing management plans for conservation, sustainable use of medicinal plants and drug development.*

**Key words:** Ethnobotany, Fidelity level, Informant consensus factor, Paired comparision

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## List of Acronyms

| | |
|---|---|
| CSA | Central Statistical Agency |
| MKGFEDO | Menz Keya Gebreal Woreda Finance and Economic Development Office |
| IK | Indigenous Knowledge |
| WHO | World Health Organization |
| MP | Medicinal Plants |
| MKWCT | Menz Keya Gebreal Woreda Culture and Tourism Office |

# CHAPTER ONE

## 1. Introduction

### 1.1 Background

Ethnobotany is a broad term referring to the study of the direct and interrelation between human and plants .It is also defined as local people's interaction with their natural environment: how they classify, manage and use plants available around them (Martin, *et.al*, 1995). Indigenous people have lived close to the natural environment depending on its products for their requirements as sources of food, medicine, and construction.Traditional societies throughout the world possess a wealth of traditional knowledge that they have accumulated during extended interactions with the natural world which remains fundamental to their physical, spiritual, and social wellbeing (Cotton, *et. al*, 1996).

Plants have traditionally been used as a source of medicine in Ethiopia for many centuries to contest various human and livestock ailments. Traditional medicine has become a crucial part of the culture in the country due to its long history. Traditional medical practice has been in existence before the growth of modern medicine and continues to be widely accepted and used in the prevention and treatment of ailments (Dawit Abebe, and Ahadu Ayehu, 1996). The indigenous people of different localities in the country have developed their specific knowledge of the use, management, and conservation of plant resources (Pankhurst, 1976).

Human beings have depended on nature for their simple requirements as being the source of medicines, shelters, food, fragrances, clothing, flavors, fertilizers, and means of transportation throughout their lives. Plants have been used for medicinal purposes since long before the prehistoric period (WHO, 1998). Medicinal plants have made a significant contribution to the primary health care of people around the world. Population increases, inadequate supplies of drugs, the prohibitive cost of treatments, side effects of several synthetic drugs, and the development of drug resistance to infectious diseases have led to the increasing use of plant materials as a source of medicine for a wide variety of human ailments. Recently, the WHO estimated that 80% of people world wide rely on herbal medicines for some aspects of their primary health care needs.

According to the WHO, around 21,000 plant species can potentially be used as medicinal plants (Lucy Hoareau and Edgar, 1999).

Africa has rich resources of medicinal plant species. Ethiopia is believed to be home for about 6500 to 7000 species, with approximately 12% of these endemic (Fisseha Mesfin *et al,* 2009).

In Ethiopia, approximately 80% of humans and 90% of the livestock population rely on traditional medicinal plants to cure different ailments due to difficulties in accessing modern health facilities, the cultural acceptability of healers, and low cost of traditional medicine (Medhin Zewdu and Abebe Demissie,2001).

## 1.2 STATEMENTS OF THE PROBLEM

Medicinal plants play a vital role in addressing primary health care, income generation and fulfilling other necessity functions. However, for centuries, in Ethiopia, both human and natural factors heavily contribute to the loss of medicinal plants, which links with the gradual displacements of indigenous knowledge associated with these plants. Medicinal plants have been under risk due to environmental degradation, local plant varieties are replaced by exotic species, agricultural activities, unwise use of timber production, construction, monoculture, shortage of water and land. In developing countries like Ethiopia the indigenous knowledge about medicinal plants is transferred secretly from generation to generation orally.

Without any know-how about the basic features of the medicinal plants, farmers cannot use their indigenous knowledge and conservation of medicinal plants. In my study area there is no documented and recorded information about the use and conservation of medicinal plants as remedies for both human and livestock ailments. Until this moment, no research on ethnobotanical study of medicinal plants was conducted at Menz Keya Gebreal Woreda. The finding of this study will help people of the study area to be aware of problem associated with medicinal plants and give attention for sustainable use and conservation of medicinal plants of their surroundings.

## 1.3. Objectives of the study

### 1.3.1. General objective

The general objective of this study is to investigate and document the medicinal plants in Menz keya Gebreal Woreda to treat both human and livestock ailments.

### 1.3.2. Specific objectives

- To collect, identify and document medicinal plants that are used by the local people for the treatments of human and livestock aliments in the study area.
- To assess current status of medicinal plants and indigenous knowledge of the people on the use, threat and conservation measures of medicinal plants practiced in the study area.
- To document plant parts used, for medicinal purposes, methods of preparation and ways of administration.
- To provide information that will contribute to the developments of strategies for conservation and sustainable utilization of medicinal plants.
- To assess management practices of medicinal plants by local people in Menz Keya Gebreal Woreda.

## 1.4. Research questions

The main focusing of this study is to investigate and document the traditional uses and remedies of various medicinal plants, which are used by Menz key Gebreal Woreda people. The findings of this study will try to answer the following main research questions.

- Which medically important plants species are used by the local people to treat both human and livestock health problem in the study area?
- Which parts of the plants are used for medicinal purpose?
- What are the main management practices taken by the local people to conserve medicinal plants in the study area?
- What are the main threats for the loss of medicinal plants in the study area?

# CHAPTER TWO

## 2. Literature review

### 2.1 Origin and developments of ethnobotany

Ethnobotany deals with the direct relationship of plants with human. According to Martin (1995), ethnobotany is the study of local people's interaction with the normal environment: how they classify, manage and use plants that are available around them and Balick and Cox (1996) defined it as the relationship between plant and people. According to (Cotton, 1996), ethnobotany is the study of the indigenous knowledge on useful plants. Present ethnobotany links with different field of studies such as botany, nutrition, conservation and pharmacology, opening a wide field so as to enrich the human knowledge (Balick, 1996).

Ethnobotany is a multidisciplinary science defined as the interaction between plants and people. It is also defined as local people's interactions with their natural environment how they classify, manage and use plants available around them (Martin, 1995). The relation between human and plants 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 (Schulte, 1992). Ethnobotanical work seems to have started with Christopher Columbus in 1942, 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). 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). This implies that humans are dependent on plants for their life. Although various animal and mineral products contribute to human welfare; the plant kingdom is most essential to human-wellbeing especially in supplying his basic needs. This close interaction and dependency ofhumans on plants is studied under the field of ethnobotany. John Hershberger proposed the term ethnobotany for the first time in 1895 (Balick, 1996). However; this term has been given different interpretations and definitions depending on the interest of workers involved in the study (Cotton, 1996). Currently ethnobotany has become a more diversified and multidisciplinary subject which requires experts in various fields of academic study such as Botany, Anthropology, Agriculture, Linguistics, Archeology

and Economics (Martin, 1995; Alexiades, 1996; Balick, 1996). Ethnobotany is also rapidly growing science, attracting people with widely varying academic backgrounds and interests (Donald,2009) and now days' ethnobotany has tended to become more analytical quantitative cross disciplinary and multi institutional (Hamilton *et al.*, 2003) (Martin ,1995) defined ethnobotany as a study of people's classification, management and use of plants. In 1941, Shultes redefined ethnobotany as the study of the relationship, which exists between humans and their ambient vegetation (Cotton, 1996).

Ethnobotanical investigation documents the knowledge on cultural interaction of people with plants. It also tries to find out how local people have traditionally used plants for various purposes, and how they incorporated plants in to their cultural tradition and religions (Balick and Cox, 1996). Therefore, traditional local communities worldwide have a great deal of knowledge about native plants on which they intimately depend (Langeheim and Thimann, 1982). As stated by Martin (1995) to achieve more detailed and reliable information of plants and plant use, ethnobotanical study needs involvement of specialists from various disciplines, such as plant taxonomists, plant ecologists, anthropologists, linguists, economic botanists, and pharmacologists' and others. With such interdisciplinary and multidisciplinary approaches, ethnobotany is aimed at gathering and documenting indigenous botanical knowledge, cultural practice, uses and management of botanical resources and discovers benefits from plants.

**2.2 Indigenous Knowledge**

Indigenous knowledge is the accumulation of knowledge as a result of many years experiences, careful observations, trial and error experiments (Martin, 1995). This knowledge is built by a group of people through generation of living in close contact with nature and it is cumulative and dynamic. Indigenous knowledge develops and changes with time and space with change of resource and culture. Therefore, such knowledge includes time tested practice that developed in the process of interaction of humans with their environment (Alcorn, 1984; Balick and Cox, 1996; Cotton, 1996).

In similar way Fekadu Fullas (2007), reported that throughout history, humans had been looking to nature to provide them, with remedies for their various diseases. In doing so, they had been using a trial and error approach to sort-out which plants are therapeutic and which are not, and further which are too toxic to use. Through the centuries some of these plants have been used

successfully in the treatment of disease and later on they constituted the basis for many of the modern day drugs.

Systematic application of indigenous knowledge is important for sustainable use of resources and sustainable development (Thomas, 1995). Various animal and mineral products contribute to human welfare; the plant kingdom is most essential to human well-being especially in supplying basic human needs. Since ancient times, human beings used plants for the purpose of disease control and prevention. It was believed to be the result of many generations long year's experiences, careful observations and trial and error experiments that early humans acquired the knowledge on the utilization of plants for disease prevention and curative purposes (Sofowora, 1982; Martin, 1995). Thus the knowledge and application of traditional medicine is one of the widely used indigenous knowledge systems. This implies that humans are dependent on other organisms for their life. This close interaction and dependency of humans on plants is studied under the field of ethnobotany. Such knowledge, known as ethnomedicinal knowledge involves traditional diagnosis, collection of raw materials, preparation of remedies and its prescription to the patients. The documentation of traditional knowledge, especially on the medicinal uses of plants, has provided many important drugs of modern day (Balick and Cox, 1996).

When conducting research on local people, it is essential to consider about Nagoya protocol, the protocols provision on access to traditional knowledge held by indigenous and local communities to benefits from the use of their knowledge innovations and practices. By promotion of the use of genetic resource of medicinal plants and associated traditional knowledge it encourages the opportunities for equitable and fair sharing benefits. However, the indigenous knowledge of medicinal plants will creative incentives to conserve biological diversity, sustainable use components and further enhance the contribution of biological diversity to sustainable developments and human well being (CBD, 2011).

Indigenous knowledge is important to recognize that knowledge of the properties and benefits biological resources is used as transfer traditional knowledge about local biodiversity and used for different purpose like food, medicine clothing shelter to develope skill and practices for agriculture purpose and animals. This indigenous knowledge developing through the experiences of communities over, to adapt of local needs culture and environmental that transfer down from generation to generation. Therefore indigenous knowledge of medicinal plants are particularly

valuable users of genetic resource and without this knowledge many species currently used in research and commercialized product never have been identified.

### 2.3 Medicinal plants

Traditional medicine (TMPs) has been defined by the world health organization (WHO, 2008) as the sum total of all knowledge and practices whether explicable or not, used in the diagnosis, prevention and elimination of physicals, mental or social imbalances and relying exclusively on practical experience and observation handed down from generation to generation, whether verbally or in writing (Yilma Desta *et al*., 1996; cited in Fassil Kibebew, 2001). This system of health care is also known as folk medicine, ethnomedicine, or indigenous medicine.

According to Fassil Kibebew (2001), about 75-90 % of the rural population in the world (excluding western countries) relies on traditional medicines as their only health care system. This is not only because of poverty where people cannot afford to buy expensive modern drugs, but traditional systems are also more culturally acceptable and meet the psychological needs in a way modern medicine does not. According to WHO (2001), consultation of medicinal practitioners is very helpful for the development and incorporation of useful approaches in planning and budgeting system for health care provision of most developing nations and indigenous communities. In Africa, traditional medicine plays a central role in health care needs of rural people and urban poor. Here, it is said that, this situation would remain so long as modern medicine continues to be unable to meet the health care of the people of the continent effectively (Jansen, 1981). Their value and role of this health care system will not diminish in the future, because they are both culturally viable and expected to remain affordable, while the modern health care service is both limited and expensive (WHO, 1998). Indigenous traditional medicinal practices were carried out essentially based on private practice, i.e. private agreement between consenting parties, and the knowledge of traditional practice in most cases has descended through horal folk lore (Asfaw Debela *et al*., 1999).The secrete of information retained by traditional healers is relatively less susceptible to distortion but less accessible to the public (Dawit Abebe, 1986). However, the knowledge is dynamic as the practitioners make every effort to widen their scope by reciprocal exchange of limited information with each other (Dawit Abebe, 1986; Abbink, 1993).

According to Konno (2004), easily accessibility, efficacy on treatment and affordable cost in getting health services are also main reasons in preferring traditional medicine to modern medication. Traditional medicine has also draw backs 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 health care system. Lack of precise dosage which could lead to toxicity is also the other drawback of traditional medicine (Dawit Abebe, 1986).

### 2.4 Medicinal plants in Ethiopia

It is reported that the use of medicinal plant species as a medicine is as old as man and this makes traditional medicine an integral part of the different cultures of Ethiopian people who are especially vulnerable to health facilities (Pankhurst, 1965; Fassil Kibebew, 2001). The various climatic and topographic conditions of the country contributed to a rich biological diversity. Ethiopia is believed to be home for about 6,000 species of higher plants with approximately 10% endemism (Vivero *et al.*, 2006). Similarly as it was reported by IBC (2005), the flora of Ethiopia consists of an estimated number of 6000 species of higher plants with 10-12% endemism. The diversity is also considerable in the lower plants but exact estimate of these have to be made. The genetic diversity contained in the various biotic make up is also high thus making the country a critical diversity hot spot for plants (UNEP, 1995). As one of the 12 the Vavilovian centers of origin diversity for domesticated crops and their wild relatives, it is home of many endemic crops and genetic stocks (Vavilov, 1951, Endashaw Bekele, 2007). According to Dawit Abebe (1986), 95% of traditional medicinal preparations are of plant origin. In Ethiopia, plants have been used as a source of traditional medicine from antiquity to solve different health problems and human sufferings (Dawit Abebe, 1986, Asfaw Debela *et al*., 1999).

In Ethiopia 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. There is also a lack of ethnobotanical survey carried out in most parts of the country. In view of these, documentation of the traditional use of medicinal plants is an urgent matter and important to preserve the knowledge (Tadesse Beyene, 2008, Tilahun Teklehaymanot and Mirutse Giday, 2007).

In Ethiopia, medicinal plants are widely cultivated and utilized. According to EIAR (2016) a total of 134,541.97 ha areas are covered by herbs and aromatic plants in Oromia region, Amhara and SNNPRS. A large number of medicinal plants was documented and widely used to treat various human and livestock ailments in various parts of the country. However, these resources are under threat due to different reasons. For instance, *Brucea antidysenterica, Cordia africana, Cucumis ficifolius, Euphorbia abyssinica, Hagenia abyssinica, Ficus sur, Olea europaea subsp. cuspidata, Podocarpus falcatus, Millettia ferruginea, Myrica salicifolia and Withania somnifera,* are highly threatened (Asmamaw Desalew and Achamyeleh Hiwot, 2018, Nigussie Amsalu *et al.,* 2018).

According to EIAR (2016), more than 80 indigenous and exotic species are conserved in its botanical garden. To develop and enhance production, processing, marketing and utilization technologies of Medicinal Plants, Ethiopian Institute of Agricultural Research, established the Wondo Genet Agricultural Research Centre. Despite availability of diverse favorable climate, ecology, and topographic conditions for the development of medicinal plants, this subsector is far from realizing the country's expectations.

Plant diversity remains crucial for human well-being and still provides a significant number of remedies required in healthcare. Medicinal plants played a pivotal role in the treatment of various afflictions in Ethiopia (Fekadu Fullas, 2007). It was reported that the traditional medicines serve mainly for those people living in the rural area as they have no access to modern medical health services due to shortage of modern drugs, health professionals, much more cost of the medicines, un even distribution that is most of the facilities are found in towns but a few or no health facilities are in rural areas (Jansen, 1981). Despite the high value of traditional medicine to Ethiopia societies especially to rural communities, the plant species along with the associated knowledge is lost due to factors such as deforestation and expansion of modern education (Pankhurst, 2001).

### 2.5 Medicinal plants in public health care system

Plants in general and medicinal plants in particular are important, fundamental and most useful to almost all life on earth, one of the most significant uses of plant is the python medicinal role, i.e. the benefits of medicinal plants have contributed to modern medicine, through providing

ingredients for drugs or having played central role in drug discovering, some drugs having botanical origin, extracted from plants.

Plants have been used as a source of traditional medicine in Ethiopia from the time immemorial to combat different ailments and human sufferings (Asfaw Debela *et al.,* 1999). Due to its long period of practice and existence, traditional medicine has become an integral part of the culture of Ethiopian people (Pankhurst, 1965; Mirgissa Kaba, 1998).

According to Dawit Abebe (2001), there is a large magnitude of use and interest in medicinal plants in Ethiopia due to acceptability, accessibility and biomedical benefits. In this country, the long history of use of medicinal plants is reflected in various medico- religious manuscripts produced on parchments and believed to have originated several centuries ago (Fassil Kibebew, 2001). Medical textbooks written in Geez or even Arabic in Ethiopia between the mid of 17th and 18th century imply that plants have been used as a source of traditional medicine in Ethiopian health care system. Even today, it is common for people living in rural and urban areas to treat some common ailments using plants available around them (example, *Hagenia abyssinica* to expel tapeworm, *Ruta chalepensis* for various health problems) (Abbink, 1995). The continued dependency on herbal medicine along with the side of modern medicine is largely conditioned by economic and cultural factors (Aketch, 1992). In addition to these factors, the fact that modern medical services are inaccessible to the vast majority of the populations due to their costs made herbal medicines more acceptable.

The problem of ensuring equitable distribution of modern health care has become more serious, as the gap between supply and demand has continued to widen. Hence, in present day Africa including Ethiopia, the majority of people lack access to health care and where available the quality is largely below standard (Abbiw, 1996).Herbal remedies are the world's therapeutic means to act against diseases for a large proportion of people both rural and urban centers in developing countries like Ethiopia (Abbiw, 1996).

Medicinal plants play typical role in the lives of many people in terms of health support, financial income and lively hood security (Hamilton, 2003; Abdul Hamid *et al.,* 2004; Hamilton, 2004).

Plant has 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 them balancing the gases of our environment. Plants are also recycling essential nutrients, establishing soils and soil fertility, protecting areas of water catchments. They keep ecological and climatic balances and helping to control rain fall through the process of transpiration. These benefits of plants are directly or indirectly linked with health care (Ensermu Kelbessa *et al*., 2004; Hamilton, 2004). Therefore, health care and botany have evolved as inseparable domain of human activities since various plant products have paramount importance in traditional health care systems.

