ADDIS ABABA UNIVERSITY

COLLEGE OF NATURAL AND COMPETITIONAL SCIENCE DEPARTMENT OF ZOOLOGICAL SCIENCE

Ethnobotanical Study of Traditional Medicinal Plants in Siyadebr and Wayu Woreda, North Shewa Zone, Amhara Regional State, Ethiopia.

Assefa Belachew

Addis Ababa University

Addis Ababa, Ethiopia

June, 2024

ETHNOBOTANICAL STUDY OF TRADITIONAL MEDICINAL PLANTS IN SIYADEBR AND WAYU WOREDA, NORTH SHEWA ZONE, AMHARA REGIONAL STATE, ETHIOPIA.

Assefa Belachew

Advisor: Ermias Lulekal (PhD)

A Thesis submitted to

The Department of Zoological Science and Presented in Partial Fulfillment of the Requirements for the Degree of Master of Science in Biology

Addis Ababa University

Addis Ababa, Ethiopia

June, 2024

ADDIS ABABA UNIVERSITY

GRADUATE PROGRAME

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2._____	(Examiner) _____	_____
3. Dr. Ermias Lulekal	(Advisor) _____	_____
4. _____	(Department Head) _____	_____

Abstract

Ethnobotanical Study of Traditional Medicinal Plants in Siyadebr and Wayu Woreda, North Shewa Zone, Amhara Regional, Ethiopia

Assefa Belachew Asnakew M.Sc. Thesis

Addis Ababa University October, 2023

This research was carried out to record and document medicinal plants and associated indigenous plant use knowledge of the local community in Siyadebr and Wayu Woreda, of Amhara Reginal State, Ethiopia. The ethnobotanical data were collected by conducting prepared semi-structured interview items with 96 informants. In the district of these informants, 62 were males and 34 were females. Of these, 8 key informants were selected purposively. The data were also collected by using field observation, group discussion, and specimen collection. Determination of Informant Consensus Factor, Preference Ranking, Direct Matrix, and Fidelity Level were performed. A total of 87 medicinal plant species distributed in 78 genera and 40 families were documented. Out of these 87 plants were used to treat 58 species human ailments, 11 species livestock ailments and 18 species both human and livestock ailments. 45.98% of medicinal plants were harvested from the wild environments. Of the total medicinal plant species, 35 were herbs. The family Asteraceae and Fabaceae occupied the first rank with 8 species. The most frequently used plant parts were leaves 34.16%. Freshly harvested plant parts 61% preparations were mostly used for remedy preparation. The most widely used method of preparation was crushing 20.87%. The common route of administration recorded was oral 58.79% followed by dermal 26.92%. Agricultural expansion, fire wood, fence, and construction were the major threats to medicinal plants of the study area. Thus, a coordinated in-situ and ex-situ conservation measure is mandatory to save the fast-declining medicinal plants of the study area.

Keywords: Ailments, ethnobotany, medicinal plants, Siyadebr and Wayu, traditional healers

Acknowledgements

First of all, I would like to thank the Almighty God for allowing me to do this work from the start to the end. I would like to express my deepest gratitude to my advisor Dr. Ermias Lulekal for his inspiring guidance, thoughtful suggestions, and consistence encouragement and invaluable advice, constructive criticism, comments and follow-up from problem identification up to the completion of this work.

I would like to express my deepest thanks to my field guides, Ato Simegn G/Tsadik, Bereket Tsegu, W/Yohanes Bekele, Worku Bekure and Mekonen Getachew for their help in data collection.

My heartfelt gratitude also goes to the Department of Zoological science for their unreserved support during my course of study and financial support to carry out this research.

I would like to thank AAU and the Department of Plant Biology and Biodiversity Management, for delivering materials for field activities. I am also indebted to Addis Ababa University National Herbarium who provide inspiring guidance, moral and material support to give scientific names and identifications for my plant specimens.

I would like to thank people of Siyadebr and Wayu Woreda: elders, Administration Office, Health Office, Communication Office and Agricultural Office, chair persons, and development agents, especially to my informants who provide me their indigenous knowledge and valuable information.

I am also gtrateful to all my respondents for their cooperation in showing me medicinal plants and their uses with their application procedures as a result of several trips and face-to-face contact.

I am very much indebted to my wife, Tsehay Tesfaw, for typing the thesis and for consistent moral and financial support and encouragement in the course of this study. My heartfelt thanks go to all who participated directly or indirectly in the successful completion of my thesis work.

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List of Abbreviations and Acronyms

AAU	Addis Ababa University
CSA	Central Statistical Agency
DMR	Direct Matrix Ranking
FL	Fidelity Level
FTC	Farmer Training Center
ICF	Informant Consensus Factor
IK	Indigenous Knowledge
NMSA	National Metrology Services Agency
TMPs	Traditional Medicinal Plants
SWWAO	Siyadebr and Wayu WoredaAgricultural Office
SWWAO	Siyadebr and Wayu WoredaAdministrative Office
SWWCO	Siyadebr and Wayu Woreda Communication Office
SWWHO	Siyadebr and Wayu Woreda Health Office
WHO	World Health Organization

1. INTRODUCTION

1.1. Background of the Study

Ethnobotany is defined as "local people's interactions with the natural environment and how they classify, manage, and use plants available around them" (Martin, 1995). Traditional medicine is defined by the WHO (2002) as " The sum total of all knowledge and practice, whether explicable or not, used in the diagnosis, prevention and elimination of physical, mental or social imbalances, and relying exclusively on practical experience and observation handed from generation to generation, whether verbally or in writing. It is any ancient and culturally based health care practice different from scientific medicine and commonly regarded as local, alternative or folk medicine which is largely an orally transmitted knowledge used by communities of different cultures (Martin, 1995). It is also defined as "health practices, approaches, knowledge -and beliefs incorporating plants, medicines, spiritual therapies, manual techniques and exercise applied to treat, diagnose and prevent illness or maintain the wellbeing of human beings or his living possessions" (WHO, 2003).

Medicinal plants are very vital in their uses for medication, besides ecological, economical, and cultural services. From ancient times, plants have been rich sources of effective and safe medicines (Russell et al., 2006). Globally, about 64% of the total world population is reliant on traditional medicine for their health care needs (Phondani et al., 2016). According to the world health organization (WHO), nearly 3.5 billion people in developing countries including Ethiopia believe in the efficiency of plant remedies and use them regularly (WHO,2003).

Medicinal plants have played a vital role in providing healthcare to human beings since the dawn of civilization. Since time immemorial, plants have been indispensable sources in both preventive and curative traditional medicine preparations for human beings and livestock (Dery *et al*., 1999). Plants are used throughout the world as it is dependent on locally available plants, which are easily accessible, and capitalizes on traditional wisdom-repository of knowledge, simple to use and affordable. According to the world health organization (WHO, 1978), medicinal plants form the basis of traditional or indigenous healthcare systems used by the majority of the populations of most developing nations.