According to Mekonen Teferi (1990) and Tesema Assefa *et al.*, (2003), about 80% of human population and over 90% livestock in Ethiopia rely on traditional medicine. In Ethiopia, there is a large magnitude of use and interest in medicinal plants due to socio- cultural acceptability, accessibility, affordability and biomedical benefits of the traditional medicinal plants. In other words, in all regions of the country traditional medicine has high acceptability since it is an integral part of the local culture and hence, people often rely on their efficient and less costly alternative health care (WHO, 2000; Konno, 2004).

### 2.6 Integration of Traditional Medicines with Modern Medicines

In Ethiopia health care coverage, management of disease and disorders is believed to be improved by the integration of modern and traditional medicines. According to Kebu Balemie *et al.* (2004), the adaptability base for the development of modern drugs is facilitated by keeping the efficacy, and quality of traditional medicines. This promotes its integration to the modern health system of the country. Integration in this case is an increase of health coverage through collaboration, communication, harmonization of the modern system with that of the traditional one while ensuring intellectual property, right and protection of traditional medicinal knowledge. Integration of the two systems is believed to be crucial due to the fact that people with different cultures, beliefs and locality have their own unique knowledge of traditional medicines and this helps for the development of modern health system (Dawit Abebe and Ahadu Ayehu, 1993; Yilma Desta *et al.,* 1996; Tsige Gebre-Mariam and Kaleab Asres, 2001; Bekele Tefera, 2004; Tadesse Beyene, 2008).

## 2.7 Threats to and Conservation of Medicinal Plants in Ethiopia

### 2.7. 1 Threats to Medicinal Plants

Ethiopia's traditional medicine as elsewhere in Africa is faced with problems of continuity and sustainability (Ensermu Kelbessa *et al.,* 1992). Now adays herbal practitioners have to walk greater distances for herb collections that once grew in the vicinity of their homes. This is because of availability of plants in general and medicinal plants in particular have been affected by a dramatic decrease in areas of native vegetation (Cunningham, 1996).

Similar to other countries of Africa, medical plant species of Ethiopia is vulnerable to problems of continuity and sustainability primarily due to loss of taxa of medicinal plants and loss of habitats (Ensermu Kelbessa *et al.,* 1992). It has also been reported that medicinal plant species are affected by unsustainable harvesting for export and extraction of pharmaceuticals (WHO, 1998; Farnsworth, 1985). Beside to these known factors which treat medicinal plant species, other condition like the types of the medicinal plant and the part used also affect the medicinal plant. For example harvesting the roots and barks of medicinal plant possess more of a threat than collecting leaves for medicinal value (Edwards, 2001, Haile Yineger, 2005). Besides to other factor, the younger generation under estimate the traditional system of healing (Sofowara, 1982). This is one of the problems for the advancement and the conservation of medicinal plants as well as associated knowledge gap created within the community.

A threat is a status or the position of a species which determines whether it will survive or be extinct in the future (Bizuayehu Behailu and Assefa Temesgen, 2017). Various human-induced and natural factors can threaten the survival of many medicinal plant species. However, the degree of threats varies from place to place and species to species (Agisho Habtamu *et al.*, 2014)

In general, studies in different parts of the country indicated that, medicinal plants were highly threatened by Environmental degradation, deforestation, agricultural expansion, over exploitation and population growth is the principal threats to medicinal plants in Ethiopia (Ensermu Kelbessa *et al.,* 1992, Zemede Asfaw, 2001, Kebu Balemie *et al.,* 2004, Mesfin Tadesse *et al.,* 2009, Mirutse Giday, 2001, Alemayehu Kefalew *et al.,* 2015, Birhanu Zerihun and Ayalew Sebsibe 2018). Medicinal plants can have uses other than sources of medicines and threats from over harvesting, may be due to or partly due to their collection for purposes other than medicinal uses.

### 2.7.2 Conservation of Medicinal Plants

Conserving maximum diversity within each species to ensure genetic resource, sustainable management of traditional medicinal plant becomes a potential source of new drugs for future. There is some conservation actions that have been undertaken around the world designed to protect threatened medicinal plants from further damage (Cunninghum, 1996). This includes in-situ and ex-situ conservation measures. Both in-situ and ex-situ conservation efforts are implemented to capture medicinal plant genetic resources. In-situ conservation is conservation of species in their natural habitat. Some traditional medicinal plants have to be conserved in-situ due to difficulty for domestication and management (Zemede Asfaw, 2001). Moreover, some plants fail to produce the desired amount and quantity of the active principles under cultivation out of their natural habitats. 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.

According to Zemede Asfaw (2001), medicinal plants can be conserved using appropriate conservational methods in gene banks and botanical gardens. This type of conservation of medicinal plants can also be possible in home gardens, as the home garden is strategic and ideal farming system for the conservation, production and enhancement of medicinal plants.

Home gardens are used as a place to conserve medicinal plants. They are agricultural spaces that typically contain wide plant diversity, including crops with excellent micronutrient properties. They are usually located close to the homestead; home gardens can accommodate women's food production and household responsibilities (FAO, 2005). The home garden agro ecosystem in Ethiopia maintains a wide range of taxa of perennial and annual crop plants. For poor rural people, medicinal plants represent affordable and locally available resources to address many diseases and health problems. As it was reported, home gardens have a great contribution to conservation of biodiversity in general and at the same time medicinal plants species can also be conserved, thus home gardens are strategies and ideal farming systems for the conservation, production, and enhancement of medicinal plants (Zemede Asfaw, 1995, Zemede Asfaw, 2001).

## 2.8 Importance of Medicinal Plants for Development of Modern Drugs

Historically, plants have provided a source of inspiration for novel drug compounds, as plants derived medicine have made large contribution to human health and well-being. Their role in the development of new drugs could be either by serving as a natural blue print for the development of new drugs, or as phytomedicine to be used for the treatment of diseases. Rapid developments and advances in science, technology, and the world economy have drastically changed the world and environment. With remarkable improvement in human health care on one hand and environmental deterioration on the other, a growing demand for natural products and phytomedicine has shifted research and development works toward new drug discovery. Many research institutions in this field have turned to traditional medicine, mainly the use of plants as source of new drugs. Traditional medicines play a key role in the development and advancement of modern studies by serving as a starting point for the development of novelty in drug (Pramono, 2002).

In addition, an increasing reliance on the use of medicinal plants in the industrialized societies has been traced to the extraction and development of several drugs and chemotherapeutics from these plants as well as from traditionally used rural herbal remedies (UNESCO, 1998). Furthermore, chemical structures derived from plants can be used as models for synthetic compounds (WHO, 2000). Most of plant derived drugs were originally discovered through the study of traditional cures and folk knowledge of indigenous people (Balick and Cox, 1996). Evidently, traditional Knowledge of medicinal plants is important in development of new modern drugs. Currently there are more drugs (e.g. aspirin from Ulmaria (Rosacea*e*), Quinine from *Cinchona pubescens* (Rubiaceae), Morphine from *Papaver somniferum* (*Papaveraceae*). About 80 drugs prescribed in the industrialized world as a whole, most of them were discovered based on information derived from ethnobotanical investigation (Balick and Cox, 1996).

In general, many investigations indicate the relevance of ethnobotanical information on medicinal plants to guide chemical screening for drug development. Traditional herbs, which have been proven for clinical efficacy and safety, were the first chosen for screening. Then plant materials collected and identified with reference to ethnobotanical information and photochemistry analysis were screened in consultation with local users of the herbal medicines are tested through photochemistry, animal experiments and clinical trials. It is then possible to

use them in the formulation of new medicines according to government regulations concerning new medicinal developments (Sheng, 2001).

Traditional medicines also contribute to the development of pharmaceutical treatments by providing raw materials derived from plants like digitalis, alkaloids, morphine, quinine, and vinca. Traditional medicine has contributed and is more preferable for new drug development because bioactive compounds derived from herbal medicines are more likely to have minimal toxicity.

The pharmacological activities of reported medicinal plants against harmful microbes were reported in different literature. Leaf extracts of *Croton macrostachyus* showed 152 antibacterial activities against Staphylococcus aureus and Shigella sonnei (Getnet Chekole *et al.*, 2015).( Mirutse Giday *et al.*2009) found the pharmacological activities of *Croton macrostachyus, Embelia schimperi, Phytolacca dodecandra, Ricinus communis* against helminthes and bacteria.*Embelia schimperi, Ocimum. Lamiifolium and Vernonia amygdalina* have been reported to possess antimicrobial effect against different microbial strains (Ermias Lulekal *et al.,* 2013).

# CHAPTER THREE

## 3. Materials and methods

### 3.1 Description of the study area

#### 3.1.1 Geographical Location of the study area

The study was carried out in Menz Keya Gebreal Woreda (MKGW) North Showa Zone; which is found in Amhara Regional State of Ethiopia. North Showa Zone contains 24 Woreda. The study area extends between $10^0$ 00′00″ North to$10^0$ 21′ 00″ North Latitude and $39^0$ 12′ 00″ East to $39^0$ 30′ 00″ East Longitude(Menz keya Gebreal Woreda WOFED,2005 ).The study area has altitude ranges between 1400-2960 meter above sea level. The lowest peak is at Zeret kebele while the highest peak is at Akafe kebele. It is found 327 km East of Addis Ababa and about 197 km far from zone town Debrebrehan in the south west direction. The total area of the wereda is 595.44 $km^2$ or 58,869.12 ha. This area is also bordered with south Wollo zone (Jamma wereda) in the North, Merehabete wereda in the west, Menz Gera Midir wereda in the East, Menz LaloMidir wereda and Moretna-Jiru weredas in the South, and, Basona-werena wereda and Mojana-wedera wereda in the South West. Totally, Menz keya Gebreal Woreda has13 kebeles.

According to the Central Statistical Agency of Ethiopia the wereda has a total population of, 61,463, of whom 30,565 are men and 30,898 women (CSA, 2007). The peoples are dependent on agriculture and livestock (use mixed system) (CSA, 2007).

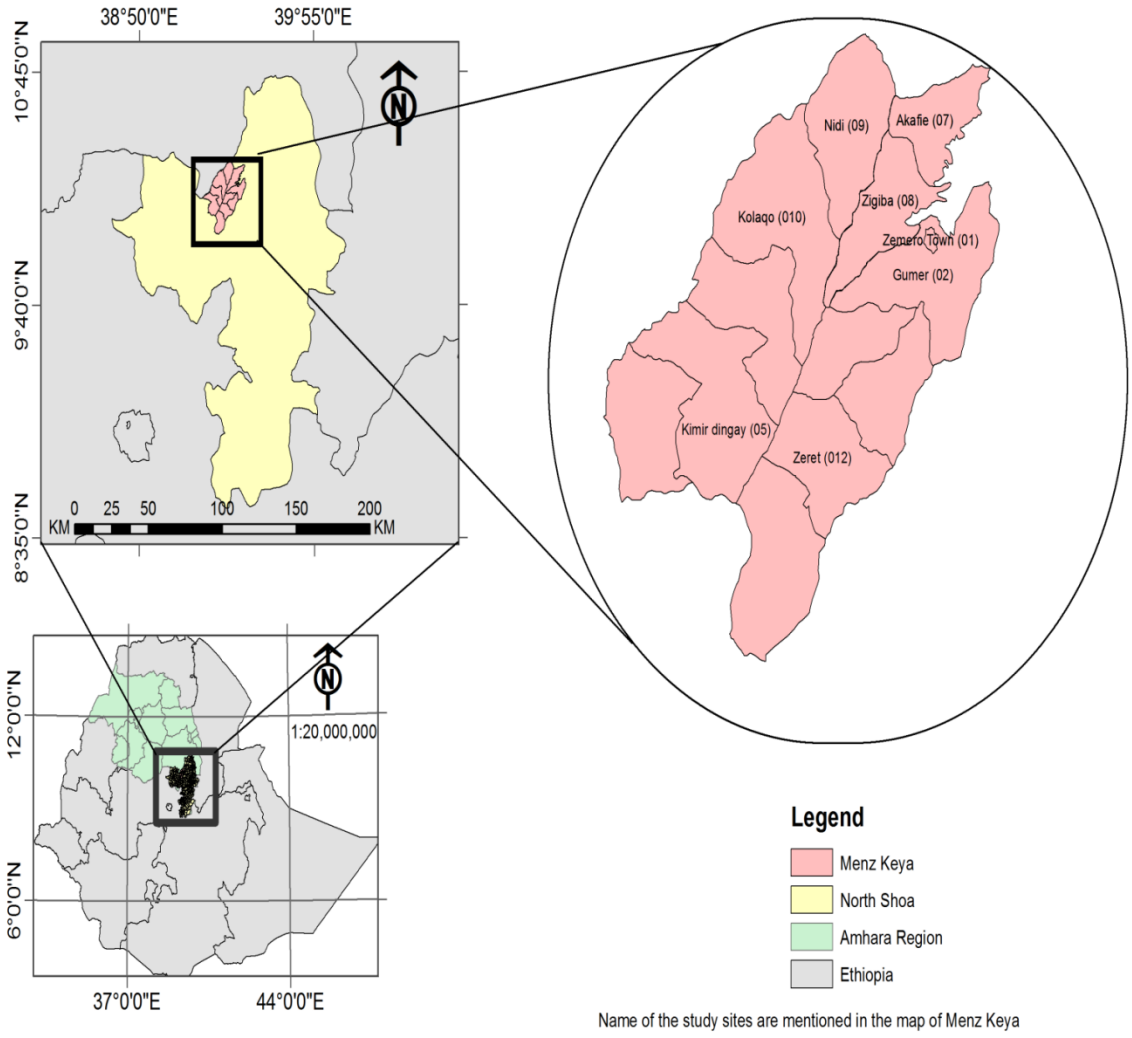



Figure 1 Map of Ethiopia showing Amhara region and the study woreda and kebeles

### 3.1.2 Demography and livelihood

The majority (99.89%) of inhabitants are followers of Ethiopian Orthodox Church (EOC), 0.08 % and 0.03 % Muslim and Protestant follower respectively. The ethnicity of the woreda people is Amhara and their language is Amharic. The economic income of the population is dependent on mixed system (both crop production and livestock). The total area of the woreda is 58,869.12 ha of which 16,708 ha is used for cultivation, 8,554 ha for grazing, 4,904 ha covered by forest and 28,703.12 ha other land uses.

The main crops and plant products cultivated in the study area are Lentil (*Lens culinaris*), Chick pea *(Cicer aestivum),* Wheat (*Tritrcum Spp),*Teff (*Eragrostis teff*), Barely (*Hurdeum vulgare*), Pea (*Pisum sativum*), Bean (*Vicia faba*), Lin seed (*Linum usitatimum*), Sorghum (*Sorghum bicolor*), Millet (*Eleusine coracana),* Garlic (*Allium sativum*), Shallot *(Allium cepa*), Apple (*Malus sylvastris*), Potato (*Solanum tuberosum*), Coffee (*Coffea arabica*), Avocado (*Persea americana),* Mango (*Mangifera indica*), Tomato (*Lycopersicon esculentum*) and Chat (*Catha edulis)* (MKGWAO, 2017).

Table 1 Major food crops in Menz keya Gebreal Woreda

| Crop category | Local name | Scientific name | English name |
|---|---|---|---|
| Vegetables | Nech shinkurt | *Allium sativum* | Garlic |
| | Key shinkurt | *Allium cepa* | Shallot |
| | Berbere | *Capsicum annuum* | Chilli |
| | Timatim | *Lycopersicon esculentum* | Tomato |
| | Duba | *Cucurbita Pepo* | Pumpkin |
| Fruit | Mango | *Mangifera indica* | Mango |
| | Birtukan | *Citrus sinensis* | Orange |
| | Lomi | *Citrus aurantifolia* | Lime |
| | Papaya | *Carica papaya* | Papaya |
| | Avocado | *Persea Americana* | Avocado |
| Stimulant | Chat | *Catha edulis* | Khat |
| | Buna | *Coffea Arabica* | Coffee |
| Root crop | Dinch | *Solanum tuberosum* | Potato |
| | Karot | *Daucus carota* | Carrot |
| | Keyser | *Beta vulgaris* | Sugar beet |
| Oil crop | Noug | *Guizotia abyssinica* | Niger seed |
| | Telba | *Linum usitatissimum* | Lin seed |
| | Gomenzer | *Brassica carinata* | Kale seed |
| Pulses | Bakela | *Vicia faba* | Bean |
| | Ater | *Pisum sativum* | Pea |
| | Shimbera | *Cicer aestivum* | Chickpeas |
| | Misir | *Lens culinaris* | Lentil |
| Cereals | Tef | *Eragrostis tef* | *Tef* |
| | Gabs | *Hordeum vulgare* | *Barley* |
| | Sandie | *Triticum aestivum* | *Wheat* |
| | Bekele | *Zea mays* | *Maize* |
| | Mashila | *Sorghum bicolor* | *Sorghum* |

### 3.1.3 Vegetation

The vegetation type of the study is dry evergreen Afromontane forest (DAF). DAF is characterized by *Olea europea* sub Spp. cuspidata, *Juniperus procera, Euphorbia* spp*, Carissa spinarum, Rosa abyssinica* (Zerihun Woldu, 1999). The presence of tree species such as *Olea europea* sub Spp. cuspidata, *Juniperus procera*, *Euphorbia* spp*, Carissa spinarum, Rosa abyssinica, Acacia abyssinica* gives good indication that a given vegetation type belongs to DAF ecosystem (Tamrat Bekele, 1993; Sebsebe Demissew and Friis, 2009).