However, medicinal plants are damaged by different causes like environmental degradation, deforestation, agricultural encroachment; over-harvesting and alarming population growth with increasing demand and consumption are the principal problems that aggravate the rate of extinction of medicinal plants from their habitat and consequently the loss of important resources of globally significant plant species (Tesfaye Seifu *et al.*, 2006). This is associated with the loss of indigenous knowledge within the community on plant use for medicine. This problem helps to suggest that there is a need to document medicinal plants and take appropriate conservation measures for threatened medicinal plants and associated knowledge in collaboration with the local community.

A medicinal plant is a plant that is used with the intention of maintaining health, being administered for a specific condition, or both, whether in modern medicine or in traditional medicine (Ahn, 2017). Over 80% of the world's population rely on traditional systems of medicines, largely plant-based, to meet their primary healthcare needs (WHO, 2011). In Ethiopia, about 80% of the human population and 90% of the livestock population still rely on traditional medicines (Getachew Addis *et al*., 2001). Medicinal plants may provide three main kinds of benefit such as health benefits to the people who consume them as medicines; financial benefits to people who harvest, process, and distribute them for sale; and society-wide benefits, such as job opportunities, taxation income, and a healthier labor force. However, the development of plants or extracts having potential medicinal uses is blunted by weak scientific evidence, poor practices in the process of drug development, and insufficient financing (Smith *et al*., 2012).

The wide spread use of traditional medicine among both urban and rural populations in Ethiopia could be attributed to cultural acceptability, physical accessibility, economic affordability and effectiveness against certain types of diseases as compared to modern medicine (Tilahun Teklehaymanot and Mirutse Giday, 2007).The knowledge and use of plants is an integral part of many ethnic rural cultures in Ethiopia, the extent of which has not yet been studied in depth (Abbink, 1995). However, according to Mirutse Giday and Gobena Ameni (2003), the loss of indigenous knowledge has been aggravated by the expansion of modern education, which has made the younger generation underestimate its traditional value. The loss of medicinal plant is coupled with the loss of indigenous knowledge within the community on plants use for medicine.

Hence, the main objective of this study focused on the ethnobotanical study of traditional medicinal plants used by the local community of Siyadebr and Wuayu Woreda. The main aim of this study will be to identify and document key medicinal plants and with the associated knowledge of the community used to treat human and livestock aliments in Siyadebr and Wayu Woreda. Thus, considering Ethiopia's varied flora and varied ethno-medicinal healing system with socio cultural diversity of the country, studies and research works are much needed on conservation, management, cultivation and ethnobotanical improvement aspects including that of medicinal plant species (Dawit Abebe *et al.*, 2003).

1.2. Statement of the Problem

In Ethiopia, little emphasis has been given to traditional medicinal plant studies over the past decade (Debela Hunde, 2001). Therefore, it can be said that ethnobotanical studies are merely at the start in Ethiopia. Though there have been some attempts to investigate medicinal plant uses and there was as yet no in-depth study on the relation between medicinal plants and indigenous knowledge on sustainable management of such plant resources. Due to these reasons, there are many parts of the country not covered by ethnobotanical study. In developing countries like Ethiopia, the indigenous knowledge about traditional medicinl plants is transferred secretly from generation to generation orally. Since there is a gap between the documentation and records on medicinal plants in the country, indigenous knowledge of usage of medicinal plants as remedies for both human and livestock ailments will be lost. Majority of the people of the Siyadebr and Wayu Woreda used herbal medicines for a long time to treat human and livestock ailments. Still now the dependence on this medicine is continuing because of its acceptability, cultural acceptance, affordability and efficacy by society. However, many of these plant species used in traditional systems by traditional health practitioners becoming rare and limited in distribution; they are threatened by several factors, both manmade and natural. Environmental degradation, agricultural expansion, loss of forest and woodlands, over-harvesting, fire, and urbanization appear to be the principal threats to the medicinal plants of the country. The danger certainly poses a significant threat to the future wellbeing of the population which has, for generations, relied on these resources to combat the ailments of both human beings and domestic animals (FAO, 2001).The present study is aimed at identifying and documenting traditional medicinal plant use with the associated indigenous

knowledge and other cultural aspects of the community, to take sustainable conservation and management of those medicinal plants in the study area.

1.3. Research Questions

The findings of the study are believed to answer the following research questions

- What are the plant species used by people Siyadebr and Wayu Woreda as traditional medicines to treat human and livestock aliments?
- Which plant parts are used for traditional medicine preparation?
- How do traditional medicines are applied to treat disease?
- What are the major threats to medicinal plants and associated indigenous knowledge in the study area?
- How do the local people conserve medicinal plant species?
- What types of diseases are treated by medicinal plant species? Is it for humans, animals or both?

1.4. Objectives of the Study

1.4.1. General Objective

The general objective of this study was to document the use of traditional medicinal plants with both human and livestock aliments and their conservation status in Siyadebr and Wayu Woreda North Shewa Zone, Amhara National Regional State, Ethiopia.

1.4.2. Specific Objectives

The specific objectives of this study were to:

- document traditional medicinal plants that are used by the local people for the treatment of human and livestock aliments in the study area;
- distinguish parts of plants for medicinal purposes;
- identify the method of preparation of traditional medicine;
- assess the marketability of medicinal plants in the study area;
- assess the current status of medicinal plants and the indigenous knowledge of the people;
- identify major threats to traditional medicinal plants and
- assess local conservation measures being taken by the community in the study area.

2. LITERATURE REVIEW

2.1. Concept of Ethnobotany

Ethnobotany was first defined in 1895 by Harshberger (Balick and Cox, 1996) and was about "plants used by primitive and aboriginal people". In broad terms, ethnobotany is understood as the study of the relationship and interactions between plants and humans (Balick and Cox, 1996). Ethnobotany is the scientific study of the relationship between people and plants, that is, how people of a particular culture and region make use of indigenous plants (Mathias, 2004). It is also the study of plants and their practical uses through the traditional knowledge of local culture and people. An ethnobotanist, thus, strives to document the local customs involving the practical uses of local flora for many aspects of life, such as plants as medicines, foods, intoxicants and clothing. Richard Evans Schulte's often referred to as the father of ethnobotany (Kandel, 2001).

Ethnobotanists are now much more engaged with questions of conservation, sustainable development, cultural affirmation, and the intellectual property rights of local and indigenous people. The scope of the subject has now expanded to include studies of modern cultures, greater interdisciplinary and more recently, greater attention to its applications to conservation and sustainable development (Hamilton *et al*., 2003). Some of the current contributions of ethnobotanical studies that play key roles include the conservation of plants and other forms of biological diversity, preservation, recovery and diffusion of local botanical knowledge and wisdom, and contributions to new drug development (Hamilton *et al*., 2003)

2.2. Indigenous Knowledge (IK)

The term indigenous knowledge stands for the unique traditional or local knowledge existing within, and developed around the specific conditions of men and women indigenous to a particular geographic area (Grenier, 1998). This knowledge includes rules, standards, skills and mental sets, which are possessed by local people in a specific geographic area (Quanash, 1988). According to Martin (1995), indigenous knowledge is a result of many generations' long years of experiences, careful observations, and trial -and- error experiments. This knowledge helps people to adapt and survive challenges from their environment. According to Hareya Fassil (2003), development efforts that 'build on indigenous knowledge', would result in a more self-reliant pattern of development, one that is more harmonious with people`s needs and preferences, more congruent with available resources, more dependable, as well as more economical.