### 3.1.4 Climate of the study area

The major agro-ecological zones of the Woreda based on the temperature and elevation are characterized as Dega, Woina-dega, and Qolla, (MKGWAO, 2017). The main rain seasons of the study area is between June to September and lowest rainfall is from October to February. The annual rainfall in this area is 866.4 mm. The rainfall distribution of the study area is bimodal. The mean monthly minimum temperature of ten years ranges from 6.08 $^{O}$C to 7.56 $^{O}$C while the maximum temperature ranges from 15.93 $^{O}$C to 19.2 $^{O}$C. The mean monthly minimum temperature was, 2.5 $^{O}$c recorded in December and the maximum 21.1 $^{O}$c recorded in February. (Mehal Meda Weather Station, 2017)

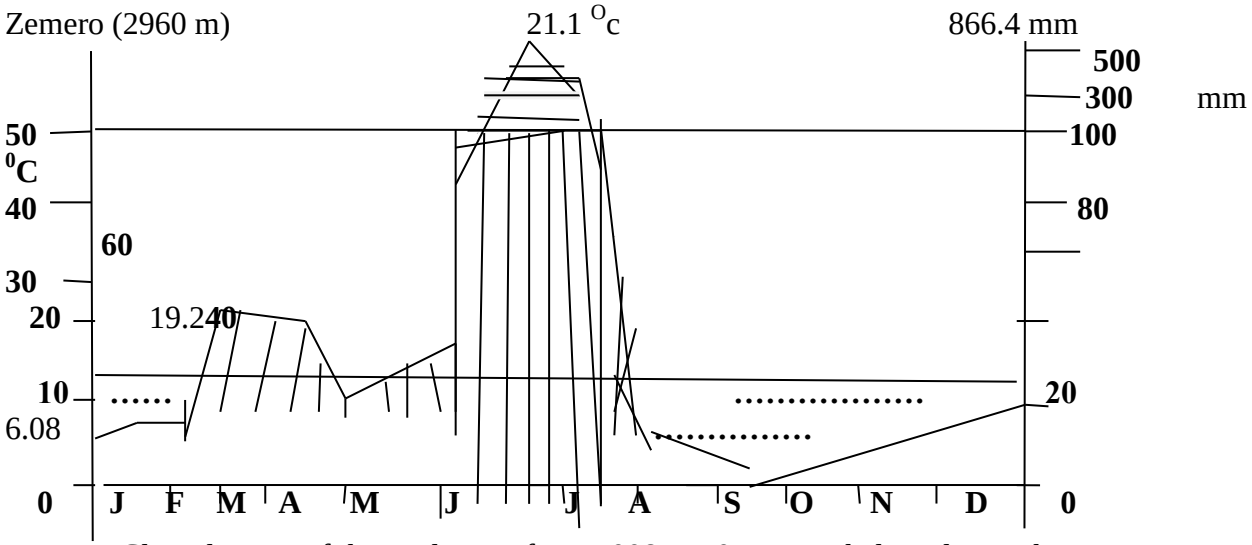



Figure 2 Climadogram of the study area from 2008 to 2017 at Mehal Meda weather station Wollo´s Kombolcha branch showing rainfall distribution and temperature variation

(Mehal Meda weather stationWollo´s Kombolcha branch, 2017)

### 3.2 Reconnaissance Survey and Selection of Study Sites

To gather all the required information about the medicinal plants different field equipment were used. These include woodenframe, blotter, plastic bag, plant digger, newspapers, rope, and cardboard were utilized for specimen collection, pressing, and drying. Additionally, some other writing materials such as pencils, pens, notebooks, and markers were used.

A reconnaissance survey of the study area was conducted from October 3 to November 1 /2022. Menz Keya Gebreal Woreda has a total of 13 kebeles. Out of these, 8 kebeles found in the different agroecological zone, and known for the abundance of medicinal plants with herbalists available were selected for ethnobotanical data collection. The traditional healers, used as key informants, were identified with the assistance of local authorities, elders, and knowledgeable persons in the study woreda.

### 3.3 Sources of an ethnobotanical data

Ethnobotanical data were collected from both primary and secondary sources following the methods given by Martin (1995) and Cotton (1996).In the study kebele's primary data were collected by using guided field walks, focus group discussions, semi-structured interviews, and Market survey methods.Secondary source, of information was obtained from government offices including woreda agriculture office, woreda health organization office.

### 3.4 Ethnobotanical data Collection methods

In ethnobotany, data collection techniques are computed by different methods such as group discussion, semi-structured interviews, market surveys, and guided field walks with informants (Alexiades 1996). Ethnobotanical data were collected from November 8/2021 to January 3/2022 following the method in Martin (1995) and Cotton (1996). Accordingly, semi-structured interviews, guided field walks; focus group discussions, market surveys, and specimen collection and identification were applied to get indigenous knowledge of local communities in the Menz Keya Gebreal Woreda on medicinal plants. All of the interviews and group discussions were held based on the checklist of questions prepared before hand in English language and translated into Amharic. Following these interviews, discussions were carried out with informants and key informants. During the interview on medicinal plants, the following pieces of information were obtained: the vernacular name of the medicinal plants, type of disease treated, parts of the plant

used, methods of preparations, mode of administration, sources of collections (wild/cultivated), degree of abundance (rare/common), duration of treatment, conservation practices and use other than medicinal value. Different ethnobotanical techniques were employed to collect information on knowledge and management of traditional medicinal plants used by the local people in the study area.

### 3.4.1 Guided Field Work

During field observation, interviews were conducted while walking through the study sites to collect data on medicinal plants. Guided field interviews were made with informants and all relevant data including the vernacular names of plants, habits, the abundance of the plant, the parts used, the preparation methods and modes of administration and disease condition treated as well as the strategies they use for the conservation of medicinal plants and the preservation of the indigenous knowledge on medicinal plants recorded. Field observations were performed with the help of local guides, as well as the respondants in the study area.

Figure 3 photo shows guided fieldwork in Menz Keya Gebreal Wereda, Kebele 02. Photo courtesy by Yohannes Manasibot in October 2022

### 3.4.2 Semi-structured interview

Semi- structured interviews were prepared to collect the data and used as guide following Martin (1995); Cotton (1996).Semi structured interview allowed the investigator to provide supplementary question when needed. The items in the semi-structured interview were first prepared in English based on modified other related literatures (Appendix8).Then they were translated into Amharic. Most of the respondants were focused on the use, availability, distribution and threats of medicinal plants in Menz Keya Gebreal Woreda. Key informants were first interviewed individually (Appendix7) to mention about types of human and livestock ailments in the study area, the local names of the plants they use to treat diseases, diseases treated, part(s) of plants used, methods of gathering, methods of preparation of remedies, route of administration of remedies, application of the remedies, dosage, side effects of the treatment, use of the plants other than medicine, types of threat and conservation problems.

Figure 4 photo shows a semi-structured interview in Gumer kebele. Photo courtesy by Maschal Abera in November 2022

### 3.4.3 Focus Group Discussion (FGD)

Focus group discussion was used to gain in-depth understanding about medicinal plants, and was used to collect data. These were done by forming four small group discussions, which is a combination of both key informants and general informantsin Zemero, Gumer, Akafe and Nidi kebele and with one woman and four men allow them to share ideas, experience and opinions on the use of medicinal plants. Four respondents (both key and general informants) were participated in the four kebele for one and half hours. They were interacted face to face and actively discusesed on use of medicinal plants.

Figure 5 Group discussions with key informants in Gumer kebele (Photo courtesy by Maschal Abera in November 2022

### 3.4.4 Specimens collection and identification

Medicinal plants were collected from wild and cultivated areas pressed, and dried for identification. The local name and growth habits of the medicinal plants were recorded for each plant species. The primary identification was done in the field. The collected voucher specimens were taken to the National Herbarium of Ethiopia (Addis Ababa University). The identification was done in June by using various volumes of the Flora of Ethiopia and Eritrea. Finally, the identification of the voucher specimens were confirmed by my advisor Dr. Ermias Lulekal and deposited at National Herbarium of Ethiopia (Addis Ababa University).

Figure 6 Plantspecimens drying and pressing after fieldwork at zemero kebele: Photo courtesy by Eshetu Akalu in October 2023

Figure 7 Plantspecimens identification at AAUnational herbarium: Photo courtesy by Asefa Belachew in January 2023

### 3.4.5 Market survey.

Market survey was conducted at selected two local markets Zemero and Kimir dingay that are the main markets to study site. Semi- structured interviews were made with medicinal plants sellers to assess the variety and amount of herbal drugs in the market. Thus, the main purpose of market survey was to record local name, types of preparation, source of collection, and mode of administration, influence of marketability, and transmission of traditional knowledge, threats and conservation of medicinal plants.

Figure 8 Photo shows a market survey of the Keble Zemero and Kimirdingay markets: Photo courtesy by Maschal Abera in November 2022

### 3.4.6 Ethical Consideration

Data collection was performed after permission was obtained from Menz Keya Gebreal Woreda administrative offices and the individuals who were targeted for the research. Moreover, taking cares of the normative exercise and innate cultural experiences [clothing, feeding, speech habit but not the only] of the local people who were the stakeholders.

Figure 9 photos represent Ethical considerations: Photo courtesy by Maschal Abera in November 2022

### 3.5 Ethnobotanical Data Analysis

The collected data were analyzed by the following basic analytical tools: paired comparison, direct matrix ranking, preference ranking, and informant consensus factor (IF), fidelity level (FL) about medicinal plants in the study site. According to ethnobotanical data analysis, Martin (1995) and Cotton (1996) recommended the methods. The collected data were presented by using charts, table's graphs and words.

### 3.5.1 Descriptive statistics

Descriptive statistical methods such as percentage, graph, and frequency were employed to analyze and summarize the data on medicinal plants, associated knowledge, management methods, use, and conservation. The full information gathered about medicinal plants that are reported by local people such as medicinal value, methods of preparation, route of application, disease treated, dosage, part, and habit used was analyzed through descriptive statistical analysis.

### 3.5.2 Preference ranking

Preferences ranking of seven medicinal plants on most preffered for treating evil eye and evil sprit were reported after selecting ten key informants. The informants were asked to compare the given medicinal plants based on their efficacy and to give the highest number (7) for most effective and the lowest number (1) for the least effective plant in treating evil eye and evil sprit. *Echinops kebericho* scored 75 ranked first followed by *Ruta chalepensis* and *Cucumis ficifolius* respectively. The least preferred species was *Caparis tomentosa* scored 51and ranked seventh.

### 3.5.3 Direct matrix ranking

As Eskedar (2011) describes by way of referring to Martin (1995) and Cotton (1996), direct matrix ranking was conducted. This was conducted considering several attributes of medicinal plants rather than a single dimension. These were uses of medicinal plants commonly reported by six key informants. Based on the information gathered from informants, nine multipurpose plant species were selected out of the total medicinal plants, and use diversities of these plants were listed for selected key informants to assign the use values (5=best, 4=very good, 3=good, 2=less use, 1=least used and 0=no value) to each species based on the criteria put in. The use values include medicinal, fodder, ornamental use, food, environmental use firewood

### 3.5.4 Paired comparison

Paired comparisons were used for evaluating the level of importance of five selected plants being compared. Eight informants were selected and asked to choose the best five medicinal plants to treat snake bite according to Martin (1995). After identifying five plants species, which have high medicinal value, and efficacy. These five most effective plants species to treat snake bite were computed. *Polygala abyssinica* was ranked first the most preferred medicinal plant

cited by respondents to treat snake bite disease followed by *Calpurnia aurea, Carissa spinarum* respectively.*Jasminum abyssinicum* ranked least to traet snake bite.

### 3.5.5 Informant Consensus Factor (ICF)

In the Ethnomedicinal study, ICF was computed to determine the most important human and livestock ailment categories in astudy area, and identify potentially effective medicinal plant species in the respective disease categories.

The traditional remedies and corresponding diseases were grouped into different categories, to compute ICF.Then ICF(Trotter and Logan,1986) was computed by using the formula: ICF = Nur-Nt/Nur-1, Nur, The number of use citations in each disease category (no of informants used) NT=the number of times a species is used (apps used time)

### 3.5.6 Index of Fidelity Level (FL)

This is one of the commonly used methods in Ethnomedicinal research. This helps to compare and determine the relative healing potential of medicinal plants.The index of Fidelity level (FL) was computed by the formula (FL=Ip/IuX100), where **Ip** is the number of informants who independently cited the importance of a species for treating a particular disease, and **Iu** is the total number of informants who reported the plant for any given disease (Alexiades, 1996).

# CHAPTER FOUR

## 4. RESULTS

### 4.1. General information about the informants in the study area

#### 4.1.1. Ages of informants in the study area

The distribution of informants with respect to age class showed that, the majority of knowledgeable elders about medicinal plants were in the age class of 50- 85 Table 1).

Table 2 Age class of informants' in the study area

| **Age classes** | **Number of respondents** | **Percentage (%)** |
|---|---|---|
| 19-34 | 8 | 8.9% |
| 35-49 | 20 | 22.2% |
| 50-64 | 30 | 33.3% |
| 65-79 | 23 | 25.6% |
| 80-94 | 9 | 10% |
| **Total** | **90** | **100%** |

#### 4.1.2. Marital status of informants in Menz keya Gebreal wereda

Out of the total informants majority of informants were married 83.3% but 4.4%, 8.9% and 3.3% were single, divorced and widowed respectively (Table 2).

Table 3 Marital status of informants in Menz Keya Gebreal Woreda

| **Marital status** | **Sex** | | | |
|---|---|---|---|---|
| | **M** | **F** | **Total** | **Percentage (%)** |
| Married | 69 | 6 | 75 | 83.3% |
| Single | 2 | 2 | 4 | 4.4% |
| Divorced | 6 | 2 | 8 | 8.9% |
| Widowed | 2 | 1 | 3 | 3.3% |

### 4.1.3. Educational statusof the respondents

The largest number of educational status of informants involved in the interview were literate category (can read and write) where as graduate and secondary school educational category were the least involved during interview (Table 3).

Table 4 Educational status of informants in Menz Keya Gebreal Woreda

| **Educational category** | **Number of informants** | **Percentage** |
|---|---|---|
| Do not read and write | 20 | 22.2% |
| Read and write | 50 | 55.6% |
| Primary school(1-8) | 10 | 11.1% |
| Secondary school(9-12) | 5 | 5.6% |
| Graduate | 5 | 5.6% |
| **Total** | **90** | **100%** |

### 4.1.4. Distribution and source of traditional medicinal knowledge in the study area

The major way of transfer of traditional knowledge on types of medicinal plants, methods of diagnosis and treatment among traditional healers in the study area were by word of mouth to a family member especiallyto an elder son. Such knowledge is kept secretly due to collection of incomes, get dignity and most people think about the knowledge of medicinal plants escape from herbalist when told to other person except family members since it passes only within family member. None of the respondents had any written documents on traditional medicine, whereas all healers reported that they had received the knowledge from their parents, literate and non-literate person, grandparents and friend's orallythrough observation and trial and error practice, in turn sharing it to their children in a similar manner. In the study area, the major source of traditional medicinal knowledge was ancestral family such as father and mother (33.3%) and grandfather/grandmother (27.8%) where as the least source of indigenous medicinal knowledge in the study site were younger's member (1.1%).

Table 5 Indigenous knowledge transfer among different informant groups in Menz Keya Gebreal Woreda

| **Distribution and sources of knowledge** | **Frequency** | **Percent (%)** |
|---|---|---|
| Father /mother | 30 | 33.3% |
| Illiterate | 5 | 5.6% |
| Young members | 1 | 1.1% |
| Observation | 6 | 6.7% |
| Grandfather/grand mother | 25 | 27.8% |
| Key/knowledgeable | 10 | 11.1% |
| Literate | 8 | 8.9% |
| Trial and error | 5 | 5.6% |
| **Total** | **90** | **100%** |

### 4.1.5. Diversity of medicinal plants in the study area

In Menz Keya Gebreal Woreda there are diverse groups of medicinal plants found. A total 70 traditional medicinal plants were collected in the woreda which are found in the different agro ecological zone. Their growth forms include herbs, shrub, tree, shrub or tree, and climbers. Most of the thus traditional medicinal plants were harvested from the wild or natural environment followed by the home garden.

A total of 70 traditional medicinal plant species belonging to 40 families and 64 genera were collected from wild and cultivated area in the study area. *Asteraceae* was the dominant family contributing 6 species (8.5%), followed by *Lamiaceae,* 5 species (7.1%), *Fabaceae* 4 species (5.7%) and *Euphorbiaceae* 4 (5.7%) species. The remaining families placed according to the species number they contain.

### 4.1.6. Growth habit of medicinal plants

In the study area shrubs were the most dominant habits represented by 32 species (45.7%) in which the dweller of the area highly utilized to treat both human and livestock diseases they may suffer followed by trees represented by 20 species (28.5%) herbs represented by 14 species (20%), and climber the last one represented by 4(5.7%) species.

Table 6 Growth habit of medicinal plants used to treat different disease

| Habit category | Frequency | Percentage |
|---|---|---|
| Herb | 14 | 20% |
| Shrub | 32 | 45.7% |
| Tree | 20 | 28.6% |
| Climber | 4 | 5.7% |
| **Total** | **70** | **100** |

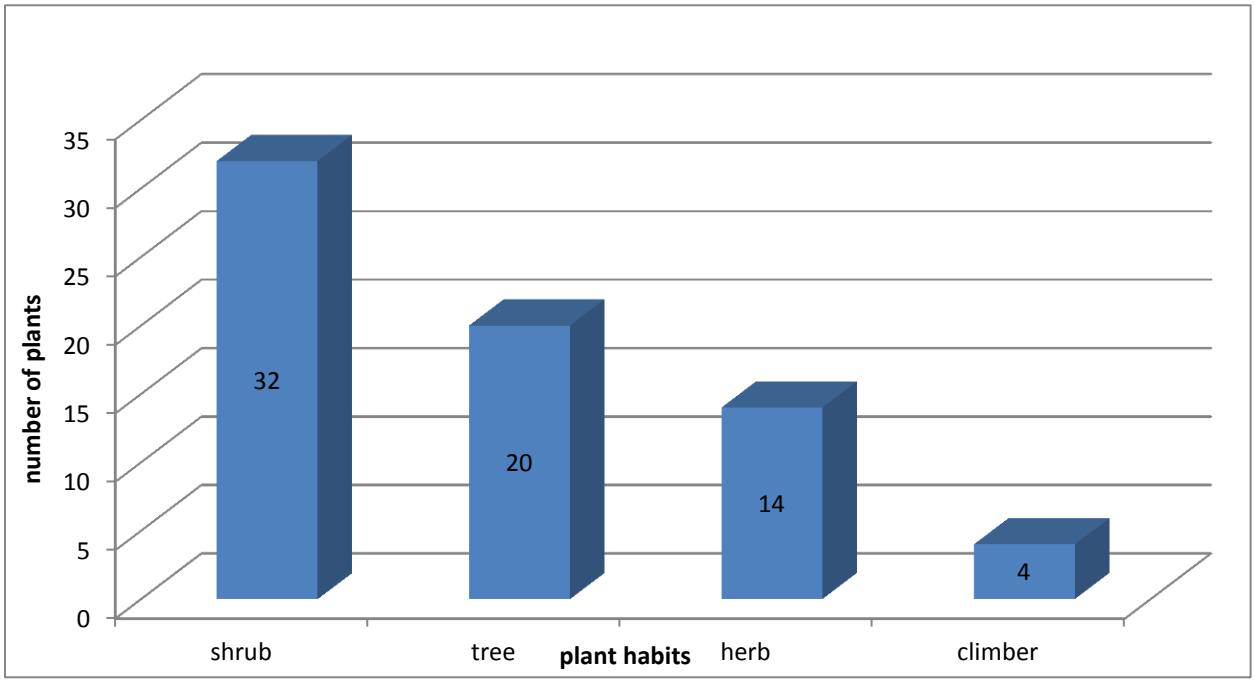



Figure 10 Growth habits of medicinal plants in the woreda

### 4.1.7 Source

Regarding the sources of traditional medicinal plants, around 70 plants were collected from the study area, 45(64.3%) from the wild or natural environment, 6(8.6%) from the cultivated and 19(27.1%) from both wild environment and cultivated area.

Table 7 Major sources of Medicinal plants in Menz Keya Gebreal Woreda

| **Source** | **Number** | **Percentage %** |
|---|---|---|
| Wild Medicinal plant | 45 | 64.3% |
| Cultivated Medicinal plant | 6 | 8.6% |
| Both | 19 | 27.1% |
| **Total** | **70** | **100%** |

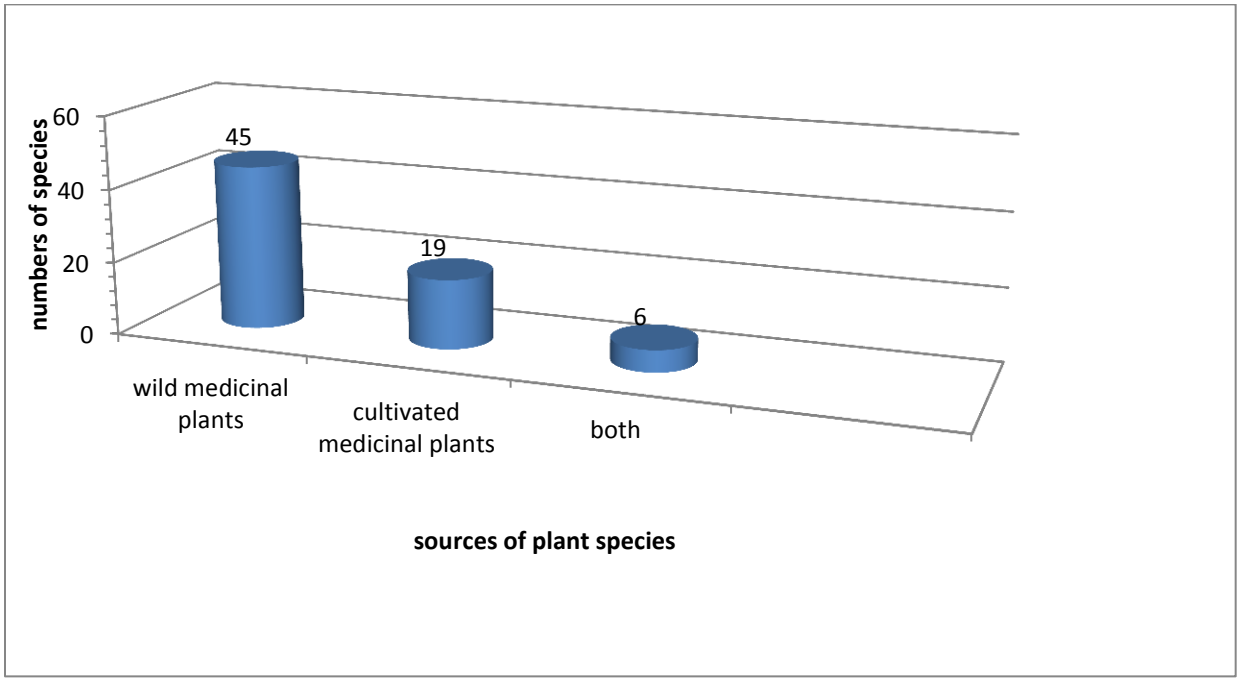
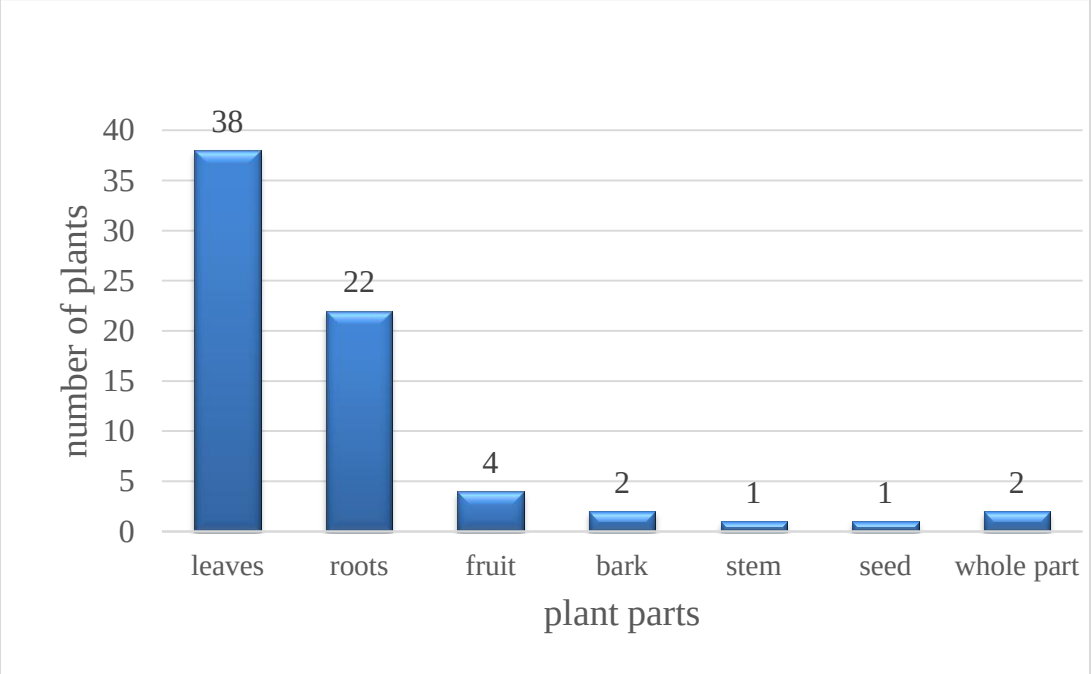



*Figure 11 major sources of medicinal plants in the woreda*

### 4.1.8 Plant parts used for remedy preparation to treat human ailments

The most frequently utilized plant parts were leaves 38 species (54.3%) of the total recorded medicinal plants followed by root, fruit, and bark which accounted for 22 species (31.4%), 4 species (5.7%) and 2 species (2.8%) respectively. Leaves were the most utilized plants part in the preparation of remedies.The less utilized medicinal plants as indicated in the figure11, were stem,seeds and whole parts which accounted 1(1.4%), 1(1.4%) 2(2.8%) respectively.

Figure 72 plant part used in Menz Keya Gebreal Woreda




### 4.1.9 Mode of Preparation

Regarding the ways of preparing medicinal plants, the local communities employed various methods of preparation of medicinal plants for different types of ailments. The variation was determined by the variation of the types of disease treated and the actual site of the ailments. The principal methods of plant part remedy preparation forms were Crushing, mixed pounding and Creaming 31(25.4%) followed by Crushing and pounding (14.7%), the least condition of preparation was chewing 1(0.8%) showed in the following table.

Table 8 Ways of remedy preparation for human ailments in Menz Keya Gebreal Woreda

| **Ways of preparation** | **Number** | **Percentage %** |
|---|---|---|
| Crushing, mixing and boiling | 13 | 10.6% |
| Crushing and pounding | 18 | 14.7% |
| Crushing, mixed pounding and Creaming | 31 | 25.4% |
| Pounding and squeezing | 10 | 8.1% |
| Crushing& powdering | 13 | 10.6% |
| Chewing | 1 | 0.8% |
| Pounding and filtering | 4 | 3.2% |
| Crushing, mixing and Boiling | 5 | 4.0% |
| Grounding and powdering | 6 | 4.9% |
| Crushing and creaming | 11 | 9.0% |
| Pounding and creaming | 5 | 4.0% |
| Pounding and roasting | 2 | 1.6% |
| Mix, pound and squeezed | 3 | 2.4 % |

Figure 8 Modes of remedy preparation and application (%) to treat human ailments in menz Keya Gebreal Woreda.

### 4.2. Routes of Remedy administration

Various routes of administration of traditional medicinal plants were used by the local community in the Menz Keya Gebreal Woreda. As pointedout in the figure number12, the majority of the medicinal plants recorded in the study area were taken in oral way which accounted 37 species (52.8%) followed by dermal 31 species (44.2%). Nasal routes of administration ranked third which was represented with 6 species (8.5%) and the else routes of administration were dermal/oral 3 species (4.3%), oral/nasal 3 species (4.3%), optical 2 species (2.8%) and ears 1(1.4%) species.

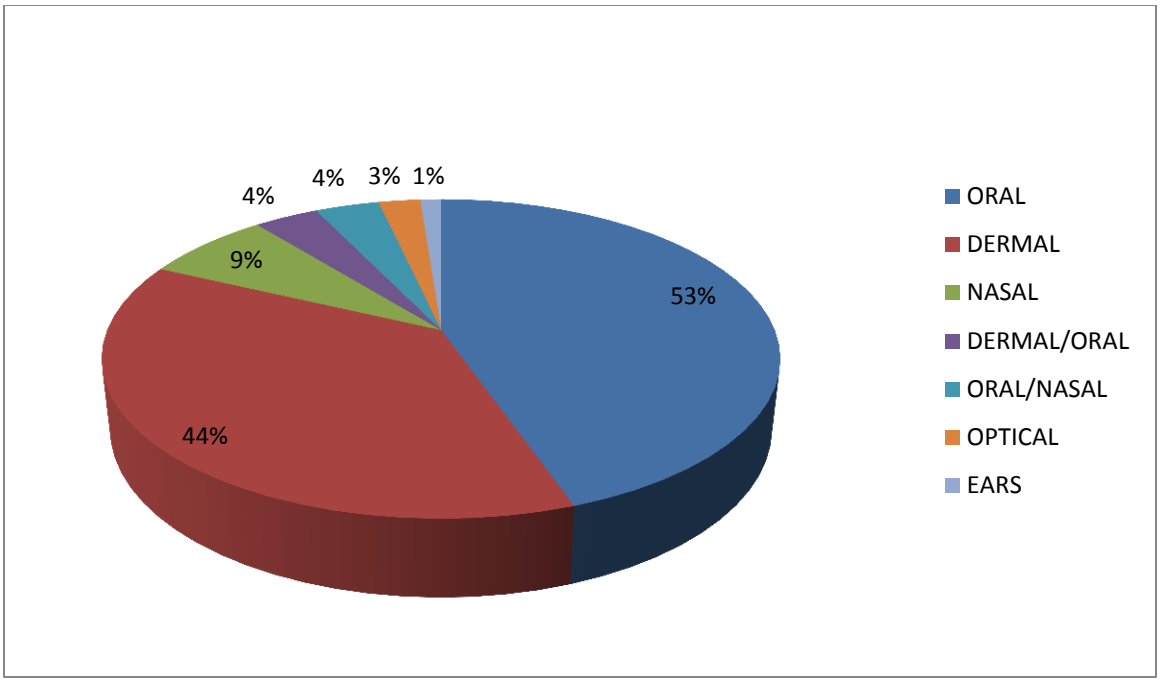



Figure 9 Route of administration and application to treat human ailments in Menz Keya Gebreal Woreda.

### 4.3. Conditions of remedy preparation

Most of the remedy preparations in Menz Keya Gebreal Woreda used by the local community were prepared from fresh condition which accounted 59 species (84.3%) followed by fresh/dried which was represented with 8 species (11.4%) and the last one was dried condition represented with 3 species (4.3%).

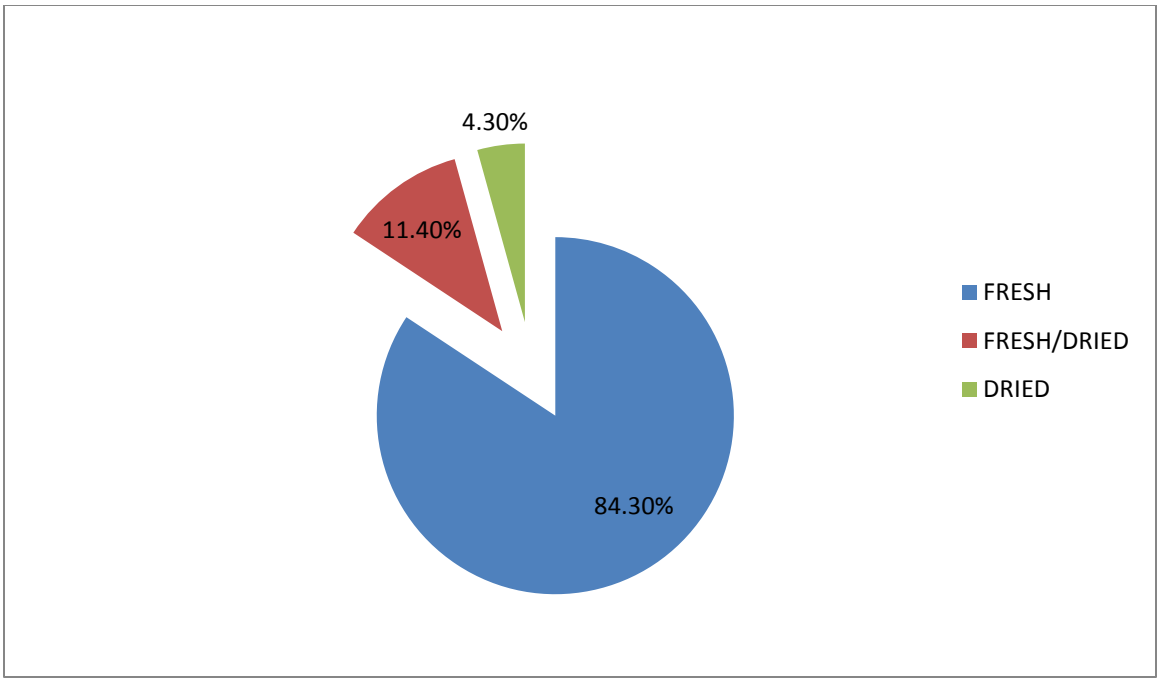



Figure 10 methods of preparation of medicinal plants in Menz Keya Gebreal Woreda.

### 4.4. Mode of remedy preparation and application

Traditional healers in the study area reported that the prepared traditional medicines were applied in several traditional methods as they followed various ways of remedy preparation. The major modes of remedy preparation in the study area were creaming accounted for the largest 35(28.68%) followed by drinking 30 (24.59%), swishing, 17(13.93%), eating 11(9.01%), sniffing 11(9.01), tieon10 (8.19%) and smoking 8 (6.55%) which indicated in the Figure number 15 below. Since most human ailments skin and other external illnesses are obliged to use traditional medicines in the forms of creaming or painting herbal preparation on an infected part, the smearing mode of application of traditional medicines that through dermal routes of administration seized the highest rank in the study area.

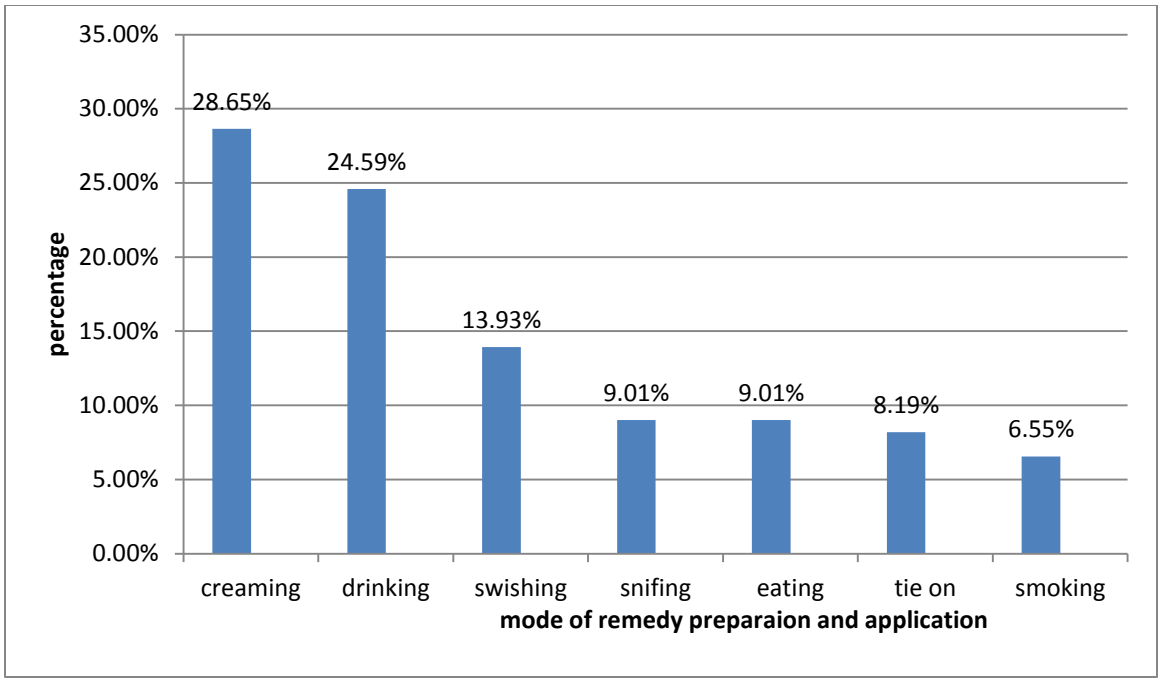



Figure 11 Way of application of traditional medicine in Menz Keya Gebreal Woreda

### 4.5. Solvents and additives

Most of the remedies were taken with different additives or solvents, so traditional practitioners used different additives to reduce pain, to get better taste and reduce adverse effects such as vomiting and diarrhea and enhance the efficacy and healing condition explained by informants during applying for traditional medicines. These additives include boiled tea, boiled coffee, butter, sugar honey, milk, and tella. Ingredients were added to medicine to prepare plant remedies in the study area to give flavor, reduce test, frustration, and overdose, and easy to take. Analysis of ingredients added or solvents that were utilized during remedy preparation for human ailments in the study site were indicated in figure (Table 9).

Table 9 Types of ingredient or solvent used for medicinal preparation in Menz Keya Gebreal Woreda

| **Types of ingredient** | **Number of preparations** | **Percentage** |
|---|---|---|
| Without ingredient | 50 | 40.98% |
| Water | 33 | 27.04% |
| Butter | 10 | 8.19% |
| Honey | 5 | 4.09% |
| Milk | 3 | 2.45% |
| Coffee | 9 | 7.37% |
| Tella | 4 | 3.27% |
| Injera | 5 | 4.09% |
| Salt | 3 | 2.45% |
| **Total** | **122** | **100%** |

### 4.6. Dosage and Antidotes

There is no clear standardized dose for traditional medicinal plants given to patients. However, approximate dosages were reported to be determined based on age, gender, pregnancy status and physical appearance of patients visiting local herbalist. Traditional medicinal plant preparations were measured with Local unit's suchas small cups (**sini**), chalice, finger tips, spoon and hand. But these units and techniques of local measurement were not standardised to determine the precise amount. For medicinal plants that were taken typically, they did not have a clear-cut dosage. Until recovery from the disease, the disappearance of the symptoms of the disease, the vanishing of the disease sign and the judgment of the healer to stop the treatment were some of the criteria used in determining the duration of the administration of the dosage. Most of the medicinal preparations in the Woreda were without antidotes. Somecommonly reported antidotes for herbal preparations withadverse side effects were milk, coffee, honey, tella and butter.