One of the widely used indigenous knowledge systemes in many countries is the knowledge of and application of traditional medicinal plants. Such knowledge, known as ethnomedicinal knowledge involves traditional diagnosis, collection of raw materials, preparation of the remedies and their prescription to patients (Farnsworth, 1994). In ethnomedicinal studies, such as the present work, terms like 'indigenous', 'traditional', 'local' or 'cultural' knowledge are used synonymously (Cotton, 1996) to discern the fundamental bodies of knowledge pertaining to health and systems of therapy which existed prior to the introduction of 'modern', 'allopathic' or 'Western' medicine to a particular area.

Indigenous knowledge of plant remedies in many countries, including Ethiopia, passes from one generation to the other verbally with great secrecy (Jansen, 1981). Such crude and secrete transfer makes indigenous knowledge or ethnomedicinal knowledge vulnerable to distortion. In most cases, some of the lore is lost at each point of transfer (Amare Getahun, 1976). Hence there is a need for systematic understanding, documentation and promotion of such useful knowledge through ethnobotanical research.

Traditional knowledge can reflect a community's interests. Some communities depend on their traditional knowledge for survival. Traditional knowledge regarding the environment such as taboos, proverbs and cosmological knowledge systems provide a lot of conservation ethos for biodiversity preservation (Adom and Dickson, 2018). This is particularly true of traditional environmental knowledge, which refers to a particular form of place based knowledge of the diversity and interactions among plant and animal species, landforms, watercourses, and other qualities of the biophysical environment in a given place (Pena and Devon, 2005). An example of a society with a wealth of traditional ecological knowledge is the South American Kayapo people, who have developed an extensive classification system of ecological zones of the Amazonian tropical savannah to better manage the land (Posey, 2008).

Some social scientists conceptualize knowledge within a naturalistic framework and emphasize the gradation of recent knowledge into knowledge acquired over many generations. These accounts use terms like "adaptively acquired knowledge", socially constructed knowledge," and other terms that emphasize the social aspects of knowledge (Wasongo *et al.*, 2011).

2.3. Traditional Medicine in Ethiopia

The world health organization defined traditional medicine as the total combination of knowledge and practices that can be formally explained or used in prevention and elimination of physical, mental or social imbalance and relying exclusively on practical experience and observation handed down from generation to generation, whether verbally or in writing (WHO, 2001)

Like all other parts of the world, plants are used as a source of medicine in Ethiopia. It is a home to many languages, cultures and beliefs which have in turn contributed to the high diversity of traditional knowledge and practices of the people which, among others, includes the use of medicinal plants to cure such diversified diseases and possible causative agents (Mirutse Giday, 2003). Hence, in Ethiopia, plants have been used both in the prevention and cure of various diseases of humans and their animals from time immemorial (Mirutse Giday and Gobena Ameni, 2003). About 80% of the population continues to use traditional plant-derived medicines for their primary healthcare needs (Tilahun Teklehymanot and Mirtse Giday, 2007). The work of Dawit Abebe (2001) also confirmed that there is a large magnitude of use and interest in traditional medicine in Ethiopia due to its acceptability, accessibility affordability, economical and biomedical benefits. This shows that since medicinal plants are often with an easy reach compared to modern drugs. That is dispensed specially in remotely located health institutions; because most people in Ethiopia rely on medicinal plants for their health care (Dawit Abebe, 2001).

2.4. Traditional Medicinal Plants in Ethiopia

Ethiopia is believed to be home for about 6027species of higher plants of which 20% are estimated to be used as medicinal value (Tesfaye Awas, 2015). Currently, Ethiopia has diverse medicinal flora distributed in different vegetation types that are found in the various agro ecological zones of Ethiopia. Edwards (2001) reported that vegetation including grasslands and forests and the evergreen scrubs and rocky areas contain more medicinal plants with higher concentrations in the woodlands. About 1000 medicinal plants have been identified and documented for the treatment of diseases (Zemede Asfaw and Tigist Wondimu, 2007).

According to Fassil Kibebew (2001), about 75-90% of the rural population in the world (excluding Western countries) relies on traditional medicine as their only health care system.

Medicinal plants in traditional health care cover the useful plants for primary health care and as remedies for disease and injury, and plants used traditionally for foods and drinks and which are believed they be good for health. Plants have been used as a source of traditional medicine from time immemorial to combat different ailments and human suffering (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 the Ethiopian people (Migrssa Kaba, 1996). Even today it is common for people living in rural and urban areas to treat some common ailments using plants available around them, example, *Hagenia abyssinica* to expel tape worms, *Ruta chalepensis* for various health problems (Abbink, 1995). The continued dependence on herbal medicine is largely conditioned by economic and cultural factors (Abbiw, 1996).

Modern medicinal services are accessible to the vast majority of the population due to their costs made herbal medicines more acceptable. Due to incomplete coverage of modern medicinal system shortage or pharmaceuticals and unaffordable prices of modern drugs, the majority of Ethiopian still depends on traditional medicine. The problem of ensuring the equitable distribution of modern health care has become serious as the gap between supply and demand has continued to widen. Since medicinal plants are often an easy to reach compared to modern drugs that are dispensed in remotely on the medicinal plants for health care. Thus medicinal plants continue to be in high demand in health care system as components to the modern medicine (Cunningham, 1996). This indicates the need for in depth investigation and documentation of plants of traditional value to rationally use and conserve the plant resources and indigenous knowledge (Dawit Abebe and Ahadu Ayehu, 1993).

2.5. Role of Medicinal Plants in Sustainable Human and Livestock Health

In fact, ancient man was dependent on plants for his needs of treatment, prevention and other form of medicaments, thus, utilizing plants as drugs for millennia (Idu, 2009). Throughout the development of human culture, the use of medicinal plants has had magical religious significance and different points of view regarding the concepts of health and disease that existed within each culture (Adepojou, 2017).

Out of the 252 drugs considered as basic and essential by the World Health Organization (WHO), 11% are exclusively of plant origin and a significant number are synthetic drugs obtained from natural precursors. Some of these drugs obtained from plants include digoxin from

Digitalis species, quinine and guanidine from *Cinchona species*, vincristine and vinblastine from *Catharanthus roseus*, atropine from *Atropa belladonna* and morphine and codeine from *Papaver omniferum*. According to Kling (2016) 60% of anti-tumor and anti-infectious drug already on the market or under clinical trial are of natural origin. These plants offer compounds for new drugs, biomimetic synthesis development and the discovery of new therapeutic properties not yet attributed to known compounds. In most cases, the crude extract of medicinal plants may be used as medicaments (Kling, 2016).