### 4.7. Ranking of Medicinal plants in the study area

#### 4.7.1 Preference ranking

*Echinops kebericho (75)* ranked first indicating that it is the most effective plant to treat evil eye followed by *Ruta chalepensis* and *Cucumis ficifollius*. Finally, *Capparis tomentosa* was the least effective for treating *Evil eye and evil sprit* (Table 10).

Table 10 Preference ranking of medicinal plants used for treating Evil eye and evil sprit

| List of Medicinal plants | Respondents from R1-------R10 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | R1 | R2 | R3 | R4 | R5 | R6 | R7 | R8 | R9 | R10 | Total | Rank |
| *Ruta chalepensis* | 7 | 6 | 7 | 8 | 8 | 8 | 7 | 7 | 7 | 8 | 73 | 2nd |
| *Cucumis ficifolius* | 7 | 8 | 6 | 8 | 7 | 7 | 8 | 3 | 6 | 8 | 72 | 3rd |
| *Capparis tomentosa* | 6 | 8 | 6 | 6 | 8 | 4 | 3 | 1 | 5 | 4 | 51 | 7th |
| *Artemisia abyssinica* | 7 | 6 | 7 | 5 | 6 | 3 | 7 | 7 | 5 | 5 | 58 | 5th |
| *Echinops kebericho* | 8 | 7 | 8 | 8 | 8 | 7 | 8 | 8 | 7 | 6 | 75 | 1st |
| *Laggera tomentosa* | 8 | 5 | 7 | 6 | 7 | 7 | 5 | 7 | 6 | 3 | 61 | 4th |
| *Schinus molle* | 7 | 6 | 8 | 5 | 7 | 2 | 4 | 5 | 6 | 4 | 54 | 6th |

### 4.7.2 Direct matrix ranking

Based on the information gathered from informants, multipurpose plant species were selected out of the total medicinal plants, and use diversities of these plants were listed for selected key informants to assign the use values (6=excellent, 5=best, 4=very good, 3=good, 2=less use, 1=least used and 0=no value) to each species based on the criteria put in. The use values include medicinal, fodder, ornamental use, food, environmental use firewood, and the results are summarized in (Table11)

Table 11 direct matrix ranking (DMR) for 9 medicinal plant species for their multipurpose use

| Multipurpose use | ***Cordia Africana*** | ***Eucalyptus globulus*** | ***Ficus sur*** | ***Myrica salicifolia*** | ***Hagenia abyssinica*** | ***Juniperus procera*** | ***Euclea racemosa*** | ***Rosa abyssinica*** | ***Acacia abyssinica*** | Total | Rank |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Medicine | 4 | 4 | 3 | 4 | 4 | 2 | 4 | 4 | 4 | **33** | **1st** |
| Agricultural tool | 4 | 3 | 1 | 3 | 2 | 2 | 3 | 2 | 1 | **21** | **6th** |
| Charcoal | 0 | 4 | 1 | 4 | 1 | 3 | 3 | 1 | 5 | **22** | **5th** |
| Food | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 2 | 0 | **3** | **8th** |
| Fencing | 1 | 4 | 1 | 3 | 4 | 4 | 4 | 3 | 3 | **27** | **4th** |
| House hold materials | 3 | 3 | 1 | 3 | 3 | 3 | 1 | 1 | 3 | **21** | **6th** |
| Timber | 5 | 5 | 4 | 2 | 5 | 5 | 1 | 1 | 3 | **31** | **2nd** |
| Fire wood | 2 | 5 | 2 | 5 | 3 | 2 | 4 | 3 | 4 | **30** | **3rd** |
| **Total score** | **19** | **28** | **14** | **24** | **22** | **21** | **20** | **17** | **23** | | |
| **Rank** | **7th** | **1st** | **9th** | **2nd** | **4th** | **5th** | **6th** | **8th** | **3rd** | | |

### 4.7.3 Paired comparison

After identifying five plants species, which had high medicinal value, and efficacy level to specific disease for treatment, paired comparison was conducted. These five most effective plants species in treating snake bite were computed. *Polygala abyssinica* was ranked first as the most preferred medicinal plant cited by respondents to treat snake bite followed by *Calpurnia aurea, Carissa spinarum* and *Jasminum abyssinicum.*

Table 12 Paired comparisons of 5 medicinal plants to treat snake bite

| List of medicinal plants | Respondents labeled from R1 to R8 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | R1 | R2 | R3 | R4 | R5 | R6 | R7 | R8 | Total | Rank |
| *Jasminum grandiflorum* | 2 | 3 | 3 | 2 | 2 | 1 | 4 | 4 | 21 | 5th |
| *Cucumis ficifolius* | 4 | 5 | 3 | 2 | 1 | 2 | 4 | 3 | 24 | 4th |
| *Carissa spinarum* | 5 | 4 | 4 | 5 | 4 | 3 | 2 | 2 | 29 | 3rd |
| *Polygala abyssinica* | 4 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 38 | 1st |
| *Calpurnia aurea* | 5 | 5 | 4 | 4 | 3 | 3 | 4 | 4 | 32 | 2nd |

### 4.7.4 Informant consensus factor (ICF)

In the Ethnomedicinal study, ICF was computed to determine the most important human and livestock ailment categories in a study area, and identify potentially effective medicinal plant species in the respective disease categories.

We grouped traditional remedies and corresponding diseases into different categories, to compute ICF. Then ICF was computed by using the formula: ICF = Nur- Nt/Nur-1, Nur, The number of use citations in each disease category (no of informants used) NT=the number of times a species is used (apps used time. Accordingly, reported traditional remedies and corresponding diseases were grouped into 18 categories for humans. The results of the study showed that diseases that were frequent in the study area have higher informant consensus factor. It is further shown that medicinal plants that are effective in treating certain diseases and well known by community members also have higher ICF values (table 13).

Table 13 ICF values of medicinal plants used for treating human ailments in Menz Keya Gebreal Woreda

| No | Disease categories | Nt | Nur | ICF value |
|---|---|---|---|---|
| 1 | Toothache and headache | 5 | 40 | 0.89% |
| 2 | Eye diseases and ear problems | 5 | 35 | 0.88% |
| 3 | Dermatological diseases | 4 | 50 | 0.93% |
| 4 | Cough and the common cold | 3 | 32 | 0.93% |
| 5 | Eczema and ring warm | 4 | 36 | 0.91% |
| 6 | Malaria | 4 | 25 | 0.875% |
| 7 | Diarrhea and Amoeba | 4 | 41 | 0.92% |
| 8 | Nasal bleeding and Blood clot | 3 | 12 | 0.81% |
| 9 | Stomach ache and Gastrointestinal infection | 2 | 14 | 0.92% |
| 10 | Febrile illness and loss of appetite | 4 | 25 | 0.87% |
| 11 | Hypertension | 3 | 19 | 0.88% |
| 12 | Sexually transmitted disease and Liver infection | 4 | 10 | 0.66% |
| 13 | Injuries and Fire burn | 4 | 15 | 0.78% |
| 14 | Parasitic worm related disease | 4 | 18 | 0.82% |
| 15 | Evil eye, evil sprite and Rabies | 4 | 58 | 0.94% |
| 16 | Herpes simplex and urine retention | 4 | 12 | 0.72% |
| 17 | Intestinal parasite and gastric ulcer | 3 | 13 | 0.83% |
| 18 | Snakebite | 5 | 44 | 0.90% |

### 4.7.5 Index of Fidelity Level (FL)

This is one of the commonly used methods in Ethnomedicinal research. The highest fidelity level (95.3%) was recorded for *Allium sativum* followed by *Ocimum lamifolium* (93.1%), *Cucumis ficifolius* (92.8%) and *Polygala abyssinica* (91.6%), (Table 14).

Table 14 Fidelity level (FL) values of medicinal plants to treat human ailments

| No | Lists of medicinal plants | Therapeutic category | Ip* | Iu* | FL (%)* |
|---|---|---|---|---|---|
| 1 | *Allium sativum* | Common cold and malaria | 26 | 27 | 96.3% |
| 2 | *Polygala abyssinica* | Snake bite and evil eye | 22 | 24 | 91.6% |
| 3 | *Hagenia abyssinica* | Tape worm | 15 | 19 | 78.9% |
| 4 | *Ocimum lamifolium* | Febrile illness | 27 | 29 | 93.1% |
| 5 | *Calpurina aurea* | Diarrhea and headache | 10 | 15 | 66.6% |
| 6 | *Cucumis ficifolius* | Stomach pain | 13 | 14 | 92.8% |
| 7 | *Rumex abyssinicus* | Spider poison | 11 | 13 | 84.6% |
| 8 | *Rhamnus prinoides* | Tonsillitis | 12 | 16 | 75% |
| 9 | *Acokanthera schimperi* | Spider poison | 12 | 17 | 70.5% |
| 10 | *Rumex nepalensis* | Abdominal pain | 18 | 21 | 85.7% |
| 11 | *Rumex nervosus* | Ear infection | 19 | 23 | 82.6% |
| 12 | *Schefflera abyssinica* | Wound | 10 | 12 | 83.3% |
| 13 | *Osyris quandripartita* | Eczema | 11 | 14 | 78.5% |
| 14 | *Cucumis ficifolius* | Snake bite | 9 | 11 | 81.8% |
| 15 | *Rumex nepalensis* | Rabbis | 9 | 15 | 60% |

### 4.7.6 Threats to medicinal plants in the Woreda

The key informants in the study area ranked that agricultural land expansion was the most threatening factor for the growth of medicinal plants followed by deforestation and Charcoal production where as urbanization was the least cause of threat on medicinal plants reported by respondents in the Woreda (Table 15).

Table 15 Ranking of threats to medicinal plants in the study area

| **Main threats** | **Respondents from R1- R8** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **R1** | **R2** | **R3** | **R4** | **R5** | **R6** | **R7** | **R8** | **Total score** | **RANK** |
| Firewood collection | 3 | 7 | 5 | 2 | 5 | 7 | 1 | 6 | 36 | 4th |
| Agricultural land expansion | 8 | 6 | 8 | 8 | 7 | 6 | 7 | 8 | 58 | 1st |
| Deforestation | 7 | 8 | 6 | 5 | 8 | 8 | 7 | 7 | 56 | 2nd |
| Charcoal production | 5 | 2 | 7 | 6 | 6 | 5 | 8 | 4 | 43 | 3rd |
| Construction | 2 | 3 | 3 | 7 | 4 | 1 | 2 | 5 | 27 | 5th |
| Drought | 6 | 1 | 2 | 3 | 1 | 3 | 5 | 2 | 23 | 7th |
| Overgrazing | 4 | 3 | 1 | 4 | 2 | 4 | 3 | 3 | 25 | 6th |
| Urbanization | 1 | 4 | 4 | 1 | 3 | 2 | 6 | 1 | 22 | 8th |

### 4.8. Management and conservation of medicinal plants

Informants reported that they know when they gather, store and processing medicinal plants. It is once a year some medicinal plants are collected and preserved. Seed, leaf, fruit or root are harvested, dried and preserved in roof corners or outside house, and dried parts are powdered and stored in different containers like pots, bottles or tied with clothes and used when needed. Indigenous and local people of the area had strong and genuine belief on healing power of plantsand they know their habitat, distribution, harvesting technique, time of harvest and the status of a plant in the area. Medicinal plants were also maintained or protected near vicinity due to their fragrance, as live fence to avoid enemies, as spices and for food. Some plants were also left as remnants of forest in agricultural field due to their uses for construction, fuel wood and other purposes.

# CHAPTER FIVE

# 5. DISCUSSION

## 5.1 Ethnomedicinal Plant Species of the Study Area

A total of 70 species of medicinal plants used to treat different health problems were gathered and documented from the study area. These plants were grouped in to 40 families. The presence of 70 plants used by the local people to treat 45 different types of human and livestock ailment was a good indication of the deep rooted culture of medicinal plants use in the study area.Out of these, majority of medicinal plants (54) were used for treatment of human ailments.This result showed that the local communities have more indigenous knowledge and give emphasis to the uses of medicinal plants to treat human ailments than livestock diseases. This result is similar with other results which were documented in other study sites of Ethiopia (Tesfaye Awas and Sebsebe Demissew, 2009; Mirutse Giday *et al.*, 2009; Moa Megersa, 2010). The presence of traditional knowledge and practice on large number of medicinal plants by peopleof Menz Keya Gebreal Woreda shows that the indigenous people of the area still depend on traditional medicine of plant origin. Majority of the plant species were in family Asteraceae and *Lamiaceae* contained 6 and 5 species respectively may related to their abundance and distribution in the study area. But families; *Fabaceae&Euphorbaceae* consisted 4species each followed *by Cucurbitaceae* and *Anacardiaceae* consists of 3 species each.

The remaining families contained two or one species each. Similarly the dominance of familyAsteraceae for the treatment of human diseases was reported in the work of Endalew Amenu (2007) and, Seyoum Getaneh (2009).

### 5.1.1. Habits and Sources of Medicinal Plants

In this study, most medicinal plants were collected from the wild (64.3%). However; the rest were collected from both wild and cultivated (27.1%) and from cultivated (8.6%),). The finding is similar with the findings of other ethnobotanical studies else where (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 indicated that the

practitioners mostly exploit the wild sources or the natural environment rather than cultivated to obtain the medicinal plants in the study area.

Out of the total 70 medicinal plants collected from the study area, 32 (45.7 %) were shrub species followed by, tree 20 (28.6%), herb species14 (20 %) and 4 (5.7%) climbers. This showed that the most widely used medicinal plants in the study area were shrubs followed by trees. This might be due to high level of abundance and distribution in the study area compared toherbs, trees and climber species.

### 5.1.2. Plant Parts Used, Conditions and Mode of Preparation

Results of plant parts used for medicinal purposes indicated that, the local communities mostly used leaves 38 (54.3%) followed by roots 22(31.4%). Other plant parts were also used to prepare traditional medicine, i.e., seeds 1(1.4%), fruits 4 (5.7%), stem 1 (1.4%), and barks 2(2.8%) and whole parts 2(2.8%). Analysis of the data showed that leaf was the most widely used part for preparation of remedies. Previous reports in Ethiopia have also showed that leaves were the most commonly used: followed by roots to treat various health problems (Mirutse Giday, 2001; Haile Yineger and Delenasaw Yewhalaw, 2007; Mirutse Giday *et al.*, 2009; Tesfaye Hailemariam *et al*., 2009).

Given the highest frequency of leaves used for medicinal purposes in the study area, threat to the destruction of medicinal plants was found to be minimal, as high threat to the mother plant comes with root, bark and stem harvest. According to Dawit Abebe and Ahadu Ayehu (1993) medicinal plant harvest that involves roots, rhizomes, bulbs, barks and stems have serious effect on thesurvival of mother plants. In the Menz Keya Gebreal Woreda,the local community relies on different ways of remedy preparation, depending on the disease treated by the traditional medicinal plants for both human and livestock ailments.These include Pounding, drying, powdering, crushing, roasting, steaming, chewing, Squeezing, mixing, creaming, eating, tying, and soaking were some of the remedy preparation from traditional medicinal plants.The most common remedy preparations were crushing, mixing, pounding, and creaming 31(25.4%) followed by crushing, and powdering, 18(14.7%), crushing, mixing and boiling 13(10.6%) crushing and creaming11(9.0%) and others.

In this study, the local people also used some other products as additives in their preparations. For example, water, coffee, butter, Injera, tella, salt, milk, and honeys were some of the additives

that the local people used to improve the flavor and reduce adverse effects such as vomiting and diarrhea so that the efficacy of the traditional medicine would be maintained or increased.

The results showed that herbal remedies were prepared using fresh material 59(84.3%), while 3 (4.3%) were used in the case of dried plant material and8 (11%) either fresh or dried similarly. A study conducted by previous researchers Endalew Amenu (2007); Haile Yineger and Delenasaw Yewhalaw (2007); Moa Megersa (2010) and Nigussie Amsalu (2010), showed that using fresh materials for different health problems is more than dry materials because the contentsare not lost before use compared to the dried forms.

### 5.1.3. Routes of Administration, Dosage and Application of Medicinal Plants

The routes of administration include oral, dermal, optical, nasal, and others. Overall, oral administration was reported as a dominant route of administration 37 species (52.8%) followed by dermal route 31species (44.2 %), nasal 6 species (8.5%) dermal/oral or oral/ nasal 3 species (4.3%), optical 2 species (2.8%) and ears 1 species (1.4%).

The dosages of medicine to be administered were reported to be given by rough estimation of the age and physical condition of the patient. Hence there was no precision on the dosage of the remedy. Dawit Abebe and Ahadu Ayehu (1993) reported that lack of precision in the dosage is one of the major drawbacks of practicing traditional remedy. The prepared traditional medicines were applied in a number of methods, among which drinking (24.59%), creaming (28.68%), eating (9.01%), put on and tie (8.19%), smoking (6.55%), sniffing, (9.01%) and swishing (13.93%).

### 5.1.4. Top Ranking Medicinal Plants

Ten respondents were asked to compare *Ruta chalepensis*, *Cucumis ficifollius, Capparis tomentosa Artemisia abyssinica*, *Echinops kebericho*, *Laggera tomentosa*and *Schinus molle*medicinal plants based on their efficacy to identify the most effective medicinal plant used for treating evil eye and evil sprit. The informants were asked to compare the given seven (7) medicinal lants based on their efficacy and to give the highest number (8) for these seven (7) medicinal plants which they thought most effective in treating evil eye and evil sprit and the lowest number (1) for the least effective plant in treating evil eye and evil sprit. *Echinops kebericho* scored 75 ranked first indicating that it is the most effective in treating evil eye and evil sprite followed by *Ruta chalepensis*, *Cucumis ficifollius*, *Laggera tomentosa, Artemisia*

*abyssinica*and *Capparis tomentosa* was the least effective. The medicinal plants that are widely used by the local people to treat one or very few ailments will have higher FL values than those that are less popular (Tilahun Teklehaymanot and Mirutse Giday, 2007). For example, *Allium sativum* was reported by many informants to treat malaria and common cold and hence had 96.3% FL. In a similar study, Endalew Amenu (2007) has reported *Allium sativum* to be the prior plant species used for treating malaria in Ejaji area.

The results showed that some medicinal plants were popular than others. The medicinal plants supposed to be effective in treating certain disease had higher ICF values, indicating that these diseases were common than those with low ICF. It is further shown that medicinal plants that are effective in treating certain diseases and well known by community members also have higher ICF values. With the ICF values ranging from 0.94 to 0.66 per illness category,problems of evil eye, evil sprit and rabies had the highest ICF value (0.94) due to the high incidence of the disease in the area whereas; sexually transmitted disease, had the lowest (0.66). According to Tilahun Teklehymanot and Mirutse Giday, (2007) medicinal plants that are presumed to be effective in treating a certain disease have higher ICF values. A high ICF value close to 1 indicated that the respondents rely most on the same taxa to manage specific disease condition, While low values of ICF close to 0 indicated that the informants disagree on the taxa to be used in the treatment of a given ailments.

In this study, a number of medicinal plants were found to be multipurpose species being utilized for a variety of uses. The common uses include medicinal, medicine, food, house hold materials, firewood, timber, charcoal, fencing and agricultural tools. Nine commonly reported multipurpose species and eight use-categories were involved in direct matrix ranking exercise in order to evaluate their relative importance to the local people and the extent of the existing threats related to their use values.

### 5.1.5. Marketable Medicinal Plants

The local market surveys were conducted with in the area of research to document the medicinal plants used in health ailments that are sold in local markets. During the interview, the respondents explained that most healers prepared and sold traditional medicinal plants in the home rather than selling in the market. Since the local people prefer either collecting these plants by themselves from the available areas in the woreda to prepare the medicines or they prefer to

go directly to the local healers to get treatments instead of buying the medicinal plants from the market.

Some medicinal plants *Echinops kebericho*, *Ocimum basilicium*, *Allium sativum*, *Ruta chalepensis*, *Lepidium sativum*, *Olea europaea* subspCuspidata, *Rhamnus prinoides*, *Otostegia integrifolia*, *Thymus schimperi*, *Citrus aurantifolia* were marketed but only for other values other than medicinal like for spices, food and fumigation. This result agreed with the study reported by Eskedar Abebe (2011) in Debark Woreda, North Gonder, Etana Tolasa (2007) in Gimbi Woreda Westren Wollega and Getu Alemayehu (2010) in Minjar Shenkora district. Butin other case *Lepidium sativum* was sold for the purpose of medicine and measured with a verysmall spoon for a price of 7 birr.

### 5.1.6. Threats to and Conservation of Medicinal Plants in the Study Area

Results showed that the accessibility of medicinal plants in the study area was less compared to the past two decade, so informants reported that they require long distance of travelling to fetch medicinal plants.The ethnobotanical knowledge on uses of medicinal plants was secrete and transferred from one generation to the next orally. The result of the present study showed that agricultural expansion,firewood collection, construction, charcoal, deforestation, overgrazing, urbanization and drought were ranked as the most severe threats notonly to medicinal plants but often to all plants of the Menz Keya Gebreal Woreda as a whole. In this study, information gathered from the key informants indicated that the threats agricultural expansion was the major threat to medicinal plants followed by deforestation, charcoal production and firewood collection. Indigenous people of the area have strong and genuine 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 study area. For instance, 35 medicinal plants were found in majority of family gardens and farm borders in the study area, as they need these plants in their daily life as medicine or for other values. According to Zemede Asfaw (2001), cultivation for medicinal value accounted for 6% of the plants maintained in homegardens in Ethiopia. Medicinal plants were also maintained or protected near vicinity due to their fragrance, as livefence to avoid enemies, as spices and for food. Plants are also left as remnants of forest inagricultural field due to their uses for construction, fuel wood and other values. Similarly Behailu Etana (2010) reported that agricultural expansion and fire wood are the most threatening factors.

# CHAPTER SIX

## 6.1 Conclusion

Seventy medicinal plants were recorded in the study area of which 54 species were noted to treat human ailments while 6 species were documented to treat livestock ailments and 10 species were reported to be used to treat both livestock and human ailments. Majority of medicinal plant species were obtained from the wild 45 species (64.3%) followed by both cultivated medicinal plants and wild 19 species (27.1%), cultivated medicinal plants 6 species (8.6%). In the study area, 45 ailments were reported which were being treated by traditional medicinal plants of the area. Herbal remedies were prepared from fresh materials 59 (84.3 %), dried plant materials3 (4.3 %) and fresh or dried 8 (11%). Shrubs were highly utilized 32(45.7%) for medicinal purpose followed by trees, 20(28.6%) herbs14 (20%) and climbers 4 (5.7%). Leaves 38 (54.3%) were used for medicinal purpose more than other plant parts for preparation of human andlivestock remedies. The remedies were taken with different additive and solvents and water was more frequently used for this purpose. Most of the medicinal plants were administered orally 37 (52.8%), followed by dermal 31 (44.2%). The major threats to medicinal plants and the associated knowledge in the study area were agricultural expansion, deforestation,charcoal production, firewood collection, construction,, overgrazing, drought and urbanization in that order. Whereas threats that erode indigenous knowledge emanate from secret, oral based knowledge transfer, unwillingness of young generation to gain the knowledge, unavailability of the species, and influence of modern education and awareness factors were the major ones. Therefore, awareness creation campaigns are timelyneeded to improve local community's knowledge on the importance and management of medicinal plants and awareness raising should be made among the healers so as to avoid erosion of the indigenous knowledge and to ensure its sustainable use.

# CHAPTER SEVEN

## 7.1 Recommendations

Based on the finding of the study, the following recommendations were suggested.

- The local community of the study area should be involved in conservation and management of plant resources and their indigenous knowledge in their locality.
- The Government should encourage and license the indigenous knowledge and skill of traditional medicine practitioners.
- The Woreda Agricultural Office and local elder people must be taught of growing medicinal plants in home gardens mixing with crops in the agricultural fields and live fences.
- The Woreda Administration and woreda Health Office have to encourage the local herbal medicine practitioners to enhance the use of traditional medicine through licensing and other incentives.
- Local government give awareness for young generation, to avoid negative impacts on the medicinal plants and associated knowledge in the area, hence, documentation of the medicinal plants of the area needs to continue.
- The Government and health office should give attention so as to standardize measurements and maintain hygiene of the medicines made from plants by training both the healers and other members of the local community.

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# Appendices

## Appendix 1

Lists of medicinal plants in the study area including abundance, local name, scientific name, family and habits.

| No | Scientific name | Family | Local name | Habit | Abundance | Collector |
|---|---|---|---|---|---|---|
| 1 | *Croton macrostachyus*Del. | Euphorbiaceae | Bissana | T | Common | GT1 |
| 2 | *Eucalyptus globules* Labill. | Myrtaceae | Nichbahirzaf | T | Common | GT2 |
| 3 | *Cucumis ficifollius* A.Rich | Cucurbitaceae | Yemdrenbuay | climber | Sparse | GT3 |
| 4 | *Carissa spinarum*L**.** | Apocynaceae | Agam | Sh | Common | GT4 |
| 5 | *Euclea racemosa* Murr. | Ebenaceae | Dedeho | Sh | Common | GT5 |
| 6 | *Jasminum abyssinicum Hochst.exDC* | Oleaceae | Tenbelel | Climber | Common | GT6 |
| 7 | *Justicia schimperiana***(**Hochst.exNees).T'Anders | Acanthaceae | Sensel | Sh | Common | GT7 |
| 8 | *Ricinus communis*L**.** | Euphorbiaceae | Gullo | T | Common | GT8 |
| 9 | *Rosa abyssinica*Lindley | Rosaceae | Kega | Sh | Common | GT9 |
| 10 | *Calpurnia aurea***(**Ait.)Benth**.** | Fabaceae | Digta | Sh | Common | GT10 |
| 11 | *Buddleja polystachya*Fresen. | Loganiaceae | Anfar | Sh | Common | GT11 |
| 12 | *Ficus vasta*Forssk. | Moraceace | Warka | T | Rare | GT12 |
| 13 | *Laggera tomentosa*(Sch. Bip. ex A. Rich) Oliv.&Hiern. | Asteraceae | Keskeso | H | Common | GT13 |
| 14 | *Urtica simensis*Steudel | Urticaceae | Sama | H | Common | GT14 |
| 15 | *Schinus molle*L**.** | Anacardiaceae | Kundoberbere | T | Rare | GT15 |
| 16 | *Osyris quadripartite* Decn. | Santalaceae | Keret | Sh | Common | GT16 |
| 17 | *Artemisia abyssinica* Sch.Bip.exA.Rich | Asteraceae | Chikugne | H | Common | GT17 |
| 18 | *Dichrostachys cinerea* (L.) Wight and Arn. | Fabaceae | Ader | Sh | Common | GT18 |
| 19 | *Maytenus* | Celastraceacea | Atat | Sh | Common | GT19 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *arbutifolia***(**A.Rich.) Wilcezk. | | | | | |
| 20 | *Zehneria scabra* (Linn.f.)Sond | *Cucurbitaceae* | Haregresa | Climber | Common | GT20 |
| 21 | *Lippia adoensis* Hochst.ex Walp | Verbenaceae | Kessie | Sh | Common | GT21 |
| 22 | *Ruta chalepensis*L. | Rutaceae | Tenadam | H | Common | GT22 |
| 23 | *Catha edulis***(**Vahl) Forssk .exEndl**.** | Celastraceae | Chat | T | Sparse | GT23 |
| 24 | *Kalanchoe petitiana* A.Rich | Crassulaceae | Endehuahula | Sh | Common | GT24 |
| 25 | *Euphorbia tirucalli*L**.** | Euphorbiaceae | Kinchib | T | Common | GT25 |
| 26 | *Ocimum lamiifolium*Hochst .ex Benth. | Lamiaceae | Damakese | Sh | Common | GT26 |
| 27 | *Rumex nervosus*Vahl**.** | Polygonaceae | Enbuacho | Sh | Common | GT27 |
| 28 | *Ziziphus spina-christi* (L.) Desf**.** | Rhamnaceae | Geba | T | Sparse | GT28 |
| 29 | *Acacia abyssinica*Hochest.ex.Benth | Fabaceae | Girar | T | Common | GT29 |
| 30 | *Olea europaea*L.Susbsp. Cuspidata(Wall.ex G.Don) | Oleaceae | Woira | T | Common | GT30 |
| 31 | *Acokantheraschimperi(*A.DC .)Schweinf. | Apocynaceae | Mirenz | Sh | rare | GT31 |
| 32 | *Allophylus abyssinicus*(Hochst.) Radlkofer | Sapindaceae | Embus | T | Common | GT32 |
| 33 | *Grewia villosa*Willd. | Tiliaceae | Lenkuata | Sh | Common | GT33 |
| 34 | *Dodonea angustifolia* L.F. | Sapindacae | Kitkta | Sh | Common | GT34 |
| 35 | *Dovyalis abyssinica* (A. Rich.) Warb. | Flacourtiaceae | Koshim | T | Sparse | GT35 |
| 36 | *Juniperus procera*Hochst | Cuperessaceae | Yehabesha tid | T | Common | GT36 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | .exEngl | | | | | |
| 37 | *Sida rhombifolia*Hochst.exA.Rich | Malvaceae | Chifrg | Sh | Common | GT37 |
| 38 | *Pterolobiumstellatum*(Forssk .)Brenan | Fabaceae | Kentefa | Sh | Common | GT38 |
| 39 | *Rhus vulgaris* Meikle. | Anacardaceae | Kimo | Sh | Common | GT39 |
| 40 | *Cordia Africana* Lam. | Boraginaceae | Wanza | T | Common | GT40 |
| 41 | *Myrica salicifolia* A.Rich. | Myricaceae | Shinet | T | Sparse | GT41 |
| 42 | *Ficussur* Forssk. | Moraceae | Sholla | T | Common | GT42 |
| 43 | *Citrus aurantifolia* (Christm.) Swingle | Rutaceae | Lomi | T | Common | GT43 |
| 44 | *Hagenia abyssinica*(Brace) J.F.Gmel. | Rosaceae | Kosso | T | Sparse | GT44 |
| 45 | *Asparagus africanus*Lam. | Asparagaceae | Kestenicha | Climber | Sparse | GT45 |
| 46 | *Polygala abyssinica* | Polygalaceae | Etse-libona | H | Sparse | GT46 |
| 47 | *Moringa oleifera Lam.* | Moringaceae | Shiferaw | T | Sparse | GT47 |
| 48 | *Rhusretinorrhoea*Oliv | Anacardiaceae | Tilem | Sh | Common | GT48 |
| 49 | *Thymus schimperi*Ronniger. | Lamiaceae | Tosign | H | Common | GT49 |
| 50 | *Clutia abyssinica*Jaub. & Spach | Euphorbiaceae | Fyelefej | Sh | Common | GT50 |
| 51 | *Olinia rochetiana* A.Juss. | Oliniaceae | Tifie | Sh | Sparse | GT51 |
| 52 | *Premna schimperi* Engl. | Lamiaceae | Chocho | Sh | Common | GT52 |
| 53 | *Capparis tomentosa*Lam. | Capparidaceae | Gumero | Sh | Common | GT53 |
| 54 | *Inula confertiflora*A.Rich. | Asteraceae | Woynagfit | Sh | Sparse | GT54 |
| 55 | *Cucumis dipsaceus*Ehrenb.ex Spach | Cucurrbitaceae | Buhe Hareg | Climber | rare | GT55 |
| 56 | *Verbascum sinaiticum*Benth. | Scrophulariaceae | Yeahiyajoro | Sh | Common | GT56 |
| 57 | *Otostegia integrifolia* Benth | Lamiaceae | Tinjut | Sh | Common | GT57 |
| 58 | *Withania samnifera***(**L.)Dunal in DC | Solanaceae | Gizewa | Sh | Sparse | GT58 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 59 | *Rhamnus prinoides*L'Herit | Rhamnaceae | Gesho | Sh | Common | GT59 |
| 60 | *Myrtuscommunis* L**.** | Myrtaceae | Ades | Sh | Sparse | GT60 |
| 61 | *Lepidium sativum* L. | Brassicaceae | Feto | H | Common | GT61 |
| 62 | *Arundo donax* L. | Poaceae | Meka | H | Common | GT62 |
| 63 | *Foeniculum vulgare*Miller. | Apiaceae | Ensilale | H | Sparse | GT63 |
| 64 | *Datura stramonium*L. | Solanaceae | Atsefaris | H | Common | GT64 |
| 65 | *Vernonia leopoldi* (Sch.Bip.ex Walp.) | Asteraceae | Wuzhign | Sh | Common | GT65 |
| 66 | *Echinops kebericho* Mesfin. | Asteraeae | Kebercho | H | Sparse | GT66 |
| 67 | *Ocimum basilicum*L. | Lamiaceae | Besobila | H | Common | GT67 |
| 68 | *Rumex nepalensis*Spreng. | Polygonaceae | Tult | H | Common | GT68 |
| 69 | *Vernonia amygdalina*Del. | Asteraceae | Grawa | T | Common | GT69 |
| 70 | *Allium sativum* L. | Alliaceae | Necheshinkurt | H | Common | GT70 |

# Appendix: 2

List of collected plant Families, number of genera (%), number of plant species (%) which treat different ailments in the study area.

| No | List of Families | Number of genera | % | Number of species | % | No | List of Families | % | Number of genera | Number of species | % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Fabaceae | 4 | | 4 | | **22** | Cuperessaceae | | 1 | 1 | |
| 2 | Polygalaceae | 1 | | 1 | | **23** | Oleaceae | | 2 | 2 | |
| 3 | Asteraceae | 5 | | 6 | | 24 | Acanthaceae | | 1 | 1 | |
| 4 | Capparidaceae | 1 | | 1 | | **25** | Brassicaceae | | 1 | 1 | |
| 5 | Apocynaceae | 2 | | 2 | | **26** | Crassulaceae | | 1 | 1 | |
| 6 | Celastraceae | 2 | | 2 | | 27 | Malvaceae | | 1 | 1 | |
| 7 | Rutaceae | 2 | | 2 | | 28 | Myricaceae | | 1 | 1 | |
| 8 | Euphorbiaceae | 4 | | 4 | | 29 | Lamiaceae | | 4 | 4 | |
| 9 | Boraginaceae | 1 | | 1 | | 30 | Santalaceae | | 1 | 1 | |
| 10 | Cucurbitaceae | 2 | | 3 | | 31 | Rhamnaceae | | 2 | 2 | |
| 11 | Solanaceae | 2 | | 2 | | 32 | Anacardiaceae | | 2 | 3 | |
| 12 | Sapindacae | 2 | | 2 | | 33 | Polygonaceae | | 1 | 2 | |
| 13 | Flacourtiaceae | 1 | | 1 | | 34 | Moringaceae | | 1 | 1 | |
| 14 | Myrtaceae | 2 | | 2 | | 35 | Oliniaceae | | 1 | 1 | |
| 15 | Ebenaceae | 1 | | 1 | | 36 | Urticaceae | | 1 | 1 | |
| 16 | Moraceae | 1 | | 2 | | 37 | Loganiaceae | | 1 | 1 | |
| 17 | Apiaceae | 1 | | 1 | | 38 | Poaceae | | 1 | 1 | |
| 18 | Tiliaceae | 1 | | 1 | | 39 | Scrophulariaceae | | 1 | 1 | |
| 19 | Rosaceae | 2 | | 1 | | 40 | Verbenaceae | | 1 | 1 | |
| 20 | Asparagaceae | 1 | | 1 | | | | | | | |
| 21 | Alliaceae | 1 | | 1 | | | | | | | |

# Appendix: 3

List of traditional medicinal plants used for treating only human (HU) ailments in the study area with scientific name,family,local name ,growth form ,source, parts used ,condition of preparations, diseasetreated, methods of preparations and applications, ingredients added and routs of administration (RA).