2.6. Medicinal Plants' Trade in Ethiopia

In Ethiopia, medicinal plants are exploited for domestic use rather than for export. The economic value of medicinal plants is highly significant in the remotest areas of the country where health centers are very rare (Kloos, 1976). Indeed, most people in this country prefer herbal drugs to modern drugs for their supposed efficiency in treating some diseases such as asthma, diabetes, hepatitis, haemorrhoids, epilepsy and evil spirits (Kloos, 1976).

A study on preliminary economic evaluation of medicinal plants in Ethiopia by Dessalegn Dessissa (2001) indicated that there is an increase in demand and supply of medicinal plants in local markets and herbal clinics established in Addis Ababa and a few other regions. The same document shows that *Hagenia abyssinica*, *Embelia schimperi*, *Ximenia americana*, *Jantropha curcas* and *Tamarindus indica* are among the most commonly sold medicinal plants in the country. Mander and Co-investigators (2006) reported that the annual harvest of medicinal plants in Ethiopia may reach around 56,000 tonnes, of which 42,260 tonnes (75%) are traded through different domestic marketing channels. The same document explains that the traditional plants market in Ethiopia is worths 2 billion Ethiopian Birr per annum (51million USD) with about 346,000 jobs.

2.7. Economic Value of Medicinal Plants

Medicinal plants have tremendous economic significance besides their role in health care provision of much of the world's population (Medhin Zewdu *et al*., 2001). These plants are commonly traded in various forms, i.e. fresh dried, powdered and processed in and between different countries (Lange, 1998). According to Pierce and Laird (2003), the main actors involved in marketing channels of medicinal plants, from the forest or farm to final consumption, include collectors, petty traders, private agents, wholesale dealers and final consumers.

Although Africa has not taken significant advantage of its medicinal plant resources, reports indicate that some African countries have made considerable progress in the export of medicinal plants (Mander *et al.*, 2006). For instance, Cameroon is the major source of *Prunus africana* bark. Other African countries, which export this bark, include (Kenya 1923 tones per year), Uganda (193 tons per year), Zaire (300 tons per year), and Madagascar 78-800 tons per year (Cunningham *et al*., 1993). Egypt, Ghana, the Republic of South Africa, Senegal, Sudan, Namibia, and Madagascar are also known in exporting different medicinal plants (Cunningham *et al*., 1992; Mander *et al*., 2006).

2.8. Major Threats to Medicinal Plants

Many of the threats to medicinal plant species are similar to those causing endangerment to plant diversity generally. People use many wild species of plants for food, medicine, clothing and shelter, fuel, fiber, income generation and the fulfilling of cultural and spiritual needs throughout the world (Zemede Asfaw, 2001). In Ethiopia, traditional medicine as elsewhere in other developing countries is faced with a problem of sustainability and continuity mainly due to loss of taxa of medicinal plants, loss of habitats of medicinal and other category of plants and cultures (Zemede Asfaw, 2001). Generally, there are two sources of threats to medicinal plants, i.e. human-induced factors and natural causes. The rich biodiversity of the country is under serious threat from deforestation, land degradation, overexploitation, overgrazing, habitat loss; invasive species and some water pollutions are human-caused threats to medicinal plants. The underlying causes for these problems emanate from poverty, population growth, lack of alternative livelihoods, inadequate policy support, inappropriate investment and inadequacy of law enforcement (IBC, 2009).

Likewise, natural causes include recurrent drought, bushfire, diseases and pest outbreaks (Fisseha Mesfin *et al*., 2009). The availability of medicinal plants has been affected by a dramatic decrease in the area of native vegetation due to agricultural expansion, deforestation, fire, overgrazing and drought, and trading charcoal, firewood and urban-associated developments (Kebu Balemie *et al*., 2004). Medicinal plants and the associated knowledge are being seriously depleted due to deforestation, environmental degradation and acculturation that have been taking place in the country (Mirutse Giday *et al*., 2009).

2.9. Conservation of Medicinal Plants

Plant conservation is defined as the protection, preservation, and careful management of natural resources. Vegetation of the world is being changed or destroyed at an alarming rate. Thus, plant conservation should be aimed at securing robust management systems in favor of conservation or sustainable production at the sites where strategies need to be understood and planned based on an understanding of indigenous knowledge and practices (Berkes and Turner, 2006). It involves the careful preservation and protection of something, especially planned management of a natural resource to prevent neglect, over-exploitation or even destruction of habitats. Effective conservation of biodiversity can only be achieved through sustained efforts of involving to Participate the rural communities that largely depend on local biodiversity for their livelihoods (Hamilton, 2003).

As a solution some conservation actions that have been undertaken around the world designed to protect threatened medicinal plants from further damage (Cunninghum, 1996). This includes in-situ and ex-situ conservation measures. Both in-situ and ex-situ conservation efforts are implemented to capture medicinal plant genetic resources and the traditional practices associated with them. In-situ conservation is the 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).

Ex-situ conservation is the conservation of species out of their natural habitat. Medicinal plants can also be conserved by ensuring and encouraging their growth in special places, this can be possible in places of worship (churches, mosques, and grave yards), scared grooves, farm margins, river banks, road sides, live fences of gardens and fields. According to Zemede Asfaw (2001), medicinal plants can be conserved 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.

3. MATERIALS AND METHODS

3.1. Description of the Study Area

3.1.1. Geographical Location

Siyadebr and Wayu is one of the 24 Woredas of North Shewa Zone Amhara Regional State. Deneba is the administrative capital town of Siyadebr and Wayu Woreda. Siyadebr and Wayu is bounded in north by Moret and Jiru woreda, in east by Baso and Werana woreda, in south by Oromia region and in west by Ensaro woreda. Siyadebr and Wayu was a part of the former Siyadebr and Wayu Ensaro Woreda. The Woreda capital town Deneba is approximately 47km to the west of Debre Brhan town (North Shewa Zone capital) at 9^0 41'-9^0 53'N latitude and 39^0 00'-39^0 23'E longitude (SWWCO, 20022) and 117km East of Addis Ababa via the short distance. The Woreda is also located 576km East from the capital city of Amhara Regional state. Its total area is about 46528.4 Km^2 hectares and it has 14 kebeles (SWWAO, 2022). These are 2 lowland, and 12 highland kebeles. The elevation of the Woreda ranges from 2033m a.s.l. at Senketa Wukir kebele to 2600m a.s.l. at Deneba 01 kebele (SWWAO, 2022).