Key: GF (Growth Form), H(Herb), Sh (Shrub), Cl(Climber), T(Tree), CP (Condition of Preparations), F(Fresh), D(Dried), F/D (Fresh or Dried).

| Scientific name | Family | Local name | GF | Source | Parts used | CP | Disease treated | Methods of preparation and application | RA |
|---|---|---|---|---|---|---|---|---|---|
| *Rhamnus prinoides* L'Herit | Rhamnaceae | Gesho | Sh | Home garden and wild | Leaf | F | Tonsillitis | The leaf of *Rhamnus prinoides* is crushed with leaf of *Ruta chalpens* and then mixed with drop of citrus lemon boiled and drunken one cup of coffee. | Oral |
| *Urtica simensis* Steudel | Urticaceae | Sama | H | wild(road side) | Leaf | F | Gastric ulcer | The leaf is washed by hot water and filter out, after that to mix with the powder of barelyin order to remove the spiny part and cooked like "wot" and eaten by enjera for weeks. | Oral |
| *Ficus sure* Forssk | Moraceae | Sholla | T | Wild (forest) | Fruit | D | Ring worm | Powder of dry fruits mixed with butter is applied after scratching the affected parts. | Dermal |
| *Eucalyptus globules* Labill. | Myrtaceae | Nich bahirzaf | T | Wild forest | Leaf | F | Common cold and febrile illness | The leaves and immature tip stem are boiled in water and fumigate the whole body by took the fumes through nasal. After that, the fluid is filtered and drunk by adding honey. | Oral and nasal |

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|---|---|---|---|---|---|---|---|---|---|
| | | | | | fruit | | eczema | The fruit is crushed, and dried. After blow a fused it, the next step is powdered it and, then mixing the powder with butter and finally smeared the infected part. | -dermal |
| *Rumex nepalensis* Spreng. | Polygonaceae | Tult | H | Wild (fllow land) | Root | F | Abdominal pain and | The dried seed is pounded and boiled with water and drunk | Oral |
| | | | | | Root | | dingetegna | -chewing the root | |
| *Ricinus communis* L**.** | Euphorbiaceae | Gulo | Sh | Home garden | Seed | F/D | Herpes simplex | The seed is crushed, mixed with seed of *Brassica carinata* pounded and oil is added. After that the mixture is creamed on the body for a week. | Dermal |
| *Justicia schimperiana* **(**Hochst.exNees) .T'Anders | Acanthaceae | Sensel | Sh | wild(road side) | Leaf | F/D | Wound (Gormit) | The leaf is mixed with *Cyathula cyclindrica* and *Cynoglossum coruleum.* Then crushed, creamed and tilled on the wound until recovery. | Dermal |
| *Ocimum lamiifolium* Hochst .ex Benth. | Lamiaceae | Damakese | Sh | Home garden and wild | Leaf | F | Febrile illness | The leaves is crushed and pounded, then mixed with coffee as drunk at the morning time. | Oral |
| *Sida rhombifolia*Hochst.exA.Rich | Malvaceae | Chifrg | H | wild(road side) | Root | F/D | Abdominal pain | The root is mixed with root of *Withania somnifera,* root of *Cucumis ficifolius* and leaf of *Croton macrostachys* and leaf of *Foeniculum vulgare* .Then pounded and squeezed. Finally, the solution is drunken prosperity. | Oral |
| *Myrica salicifolia* | Myricaceae | Shinet | t | Wild(forest) | Bark | F/D | Skin diseas | The bark of *Myrica salicifolia*is crushed in | Dermal |

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|---|---|---|---|---|---|---|---|---|---|
| A.Rich. | | | | | | | es | to smaller pieces and roasted on the fire. Then mixed with butter and creamed on the skin. | |
| *Rumex nervosus* Vahl**.** | Polygonaceae | Enbuacho | Sh | wild(agricultural land) | Stem | F | Ear infection | The stem is heated on fire and squeezed and pounded. Then the fluid is inserted to the ears. | Ears |
| | | | | | leaf | F | wen | Mixed the leave of Embuacho, salt, fluid of lemon, honey of lady bird. Then first of all ill parts of the body was creamed by white honey and then the locally produced medicine was mulched on the infected parts until it get better. | Dermal |
| *Olea europaea* L.Susbsp. Cuspidata (Wall.ex G.Don) | Oleaceae | Woira | T | Wild forest | Leaf | F | Swelling, | The leaf is mixed with the leaf of *Juniperous procera*. Then roasted on fire and creamed on the swelled part. | Dermal |
| | | | | | Dry leaf | | caught | -The leaf is pounded, powdered and mixed with egg and little water and then drunk for seven days | -oral |
| *Juniperus procera* Hochst .ex Engl | Cuperessaceae | Yehabeshatid | T | Wild forest | Latex | F | Leshimanias is | The latex is extracted and creamed on wound. | Dermal |
| *Pterolobium stellatum*( Forssk.)Brenan | Fabaceae | Kentefa | Sh | Wild (forest) | Root | D | Mental disorder | The dried root of *Sterolobium stelatum* mixed with *Acacia brevipica, Withania somifera, Asparagus africanus* and *Carrisa spinarum.* Then crushed and fumigated. | Dermal or oral |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Croton macrostachyus* Del. | Euphorbiaceae | Bissana | T | Home garden and wild | Leaf sap | F | Gonorrhea | The leaf sap of *Croton macrostachyus* is pounded. Then added to boiled water and filtered through white cloth and drunk every morning before eating food for 7 days. | Oral |
| | | | | | Root | F | Snake poison | The root of *Croton macrostachyus* is crushed and mixed with one cup of coffee water and drunk orally. | Oral |
| *Cucumis ficifollius* A.Rich | Cucurbitaceae | Yemdr Enbuay | H | wild (Fallow land) | Root | F | Snake bite | The root of *Cucumis ficifolius*is pounded and mixed with butter and tied on the infected part of the body. | Dermal |
| | | | | | Root | F | Stomach pain | The root of *Cucumis ficifolius* is pilled and chewed then; the juice is swallowed or added water to drunk. | Oral |
| | | | | | root | F | Evil eye | The root of *Cucumis ficifolius* is crushed and tied on the neck region with new cloth. | Dermal |
| *Capparis tomentosa* Lam. | Capparidaceae | Gumero | Sh | Wild forest | Root | F/D | Skin rash | The root is mixed with leaves of *Vernonia amygdalina, Millettia ferrugeinea* pounded together and creamed on the infected part. | Dermal |
| | | | | | Root | D | Evil eye | The root is mixed with root of *Acanthus senni* and *Croton macrostachyus* crushed all together then tie on the neck. | |
| | | | | | root | D | Ayine tila | The moist root cut off in to very small piece and dried. The dry root powdered and smoking the powder | Oral/Nasal |
| *Acokanthera* | Apocynaceae | Merenz | Sh | Wild forest | Leaf | D | Spider poison | Crushed and powdered the leaf. Then mixed | Dermal |

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|---|---|---|---|---|---|---|---|---|---|
| *schimperi (*A.DC.) Schweinf. | | | | | | | | with butter creamed on wound. | |
| *Artemisia abyssinica* Sch. Bip.ex A.Rich | Asteraceae | Chigu gne | H | Wild and homeg arden | Leaf | F | Comm on cold | The leaf of *Artemisia abyssinica* is sniffed through nose. | Nasal |
| | | | | | leaf | F | Evil eye | The leaf is crushed, powdered is sniffed used as *Ruta chalepensis.* | Nasal |
| *Ficus vasta* Forssk. | Moraceace | Warka | T | Wildfo rest | Bark | F/ D | Blood pressu re | The bark is pounded and mixed with *Citrus auranti follia.* After that drunk orally by adding water. | Orally |
| | | | | | Bark | D | Eczem a | -Crushed bark and dried it. Then the dried bark trickled and powdered. Finally the powder mixed with butter and smeared the infected part. | Derma l |
| | | | | | latex | F | wen | -Mixed the milk white of warka, salt, fluid of lemon, honey of lady bird. Then first of all ill parts of the body was creamed by white honey and then the locally produced medicine was mulched on the infected parts until it get better. | Derma l |
| *Catha edulis* **(**Vahl) Forssk .exEndl**.** | Celastraceae | Chat | Sh | Home garden | Stea m | F | Urine retenti on | Crushed the steam, mixed with leaf of *Vernonia amygdalina* and boiled, and one glass of filtrate is drunk orally. | Oral |
| | | | | | Leaf | F | Asthm a | The leaf of *Catha edulis* with the leaf of *Coffea arabica* are boiled with honey and drunk | orally |
| | | | | | Leaf | F | Intesti nal parasit e | The leaf is crushed and boiled, mixed with sugar , 1 tea cup of the solution is take every morning for 3 days | Oral |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Echinops kebericho* Mesfin. | Asteraeae | kebercho | H | wild(forest) | Root | D | Evil eye | the root cut down in to very small piece and fumigate the ill person | Nasal |
| *Dovyalis abyssinica* (A. Rich.) Warb. | Flacourtiaceae | Koshim | Sh | Wild and flowland | Fruit | F | Intestinal parasites | Its fruit is eaten as a food case of intestinal parasite before breakfast every morning until recovery. | Oral |
| *Calpurnia aurea* **(**Ait.) Benth**.** | Fabaceae | Digta | Sh | wild(road side) | Seed | F/D | Diarrhea | The seed is crushed and roasted. Then drunk with water. | Oral |
| *Osyris quadripartite* Decn. | Santalaceae | Qeret | Sh | Wild (forest) | Leaf | D | Eczema | The dried leaves are crushed and pounded then creamed on the infected part of the body. | Dermal |
| *Clutia abyssinica* Jaub. & Spach | Euphorbiaceae | Fyelefej | Sh | Wild forest | Root | F | Diarrhea | Crushed the root and tied on neck region of babies until recovery. | Dermal |
| | | | | | Root | D | Rabies | The roots of Ensilal, Fiyele feji, Lut, Woinagift, Gizewa, and Yemidir enbuay pounded together. Then the dry and kneaded with powder of teff, and finally the ill person ate it in the form of bread. | Oral |
| *Foeniculum vulgare*Miller. | Apiaceae | Ensilal | H | Wild (Road side) | Leaf | F | Asthma | Crushed and immersed with milk then drunk until recovery. | Oral |
| *Rosa abyssinica* Lindley | Rosaceae | Kega | Sh | Wild forest | Fruit | F | Hypertension | The fruit is covered by leaves of *Otostegia integrifolia* are grind, powdered and mixed with water and one cup of coffee is drunk during feeling of pain time. | Oral |
| | | | | | leaf | F | Body swelling | The leaf of kega, agam, woira and kenbet pounded. Then squeezed, and finally the liquid part drunk or bundled over the ill | Dermal/Oral |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | parts. | |
| *Kalanchoe petitiana* A.Rich | Crassulaceae | Endehuahula | H | Wild (flow land) | Leaf | F | Body swelling (begungi) | The leaves are heated slowly by fire and then put on the infected part of the body. | Dermal |
| *Allophylus abyssinicus* (Hochst.) Radlkofer | Sapindaceae | Embus | T | Wild (forest) | Leaf | F | Snake bite | The leaf sap is mixed with the sap of *Croton macrostachyus,Oleaeuropea, Ruta chalepensis, Olinia rochetiana*are pounded together and then tied on the swelled part of the body. | Drmal |
| *Rhusretinorrhoea*Oliv | Anacardiaceae | Tilem | T | Wild forest | Leaf | F | Liver infection | The leaves are dried and crushed and then boiled. After that filtered by clean cloth and the solution is drunk. | Oral |
| *Laggera tomentosa* (Sch. Bip. ex A. Rich) Oliv.&Hiern. | Asteraceae | keskeso | Sh | Wild | Root | D | Evil eye | The moist root cut off in to very small piece and dried. The dry root powdered and smoking the powder. | Oral |
| *Hagenia abyssinica* (Brace) J.F.Gmel. | Rosaceae | Kosso | T | Home garden and wild forest | Seed | F/D | Tape worm | Crushed the dry seed, mix the powder with honey and a small amount of water and then boil and drank before breakfast for 3 days. | Oral |
| *Vernonia amygdalina* Del. | Asteraceae | Grawa | T | Home garden and wild | Leaf | F | Abdominal pain | The leaves of *Vernonia amaygdalina* are crushed and pounded. Then drunk with water. | Oral |
| | | | | | leaf | F | dandruff | Pounded the leaf and then squeezed to get watery must. Then smeared the infested parts of the body. | Dermal |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Carissa spinarum* L. | Apocynaceae | Agam | Shrub | Wild | Leave | F | Snake bite | -The leave foliated in to very small piece and pounded. And finally drink until recovery | Oral |
| | | | | | Root | D | Ayine tila | -The moist root cut off in to very small piece and dried. The dry root powdered and drink the shattered medicine or smoking the powder. | Oral |
| *Schinus molle*L. | Anacardiaceae | Kundo Berbere | T | Cultivate | fruit | D | Evil eye | The dry fruit incinerate in front of the one who victim an evil eye sprit. | Nasal |
| *Ruta chalepensis* L. | Rutaceae | Tenaadam | Sh | Cultivate | All parts | D | kunchir | The pounded root dried and powdered. Then, the powdered kneaded together with the dough of black teff. Finally the infected parts of the body creamed until it recover. | Dermal |
| | | | | | fruit | F | evil eye | The fruit of *Ruta chalepensis* with *Allium sativum* and mixed with hyena liver are finely crushed together and sniffed at sickness time | Nasal |
| *Dichrostachys cinerea* (L.) Wight and Arn. | Fabaceae | Ader | Tree | Wild | Leave | F | wart | -The dry leave pounded, grinded and kneaded by the batter of barley. After all the infected parts smeared. | Dermal |
| *Jasminum abyssinicum* Hochst.ex DC | Oleaceae | Tenbelel | Liana | Wild | Leave | F | Snake bite | -The leave foliated in to very small piece and pounded. And finally drink until recovery. | Oral |
| *Thymus schimperi* Ronniger. | Lamiaceae | Tosigne | H | wild(forest) | Leaf | D | Common cold | The leaves are crushed, pounded and powdered. Then the powder is boiled in hot water or tea and drunk orally by adding sugar. | Oral |
| *Ziziphus spina-christi* (L.) | Rhamnaceae | Geba | T | Wild (river side) | Leaf | F | Dandruff | The leaves are crushed and creamed on the infected part(head) | Dermal |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Desf**.** | | | | | | | | | |
| *Acacia abyssinica* Hochest.ex.Benth | Fabaceae | Girar | T | Wild forest | Bark | F | Scorpion poison | The inside part of the bark is tied on the Poisoned part of the skin | Dermal |
| *Myrtuscommunis* L**.** | Myrtaceae | Ades | Sh | Wild and homegarden | Leaf | D | Dandruff | The leaf of *Myrtus communis* is powdered, mixed with butter and creamed on infected part (head ) | Dermal |
| *Moringa oleifera* Lam. | Moringaceae | Shiferaw | T | Wild (agricultural land) | Leaves | F | Hypertension | The leaf of moringa is crushed and extract the leaf, then drunk in the form of tea with in a cup in every morning | Oral |
| *Maytenus arbutifolia* **(**A.Rich.) Wilcezk. | Celastraceacea | Atat | Sh/T | Wild | Leave | F | herpes | The leaf foliated in to very small piece and pounded. Then it macerated for three days and finally creamed the infected body or drink until it recover | Dermal/Oral |
| *Datura stramonium* L. | Solanaceae | Asefaris | H | Wild (flowland) | Leaf | F | Head wound | The leaf is crushed and pounded, squeezed and then creamed on head. | |
| *Polygala abyssinica* | Polygalaceae | Etse-libona | Sh | Wild | Root | F | Snake Bite | The root foliated in to very small piece and pounded. And finally drink until recovery. | Oral |
| *Verbascum sinaiticum* Benth. | Scrophulariaceae | Yeahya joro | H | wild(forest) | Leaf | F | Snake bite | The leaf is pounded and squeezed then drunk orally. | Oral |
| | | | | | Leaf | F | Evil sprit | The leaves are boiled with new pot and fumigated the fume. | Dermal |
| | | | | | Leave | | wen | -Mixed the dry and powdered leave of ketetina, salt, fluid of lemon, honey of lady bird. Then first of all ill parts of the body was creamed by white honey and then the locally produced medicine was mulched on the infected parts until it get better. | Dermal |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Withania samnifera* **(**L.)Dunal in DC | Solanaceae | Gizewa | S | wild (Road side) | Root | D | Evil eye | The root of *Withania somnifera* is mixed with the root of *Carissa spinarum, Artemisia abyssinica, Ruta chalepensis,* seed of *Lepidium sativum* bulb of *Alliumsativum* and the crushed part is dried. Finally, the mixture is sniffed at the time of pain feeling. | Nasal |
| *Vernonia leopoldi* (Sch.Bip.ex Walp.) | Asteraceae | Wuyign | Sh | Wild | Leave | F | herpes | The leave foliated in to very small piece and pounded. Then it macerated for three days and finally creamed on the infected body until the ill person recover. | Dermal |
| *Allium sativum* L. | Alliaceae | Nechshinkurt | H | Home garden | Bulb | F/D | Common cold | The bulb of *Allium sativum* is crushed and pounded and then drunk with tea. | Oral |
| | | | | | Bulb | F/D | Malaria | The bulb of *Allium sativum* crushed with seed of *Lepidium sativum* are pounded and eaten with injera every morning. | Oral |
| *Zehneria scabra* (Linn.f.)Sond | *Cucurbitaceae* | Haregressa | *Climber* | wild | Leaves | F | *Common cold* | *Leaves: The leaves are boiled with water and drink* | *Oral* |
| *Olinia rochetiana* A.Juss. | Oliniaceae | Tifie | Shrub/Tree | Wild | Leave | F | eye disease | The seven leaves Tfie are cut of then squeezed it and filtered. Finally inserted it in to the infected eye. | Dermal |
| *Lippia adoensis*Hochst.ex Walp | Verbenaceae | Kessie | Shrub | Wild | Leaves | F | Febrile illness | The leaves of kessie and damakessie squeezed together and the fluid parts are drunk, or may be creamed on around the body parts | Oral/dermal |

## Appendix: 4

List of medicinal plants used for treating only animal ailments in menz keya District with scientific name, family, local name, growth form (GF), source, parts used, condition of preparations (CP), disease treated, methods of preparations and applications and routs of administration (RA).

| Scientific Name | Family | Local name | GF | Source | Parts used | CP | Disease treated | Methods of preparation and application | RA |
|---|---|---|---|---|---|---|---|---|---|
| *Inula confertiflora* A.Rich. | Asteraceae | Woyna gift | H | Wild(forest) | Leaf | F | Eye disease | The leaf is mixed with leaf of *Leucas abyssinica* and *Olea europea* are crushed, dried and powdered. After that mixedbwith water for 5 to 6 drops of the mixture is applied on each eye of cattle for 3 days. | Optical |
| *Euclea racemosa* Murr. | Ebenaceae | Dedeho | Sh | Wild forest | Root | F | Eye problem | The root is crushed and mix with butter for one night and then the mixture is creamed on cattle eyes | Optical |
| *Asparagus africanus* Lam. | Asparagaceae | Kestenicha | Shrub | Wild | Leave | F | herpes | The leaf foliated in to very small piece and pounded. Then it macerated for three days and finally creamed the affected body or drink until it recovers. | Dermal/ Oral |
| *Acokanthera schimperi (*A.DC.) Schweinf. | Apocynaceae | Mirez | Sh/T | Wild | Root | D | Aynewog for animal | The root of machid seber,shenbeko,Chifirg,jibra kestencha, Gumaro, Gizewa, Yemidir embuay,Ameraro, Koshim,Mirez,Zert embuay and Kitkta pounded and it burned down. While the animal smuggled the puff the bad sprit removed. | Nasal |
| *Premna schimperi* Engl. | Lamiaceae | Chocho | Sh | Wild | Leave | F | Choq | The leaf of chocho pounded, and it pawed with less thaw water. Finally, the infected parts of animal was swilled until it recover well | Dermal |
| *Grewia villosa* Willd. | Tiliaceae | Lenkuata | Sh | Wild (forest) | Bark | F/D | Leech infection | The bark of *Grewia Villosa* is pounded. Then little water is added and given to the cattle through nose for 3 days | Oral |