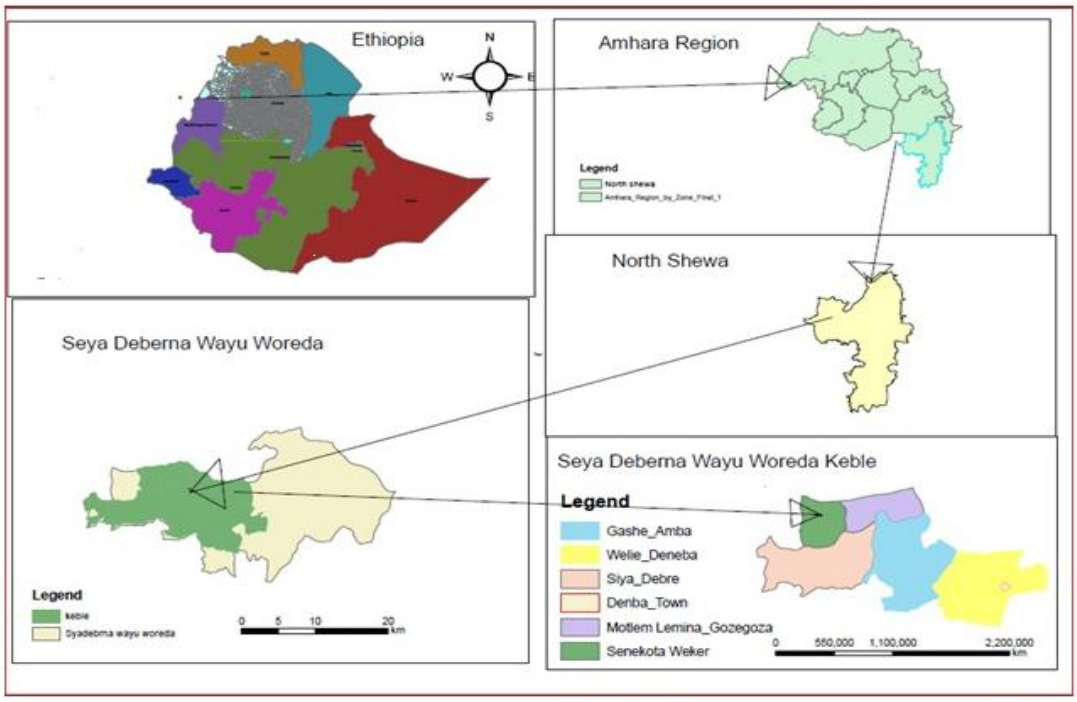

Figure 1. Map of Ethiopia, showing Amhara Region and the study Woreda

3.1. 2. Climate and Agroecology

The Siyadebr and Wayu Woreda mainly gains annual rain fall in summer at once. The average annual rainfall of this Woreda is 900mm (NMSA, 2020). There are March, April and May in the Woreda that show little variability of the rain. Hence, crops and livestock production are not constrained by the amount and distribution of rainfall. Agroecologically, Siyadebr and Wayu Woreda is classified as Lowland and High land (SWWAO, 2022).

3.1.3. Population, and Socio-economy

Based on the 2007 National census conducted by the central statistical agency of Ethiopia (CSA, 2007) the total population of the Woreda is 61,046, of whom 31,322 (51.30%) are males and 29,724(48.70%) are females. About 4,522 or 7.41% are urban inhabitants and the remaining 92.59% were living in the rural kebeles of the Woreda. According to the information from the Woreda office of the communication total population of the Woreda is projected in 2015 to reach to 76944 of which 42098(54.713%) are males and 34846(45.287%) are females. Of the total population which is living in an urban area of the Woreda, in 2015 are 6,550(9.27%) of which 3,505 are males and 3,045 are females. The majority of the inhabitants 76813(99.8%) follow Orthodox Christianity and the remaining 70(0.09%) of the population follow Muslim and 61(0.079%) follow protestant. Amharic is spoken as a first and the working languages of the Woreda (SWWCO, 2022).

The Woreda is composed of 14 kebeles which 13 rural kebeles and one town kebele. According to the (SWWCA, 2019) source from the Woreda office of agriculture, the total area of the Woreda is 46,528.4 hectares, of which 25,188.7 (55.43%) hectares is agricultural land, 5,585.7(12%) hectares is grazing land, 1,662(3.57%) hectares is forest land and the remaining 14,092.3(30.23%) hectares is used for other purposes or it may not be suitable for any activity. In terms of climatic condition, the average rainfall of the Woreda is 900mm (minimum 800mm, and maximum 1000mm) and 51.54% of the Woreda is within the Dega Agro-climatic zone 48.01% of the Woreda is Weina Dega Agro-climatic Zone and the remaining 0.44% of the Woreda is kola agro-climatic zone. The highest place in the Woreda Deneba 01 kebele is 2600 m a.s.l. and the lowest Senketa Wukir is 2033m a.s.l. (SWWCO, 2022).

3.1.4. Soil

The three different dominant soil types such as black soil, sandy and loam soil were favored to grow various types of plants. The soil of the study area 85% of the soil of the Woreda is black, 10% Loam and 5% sandy soil. 75% of the land feature of the Woreda is flat land, 10% of the land is steep slope, 2% of the land is Mountainous and other land features account 13% of the Woreda total area (Siyadebr and Wayu Woreda Agricultural Office, (SWWAO, 2022).

3.1.5. Agriculture in the Woreda

In all the 13 rural kebeles of the Woreda, there is Farmer Training Center/FTC/ that provides extension service to the farmers in the kebeles. In terms of crop production in all of the 13 kebeles, there is a production of crops. In the production year of 2021/22, in terms of area coverage, cereal crops like wheat, teff, and barley cover 17,185 (78.87%) hectares of land. Of the cereals, wheat accounts 9,790 (45 %), hectares followed by teff, 5,258.75 (24%) hectares and barley 278 (1.27%) hectares. Crops like bean, pea, chickpeas, and lentils are also produced and they account 24.39% hectares of land. Sorghum and oilseeds are also crops produced in the area and they account 4.24% of the production and 0.004 % of the area. There is also horticultural crop production in the Woreda, (SWWAO, 2022).

3.1.6. Human Health

The number of health stations in the Woreda are hospital 1, health center 3, health post 14 and the total health workers employed in these stations are 179 (120 males and139 females). The health problems in Siyadebr and Wayu Woreda are directly or indirectly related to the problems of sanitation, inadequate diet, lack of potable water and poor physical condition of the houses. Data obtained from Health Office of Siyadebr and Wayu Woreda (2022) show the three major health problems in the Woreda based on the number of local people who visited health services are Febrile, Helminthiasis, Pneumonia, Hypertension and Diarrhea (source; SWWHO, 2021/2022).