# Appendix: 5

List of medicinal plants used for treating both human and animal ailments in the study area with scientific name, family, local name ,growth form(GF) ,source, parts used ,condition of preparations, disease treated, methods of preparations and applications and routs of administration (RA).

| Scientific name | Family | Local name | GF | Source | Parts used | CP | Disease treated | Methods of preparation and application | RA |
|---|---|---|---|---|---|---|---|---|---|
| *Buddleja polystachya* Fresen. | Loganiaceae | Anfar | Sh/T | Wild | Leave | F | Leech | The pounded leaf shattered with water and the infected animal drunk it. | Oral |
| *Citrus aurantifolia* (Christm.) Swingle | Rutaceae | Lomi | S | Homegarden | Latex | F | Leech infection | The latex is mixed with "Beribere" and "Areke" then drunk the cattle orally. | Oral |
| | | | | | Latex | D | kunchir | The fruit of yejib shinkurt,root of,sindedo, and the whole part of Tenadam are pounded and dry then powdering it. Finally; smear the infected part. | Dermal |
| | | | | | latex | F | hypertension | The juice of *Citrus aurantifolia* is drunk once a days | Oral |
| *Lepidium sativum* L. | Brassicaceae | Feto | Herb | **C**ultivate | All parts | D | Malaria | Drink the powdered and shattered leaf of parts of feto | Oral |
| | | | | | seed | F | Cough and diarrhea | The seed of *Lepidium sativum* is crushed with *Allium sativium*andmixed with water then drunken one cup of coffee at morning time for 7 days to human and one litter is given for cattle. | Oral |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Otostegia integrifolia* Benth | Lamiaceae | Tunjut | Sh | Wild and homegarden | Leaf | F | Stomach ache | The leave are crushed, powdered and mixed with *Rumex nervosus* and water. After that drunk cup of coffee for human and one liter for cattle | Oral |
| | | | | | Root | F | Snake bite | The root foliated into very small pieces and pounded. And finally, drink until recovery. | Oral |
| | | | | | leaf | | malaria | Drink the powdered and shattered leave of Tinjut for 7days. | Oral |
| *Cordia Africana* Lam. | Boraginaceae | Wanza | T | Wild (agricultural land) | Leaf | F | Anthrax | The leaves are crushed mixed with *Verbascum sinaiticum, Jusicia schimperiana* and *Cucumis ficifollius.* Then given to cattle by adding water. | Oral |
| | | | | | fruit | D | Wen on armpit | The fruit of wanza and injury are pounded, dry and powdered it. Then the powder swished on infected parts. | Dermal |
| *Dodonea angustifolia* L.F. | Sapindaceae | Kitkta | Sh | Wild (flow land) | Leaf | F | Bone fracture | The twig part of leaf and stem is tied the broken part of the bone of cattle, goat, sheep and even human until connected /recovery/. | Dermal |
| | | | | | leaf | D | Skin rash | The leave of Abalo, kitikta pounded and dry. Then it roasted and mashed. Finally it kneaded and coated the disease-ridden parts of the body. | Dermal |
| *Euphorbia tirucalli* L**.** | Euphorbiaceae | Kinchib | Sh | Wild (forest) | Root | F/D | Hemorrhoids (kitarot) | The root of *Euphorbia tirucalli* is crushed and mixes with crushed leaves of Coffee Arabica then after, rubbing affected part of the body. | Dermal |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Capparis tomentosa* Lam. | Capparidaceae | Gumero | Sh | Wild | Root | D | Ayne Tila | The moist root cut off in to very small piece and dried. The dry root powdered and smoking the powder | Oral/Nasal |
| *Cucumis dipsaceus* Ehrenb.ex Spach | Cucurrbitaceae | Buhie hareg | Herb | Wild | Leave | F | Febrile illness | The fresh leave of haregresa is crushed, squeezed and filtered the liquid. Then the liquid is mixed with sugar and drink it. | Oral |
| | | | | | Leave | F | Febrile illness | The fresh leave of hareg resa is crushed, squeezed and filter the fluid. Then the fluid is simply creamed on the body. | Dermal |
| *Vernonia amygdalina* Del. | Asteraceae | Girawa | Shrub/tree | Wild | Leave | F | Dandruff | Pounded the leaf and then squeezed to get watery must. Then smeared the infested parts of the body. | Dermal |
| | | | | | Leave | F | Athlet foot | Grind the leaf of the Girawa then they must shall be applied on the foot. | Dermal |

# Appendix: 6

Lists of human, animal and both disease with their medical and local name in menz keyagebreal woreda.

| No | Medical name | Amharic name | Types of disease |
|---|---|---|---|
| 1 | liver infection | Ye wof Beshita | Only human |
| 2 | Gonorrhea | Chebto | Only human |
| 3 | Abdominal ach(stomach ache) | Ye hod kurtet | Both human and animal |
| 4 | Bone fracture | Ye atint sbirat | Both human and animal |
| 5 | Snake bite | Ye ebab merz | Only human |
| 6 | Swelling | Ebach | Both human and animal |
| 7 | Dandruff | Forefor | Only human |
| 8 | Hemorrhoids | Kintarot | Only human |
| 9 | Ring worm | Chirt | Only human |
| 10 | Fibril illness | Mich | Both human and animal |
| 11 | Evil eye | ye buda beshita | Only human |
| 12 | Diarrhea | Tekimat | Both human and animal |
| 13 | Intestinal parasite | Ye anget tlatil | Only human |
| 14 | Tonsillitis | Ye entl beshita | Only human |
| 15 | Urine retention | Shekmat | Only human |
| 16 | Eye disease (infection) | Ye ayn himem | Both human and animal |
| 17 | Cancer | Nekersa | Only human |
| 18 | Hypertension | Dem gfit | Only human |
| 19 | Skin rash (disease) | Ye koda beshita | Only human |
| 20 | Ear wound (deafness) | Ye joro himem | Only human |
| 21 | Tapeworm | ye koso til | Only human |
| 21 | Gastric ulcer | Ye cheguara himem | Only human |
| 23 | Common cold | Gunfan | Only human |
| 24 | Body swelling | Bgunj | Only human |
| 25 | Cough | Sal | Both human and animal |
| 26 | Itching | Ekek | Only human |
| 27 | Malaria | Woba | Only human |
| 28 | Evil sprite | Menfes | Only human |
| 29 | Leech infection | Ye alkt beshita | Both human and animal |
| 30 | Herpes simplex | Yegela (blit) kuslet | Only human |
| 31 | Asthma | Asim | Only human |
| 32 | Spider poison | Yegdgdawa | Only human |

| | | | |
|---|---|---|---|
| 33 | Eczema | Chife | Only human |
| 34 | Wound (gormit) | Kusl | Both human and animal |
| 35 | Ear infection (wound) | Ye joro himem | Only human |
| 36 | Loss of appetite | Ye mgb flagot mekenes | Only human |
| 37 | Rabies | Ye ebd wusha likft | Both human and animal |
| 38 | Wart | Yegela kitarot | Only human |
| 39 | Scorpion poison | Ye gint merz | Only human |
| 40 | Sudden sickness | Dngetegna himem | Both human and animal |
| 41 | Blotting | Hod menfat | Only animal |
| 42 | Athlete's foot | Choq | Both human and animals |
| 43 | Head wound | Korekor | Only human |
| 44 | Mental disorder | Ye ayimiro himem | Only human |
| 45 | Leshimaniasis | Kunchir | Only human |

# Appendix 7

List of informants in Menz keya Gebreal woreda t (Key: with * are key informants

| No | **Name** | **Sex** | **Age** | **Martial Status** | **Educational status** | **Kebele** | **Occupation** |
|---|---|---|---|---|---|---|---|
| 1 | Abate Gebeyehu | M | 69 | Married | read & write | Gumer | Farmer |
| 2 | Abate W/girum | M | 66 | Married | MSc | Zemero | Agricultural office |
| 3 | Abebanesh Zame | F | 83 | Divorce | read&write | Kolako | Farmer |
| 4 | Abebe Lema | M | 66 | Married | read & write | Kolako | Farmer |
| 5 | Abera Tenifu | M | 62 | Married | read & write | Kimir-Dingay | Farmer |
| 6 | Abera Worku* | M | 91 | Married | Illiterate | Nidi | Farmer |
| 7 | Ademu Afework | M | 60 | Married | 12 | Zemero | Farmer |
| 8 | Adimas Arage | M | 35 | Married | Illiterate | Gumer | Farmer |
| 9 | Adimasu Cherinet | M | 62 | Married | read & write | Gumer | Farmer |
| 10 | Alayu Abera | M | 35 | Married | Illiterate | Nidi | Farmer |
| 11 | Alemu W/aregay | M | 66 | Married | read & write | Kimir-Dingay | Farmer |
| 12 | Altaye Tizazu | M | 67 | Married | Illiterate | Akafie | Farmer |
| 13 | Amare Taschalew | M | 56 | Married | Reade and write | Akafie | Farmer |
| 14 | Asalif T/tsadik | M | 51 | Married | 12 | Gumer | Farmer |
| 15 | Asamin Shewaye | M | 30 | Married | 9 | Zeret | Farmer |
| 16 | Asefa Zenebe | M | 60 | Married | 9 | Zigiba | Farmer |
| 17 | Aselefech Asfaw | F | 82 | Divorce | Read & write | Gumer | Farmer |
| 18 | Asfaw Kebede # | M | 50 | Married | read & write | Zeret | Kebele official |
| 19 | Asfaw Negash | M | 50 | Married | read & write | Zeret | Farmer |
| 20 | Atifraw Zenebe | M | 52 | Married | read & write | Zigiba | Farmer |
| 21 | Atile Endale | M | 80 | Married | read & write | Kimir-Dingay | Farmer |
| 22 | Atrisaw Beyene | M | 55 | Married | read & write | Akafie | Farmer |
| 23 | Awoke Demissie | M | 59 | Married | Read & write | Nidi | Farmer |
| 24 | Awule Walte* | M | 80 | Married | Illiterate | Nidi | Farmer |
| 25 | Ayalew Zenebe | M | 50 | Married | 10 | Zigiba | Farmer |
| 26 | Ayifokiru Tesfaye | M | 35 | Married | 9 | Kimir-Dingay | Farmer |
| 27 | Ayinenesh Dagne | F | 57 | Divorce | 3 | Zeret | Farmer |
| 28 | Basazin Girmaye | M | 57 | Married | Read & write | Kolako | Farmer |
| 29 | Bekele Amtataw | M | 65 | Married | read & write | Zigiba | Farmer |
| 30 | Bekele W/aferew | M | 58 | Married | read & write | Zemero | Pensionerr |
| 31 | Belay Arigaw | M | 66 | Married | read & write | Kolako | Farmer |
| 32 | Belay Demeke | M | 52 | Married | read & write | Zigiba | Farmer |
| 33 | Belayihun Ayalew | M | 25 | Single | level 3 | Nidi | DA worker |
| 34 | Belayihun Tefera | M | 60 | Married | Read & | Kolako | Farmer |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | write | | |
| 35 | Belayineh Lakew* | M | 65 | Married | Read & write | Kimir-Dingay | Farmer |
| 36 | Beletew Tesfa | M | 51 | Married | read & write | Gumer | Farmer |
| 37 | Chere Asefa | M | 35 | Married | read & write | Zemero | Farmer |
| 38 | Damitew Zelibanos | M | 60 | Married | read & write | Kolako | Farmer |
| 39 | Degu Sirahbizu | M | 50 | Married | read & write | Akafie | Farmer |
| 40 | Demekech Shewafera | F | 60 | Divorce | Illiterate | Nidi | Farmer |
| 41 | Derbe Ashagire | M | 68 | Married | BSc | Zemero | Pensioner |
| 42 | Dereje Belayineh | M | 55 | Married | 4 | Zigiba | Farmer |
| 43 | Dereje Birehane | M | 32 | Married | Diploma | Zigiba | DA worker |
| 44 | Difabachew Yilifashewa | M | 45 | Married | read & write | Kimir-Dingay | Farmer |
| 45 | Emishaw Tenifu | M | 56 | Married | read & write | Kimir-Dingay | Farmer |
| 46 | Enani Taddesse | F | 94 | Divorce | Illiterate | Kimir-Dingay | Farmer |
| 47 | Endale Ayigemite | M | 58 | Married | 4 | Zigiba | Farmer |
| 48 | Endalamaw Agachew | M | 40 | Married | 6 | Kimir-Dingay | Kebele official |
| 49 | Etaferahu Girima | F | 40 | Married | 10 | Zemero | Farmer |
| 50 | Etagegnehu Asefa | F | 60 | Divorce | Illiterate | Zigiba | Farmer |
| 51 | F/silase Mekonnen | M | 32 | Married | read & write | Zemero | Farmer |
| 52 | Fantaye zelibanos | F | 42 | Married | read & write | Zemero | Teacher |
| 53 | G/Hiwot W/yesus | M | 47 | Married | read & write | Gumer | Farmer |
| 54 | G/Mariam Belayihun | M | 41 | Married | read & write | Kolako | Kebele official |
| 55 | Gashaw Dessie | M | 29 | Married | read & write | Zemeroo | Farmer |
| 56 | Gashaw Tsegaw | M | 35 | Married | read & write | Zeret | Farmer |
| 57 | Geremew Debebe | M | 60 | Married | read & write | Gumer | Farmer |
| 58 | Gessese Alemayehu | M | 47 | Married | read & write | Zigiba | Farmer |
| 59 | Getachew Abay | M | 60 | Married | 12 | Kolako | Farmer |
| 60 | Getachew Abebe | M | 45 | Married | 8 | Nidi | Kebele official |
| 61 | Getahun Mammo | M | 34 | Married | BSC | Zemero | Teacher |
| 62 | Getenesh Abera | F | 28 | Married | read & write | Zemero | Farmer |
| 63 | Getenesh Amitataw | F | 40 | Divorce | read & write | Zigiba | Farmer |
| 64 | Getnet Damtew | M | 50 | Married | read & write | Akafie | Kebele official |
| 65 | Getnet Gashaw | M | 30 | Married | Diploma | Kimir-Dingay | DAworker |
| 66 | Getnet Mamo | M | 34 | Married | Read & write | Kimir-Dingay | Farmer |
| 67 | Getu Erigete | M | 42 | Married | read & write | Nidi | Farmer |
| 68 | Girma Biru | M | 59 | Married | read & write | Akafie | Farmer |
| 69 | Girmachew tesfaye | M | 40 | Married | read & write | Akafie | Farmer |
| 70 | Girmaye Lemma | M | 45 | Married | read & write | Zeret | Farmer |
| 71 | Girmaye Tsegaye | M | 52 | Married | read & write | Nidi | Farmer |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 72 | Gizachew Amitataw | M | 55 | Married | read & write | Zigiba | Farmer |
| 73 | Goremis W/meskel | M | 57 | Widowed | read & write | Kimir-Dingay | Farmer |
| 74 | Habitamu Shewairga | M | 45 | Married | 12 | Zemero | Kebele official |
| 75 | Hailu Ajibe | M | 56 | Married | 2 | Kolako | Farmer |
| 76 | Kabitamu Zame | M | 50 | Married | 8 | Kolako | Farmer |
| 77 | Kasegn Yitina | M | 55 | Married | Read & write | Zeret | Farmer |
| 78 | Kebede Gizaw | M | 65 | Married | 2 | Zigiba | Farmer |
| 79 | Kefelegn Awgichew | M | 35 | Married | Illiterate | Kimir-Dingay | Farmer |
| 80 | Kifetew Hailu* | M | 81 | Married | read and write | Zigiba | Farmer |
| 81 | Lemma Bekele | M | 85 | Widowed | 3 | Zeret | Farmer |
| 82 | Manaye Amete | M | 45 | Married | read & write | Nidi | Farmer |
| 83 | Mebireku Demeku | M | 64 | Married | read & write | Zeret | Farmer |
| 84 | Melaku Abebaw* | M | 37 | Single | BSC | Gumer | DA worker |
| 85 | Merkebu Ashagire | M | 60 | Divorced | 3 | Kolako | Farmer |
| 86 | Mindesil Zike | M | 36 | Single | Level 4 | Zeret | DA worker |
| 87 | Minil Chernet | M | 50 | Married | read & write | Zemero | Farmer |
| 88 | Misaw Esubalew | M | 35 | Widowed | read & write | Gumer | Farmer |
| 89 | Mitike Shibeshi | M | 36 | Married | read & write | Zigiba | Farmer |
| 90 | Monk Beshewa Tefera* | F | 81 | Single | 3 | Zeret | Farmer |

# Appendix 8

Checklist of semi-structured interview questions for collecting ethnobotanical data

Semi structured interview and questionnaires

Date_____Kebele_____

Name of informant_____Sex;

Male_____Female_____Age_____

Occupation _____Religion_____Level of education_____

1) What are the most common human health problems in your locality?

2) What are the most common livestock health problems in your locality?

3) What are the most important medicinal plants used to treat human and livestock ailments?

List of medicinal plants used for both human and livestock, scientific name; family; local name; habit; parts used; disease treated; methods of preparation with dosage used and route of application

4) Which plant do you use to treat the particular health problem (disease)?

5) For what other purpose do you use the medicinal plants? Beside, its medicinal value?

6) What part of medicinal plant is used?

7) How is the parts gathered? (Including the collected time)

8) Does the dose differ among sex and age?

9) Any restrictions in taking remedies (pregnancy, age, etc.)?

10) Are medicinal plants easily accessible?

11) Do you store the medicine? If yes. How and for how long? _____

_____

_____ 12) Are the medicinal plants marketable? If Yes;

A) What is their availability?

B) What is their measurement?

C) How much its price?

13) What are the major threats to medicinal plants?

14) How do you conserve the medicinal plants?

Thank you very much

# Appendix 9

Photographs that illustrate Part of field activity and herbarium work

## I. Field activities


**Market survey**

## II. Herbarium activities