Table 1.Top ten (10) human ailments in 2021-2023 and a number of patients treated in study area

2021		2022		2023	
Diseases	Total	Diseases	Total	Diseases	Total
Hypertension	4953	Typhoid Fever	4068	Hypertension	2721
Pneumonia (Bacterial pneumonia unspecified)	3921	Hypertension (primary)	3732	Diabetes Mellitus (insulin-dependent diabetes)	1602
Typhoid Fever	3840	Dyspepsia	3453	Dyspepsia	1077
Diabetes Mellitus (Insulin-dependent diabetes)	3750	DM(ID)	2841	UTI	1050
Dyspepsia	3150	Pneumonia(Bacterial pneumonia unspecified)	2841	Diabetes Mellitus (non insulin-dependent diabetes)	1245
Urinary Tract Infection	2644	UTI	2787	Typhoid	891
Pneumonia Pneumonia (Unspecified)	2403	Helminthiasis	2175	Diarrhea	774
Diadetes Mellitus (non-Insulin dependent diabetes)	1959	Other medical care	1689	Bacterial pneumonia	759
Typhus	1197	Pneumonia (pneumonia unspecified)	1650	Pneumonia unspecified	1962
Diarrhea	1095	Injury	1614	Sero positive RA	756

3.2. Reconnaissance Survey

Siyadebr and Wayu Woreda has total of 14 Kebeles. Before starting the actual study, reconnaissance survey was carried out from September 30 to October 15, 2022 to select 6 potential Kebeles, which includes Deneba 01, Wole Deneba, Siyadebr, Senketa wukr, Moteleme, and Gashu Amba. These Kebeles were purposively selected based on the availablity of traditional medicine practitioners, traditional medicine use history and altitudinal variation between Kebeles. During which general information about the settlement pattern; topographical feature, vegetation cover, and distribution of key informants were assessed. Based on the information obtained during the survey, methods of study site and informant selection were determined.

3.3. Study Site Selection

Six kebeles were selected purposively for ethnobotanical data collection based on the availability of traditional healers and medicinal plant distributions which were identified with the assistance of the local authorities, elders and religious leaders.

3.4. Informants Selection

Representative informants and knowledgeable Traditional Medicine Practitioners were selected by using purposive simple and random sampling approaches in the manner described by Martin (1995). Informants were selected from 6 Siyadebr and Wayu Woredas's sample kebeles of the 14 total kebeles in the study (Appendix 8). A total of 96 informants with ages between 20 and 80 (62 males and 34 females) out of these 6 males and 2 females key informants were selected by purposive sampling methods based on the recommendations of local authorities, administrators, and knowledgeable elders to drain necessary information in each study site based on relative status of forest cover and population settlements by Martin (1995). The other 88 (56 male and 32 female) informants were selected randomly from the local people of the study area. This was done by tossing acoin and using him/ her as informant whenever head of the coin was up if he/she volunteered to participate.

3.5. Data Sources

Ethnobotanical data were obtained from both primary and secondary sources. The primary sources were from face-to-face interview, guided field walk with informants, market surveys and group discussion in the field of the study area whereas the secondary data sources were from various relevant literature review and unpublished Woreda reports and documents.

3.6. Ethnobotanical Data Collection Methods

Ethnobotanical data were collected between October and January 2023. Guided field walks with informants, face to face interview, and group discussion and market surveys were employed to collect the ethnobotanical data. Consent with the informants were made before starting data collection through awareness creation to informants by describing the post significance of the research in terms of adding value to the way how local people interact with plants and become sustainably beneficial in the future. All of the interviews and group discussions were held based on the checklist of questions prepared in English language before hand and translated into the mother tongue of the residents, Amharic.

3.6.1. Group Discussion

A brief group discussion was made at each site prior to important medicinal plant collection with all informants of the study area. Based on the prepared checklist, two discussions were conducted at each kebele with five to seven informants and residents in seeking to understand the traditional medicinal system of the people and its management and to know how knowledge is maintained and transferred from one generation to other generations (Eskedar Abebe, 2011). Group discussion was conducted with the combination of both key and general informants regarding the status, distribution, threats, conservation and the use of medicinal plants. During the discussion, the both key and general informants were free to state about the traditional medicinal plants without interference (Figure 2).

Figure 2. Group discussion with informants (at the left Siyadebr kebele and at the right Motelemi kebele)

3.6.2. Semi-Structured Interview

Semi-structured checklist consisting 32 questions or issues were prepared in advance. Interviews were based on, around a semi-structured checklist of topics related to medicinal plants usage in the study area. The questions (Appendix9) were prepared with personal data of the respondents which includes the name, address, age, and gender, and information on medicinal plants such as vernacular name, parts of the plant used, preparation, dosage, administration and conservation measures. The approaching with will informant is very systematic. By telling the fact and convincing each informant following his or her culture strictly. They were informed that the

objective of the research is not for commercial purposes but for academic reasons. In so doing, the informants in the study area were well informed about the objective of the research before the starting of data collection and/actual works. Finally, most informants were accepted the idea and come to reach an agreement (Eskedar Abebe, 2011).

3.6.3. Field observation

A number of field observations were made during the feasibility study and later with informants. Field observation was conducted in Senketa forest in senketa wukir kebele, Motelemi forest in Motelemi gozegoza kebele and Gashuamba forest in Gashuamba kebele and (Figure 3). Field observation was carried out with the guidance of the local people. This field observation was important to identify the community, distribution and the status of medicinal plant species in each kebele and also the cultivation practices of medicinal plants by the local people were recorded. This field observation was carried with the famous traditional healer in each kebele in the study area.

Figure 3.Forest of the study area (at the left Senketa Wukir kebele, at the middle Gashuamba kebele and at the right Motelemi kebele)

3.6.4. Guided Field Walks

Guided field walks was made with informants and all relevant data including the vernacular names of plants, habit, habitat of the plant, as well as the strategies they use for the conservation of medicinal plants and the preservation of the indigenous knowledge on medicinal plants were recorded (Figure 4).

Figure 4.Guid fild walk (the left and the middle were Senketa Wukir kebele) while (the right Motelemi kebele)

3.6.5. Market Surveys

During the study market, survey was also made to record the varieties and number of medicinal plants sold in the market, and to record the information on market values of medicinal plants. Two local markets in the study area (Siyadebr and Deneba markets) were selected for market survey to observe and collect the data on the marketability and trade of medicinal plants. During the study, markets survey were made to record the names of the medicinal plants and other aspects of herbal drugs sell in the local markets of the study area. Semi-structured interviews (Figure 5) were conducted with medicinal plant sellers to assess the varieties and amounts of the plant materials, and to determine the value (income) generated from such practice.

Figure 5. Market survey (Siyadebr market in different positions)

3.7. Specimen Collection and Identification

During guided field walk, medicinal plants were collected with the help of informants from wild forest, wood land, home garden, grazing land, crop field, abandoned land, forest margin, farm boundary, river bank, live fence, under the tree, and cultivated sources. The local names, habits and associated plants information were recorded for each species. Collected plants specimens were dried, pressed and identified at species level using Flora of Ethiopia and Eritrea and by comparing with the authentic specimens. The identified specimens were confirmed by advisor Dr. Ermias Lulekal, and voucher specimens were deposited at the National Herbarium of Ethiopia (ETH); Addis Ababa University.

3.8. Data Analysis Method

3.8.1. Descriptive Statistics

The ethnobotanical data was entered in to Microsoft Excel 2010 spread sheet and organized for statistical analysis. Descriptive statistical methods such as percentage and frequency were employed to analyze and summaries the data on medicinal plants, associated knowledge, management methods, use and conservation. The most useful information was gathered on medicinal plants reported by local people medicinal value, application, and methods of preparation, route of application, disease treated, dosage, part and habit used were analyzed through descriptive statistics (Alexiades and Cotton, 1996).

3.8.2 Informant Consensus

Informant consensus (IC) was done to confirm effectiveness of medicinal plant species and evaluate reliability of information recorded from informant. During data collection, informants were visited two times in order to confirm and exhaust the reliability of ethnobotanical information. The response of each informant, which is not in harmony with each different visits, were rejected and the informant were replaced by another knowledgeable person. This is because such responses were considered unreliable. Before the interviews, informants were instructed carefully about the method and encouraged to admit if they do not know the medicinal plant species or its uses (Phillips, 1996).

3.8.3 Informant Consensus Factor

The Informant Consensus Factor (ICF) was used to identify the agreements of the informants on the reported cures for the group of ailments. The ICF was calculated as follows: number of use citations in each category (nur) minus the number of species used (nt), divided by the number of use citations in each category minus one (Heinrich, 1998). The factor provides a range of 0 to 1, are a high value acts as a good indicator for a high rate of informant consensus.

ICF=nur-nt/nur-1 Where, ICF = Informants Consensus Factor, nur = number of use citation in each category, nt = number of species used.

3.8.4. Preference Ranking

Preference ranking was a participatory technique that used to analyze, identify the problem and compare the priority of different item against one another. To perform preference ranking, 8 key informants were selected by the recommendation of the local community. Those informants identified the six best preferred medicinal plant species for the treatment of the selected disease (common disease such as Stomach ache, Wound, Gastritis, Febrile illness, Tonsillitis and Common cold). Each informant was expected to assign the highest value for plant species (*Lepdium sativum*) most preferred, against that illness and the lowest (*Zehneria scabra*) for the least preferred plant and in accordance of their order for the remaining ones. These values were summed up and ranked to each plant species (Martin, 1995; Alexiades 1996).

3.8.5. Direct Matrix Ranking

Direct matrix ranking was a method that used to compare the use value of multipurpose traditional medicinal plant species to know their status of utilization. Six important multipurpose species were selected based on uses by the recommendation of 8 key informants out of the total medicinal plants and use categories like medicinal, fence, furniture, food, firewood, construction, and charcoal. Those eight key informants were assigned use values to each species (5 = best, 4 = very good, 3 = good, 2 = less used, 1 = least used and 0 = not used). Accordingly, each key informant use values for the multipurpose medicinal plant species, average value of each use category for a species and the values of each species were summed up and ranked (Martin, 1995).

3.8.6. Fidelity Level

The fidelity level (FL) is the percentage of informants who mentioned the use of certain plant species to treat a particular ailment in the study area. It is useful for identifying the key informants most preferred species used for treating certain ailments. Fidelity level is calculated as FL (%) = (Np/N) x 100, where Np is the number of informants that claim a use of a plant species to treat a particular disease and N is the number of informants that use the plants as a medicine to treat any disease as stated by Alexiades (1996). Confirmation or consensus could not be taken as a single measure of the potential efficiency of any medicinal plant. Thus, effective is not the only factor that influences the informant choice but prevalence of given plant and disease in the area can affect informants' choices. The total overall use and particular use reports of informants were recorded and its fidelity level was calculated and summarized (Alexiades, 1996).

4. RESULTS

4.1. Medicinal Plant Resource of the Study Area

A total of 87 medicinal plants were collected, documented and identified from the study area. These plants were distributed under 40 families and 78 genera. Family Asteraceae and Family Fabaceae were represented by eight species each followed by Lamiaceae seven species, Solanaceae six species, Euphorbiaceae five species, Polygnanceae, Brassicaceae, Cucurbitaceae and Poaceae (three species each) the remaining ten families had (two species each), and 21 families had (one species each).

Table 2. Distribution of collected species in different families

No.	Family	No. of genera	Percent (%)	No. of species	Percent (%)
1	Asteraceae	6	7.69	8	9.19
2	Fabaceae	8	10.25	8	9.19
3	Lamiaceae	6	7.69	7	8.04
4	Solanaceae	6	7.69	6	6.89
5	Euphorbiaceae	4	5.13	5	5.74
6	Polygnanceae	1	1.28	3	3.45
7	Brassicaceae	2	2.56	3	3.45
8	Cucurbitaceae	3	3.85	3	3.45
9	Poaceae	3	3.85	3	3.45
10	Apiaceae	2	2.56	2	2.29
11	Apocynaceae	2	2.56	2	2.29
12	Cuperssaceae	2	2.56	2	2.29
13	Malvaceae	2	2.56	2	2.29
14	Oleaceae	2	2.56	2	2.29
15	Rhamnaceae	2	2.56	2	2.29
16	Rubiaceae	2	2.56	2	2.29
17	Rutaceae	2	2.56	2	2.29
18	Alliaceae	1	1.28	2	2.29
19	Aloaceae	1	1.28	2	2.29
20	The remaining 21 families	1	26.92	1	24.13
Total	40	78	100	87	100

4.2. Plant Habit Growth

Regarding the habit of diversity herbs were the most common and stood first (Figure6).

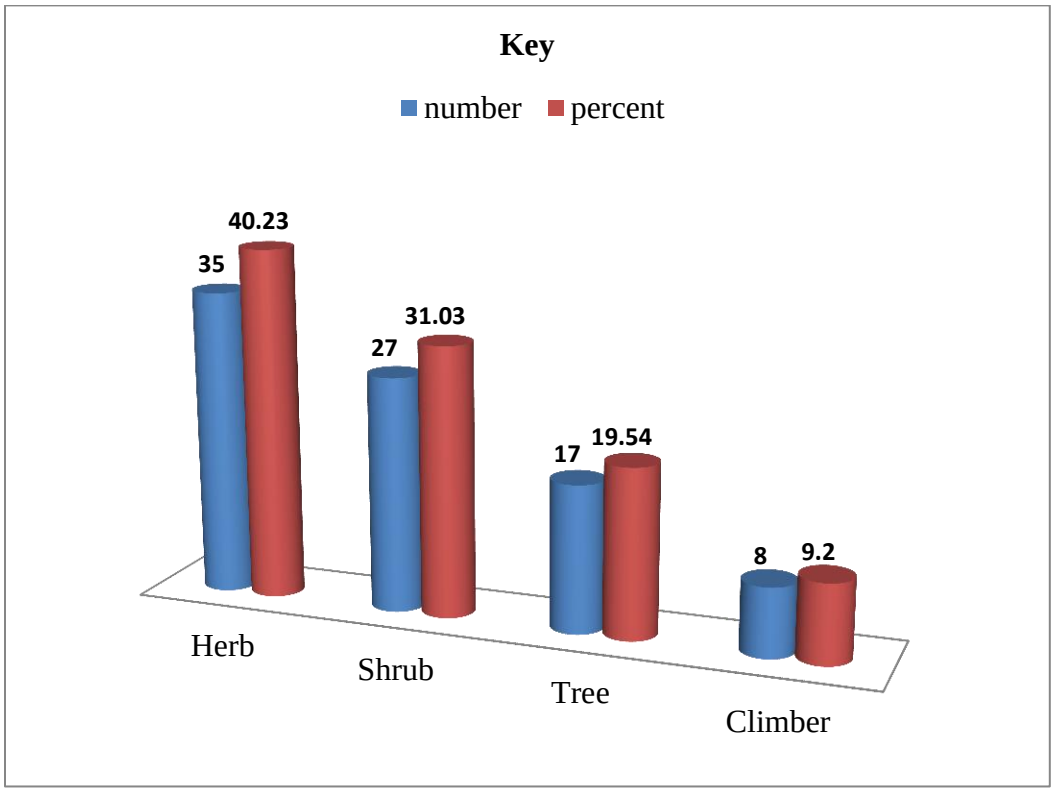

Figure 6. Habit of medicinal plant to treat human, livestock or human and livestock ailments

4.3. Sources (Habitats) of Medicinal Plant

From the total of 87 medicinal plant species documented in the District 40 species (45.98%) were collected from the wild vegetation, 35 species (40.23%) were home garden and the

remaining 12 species (13.79%) were either from cultivated or wild vegetation, (Figure.7).

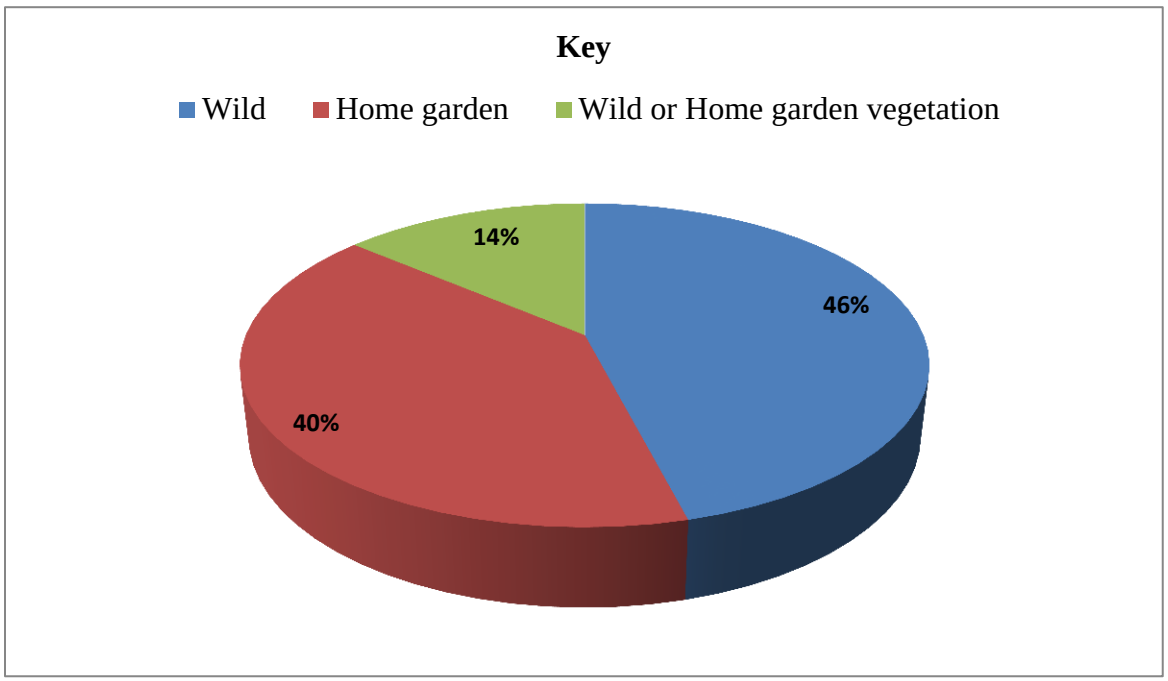

Figure 7. Number and source of medicinal plant species used to treat human, livestock or both human and livestock

4.4. Medicinal Plants Used to Treat Human, Livestock and Both Human and Livestock Diseases

From the six kebeles a total of 87 plant species were recorded, of which 58 species (66.67%) were used to treat only human ailments, 11 species (12.64%) were used to treat only livestock ailments and 18 species (20.69%) were used to treat both human and livestock ailments.

4.4.1. Disease Types and the Medicinal Plants Used to Treat Human Ailments

From the total 87 medicinal plant species found in the study area, 58 species (66.67%) were used to treat only human ailments and these belongs to 18 families and 53 genera. Out of the total 87 medicinal plant species documented from the area, 58 plant species (66.67%) were used to treat about 57 types of human ailments (Appendix3) and one plant species can treat a single or more than one disease (Appendix3). For instance, stomach ache was treated by 8 species; wound was treated by 7 species. Febrile illness, gastritis and common cold were treated by 5 species each; Evil eye, tonsillitis and ring worm were treated by 4 species for each; wart, couph, hypertension,

dandruff, tooth ache, eye disease, unstopped menstruation, ear ache, syphilis and anthrax were treated by 3 species each.

Table 3. List of the major treated human illness and corresponding number and percentage of medicinal plant species used for the treatment of each human ailment

No.	Disease treated	Local name	No. of plant species used	% of plant
1	Febrile illness	Mich	5	6.67
2	Gastritis	Cheguara	5	6.67
3	Stomach ache	Hod himem	8	10.67
4	Common cold	Gunfan	5	6.67
5	Wound	Kusl	7	9.33
6	Tonsillitis	Tonsil	4	5.33
7	Dandruff	Forefor	3	4.00
8	Wart	Kintarot	3	4.00
9	Ring worm	kuakucha	4	5.33
10	Tooth ache	Yetirs himem	3	4.00
11	Hypertension	Dem gifit	3	4.00
12	Evil eye	Buda	4	5.33
13	Cough	Sal	3	4.00
14	Unstopped menstruation	Yewor abeba mefses	3	4.00
15	Anthrax	Kurba	3	4.00
16	Snake bite	Ye ebab niksha	3	4.00
17	Eye disease	Yeayn himem	3	4.00
18	Syphilis	Kitgn	3	4.00
19	Ear ache	Yejoro himem	3	4.00

Out of the 58 species (66.67%) of plant used for treating human ailments in the area 26 species (44.82%) were herbs, 14 species (24.14%) were shrubs, 12 species (20.68%) were trees and the remaining 7 species (12.06) were climbers (Figure 9). As shown Figure9, the rank indicates that

herbs and shrubs were the most medicinal plants used for treating human ailments in the study area.

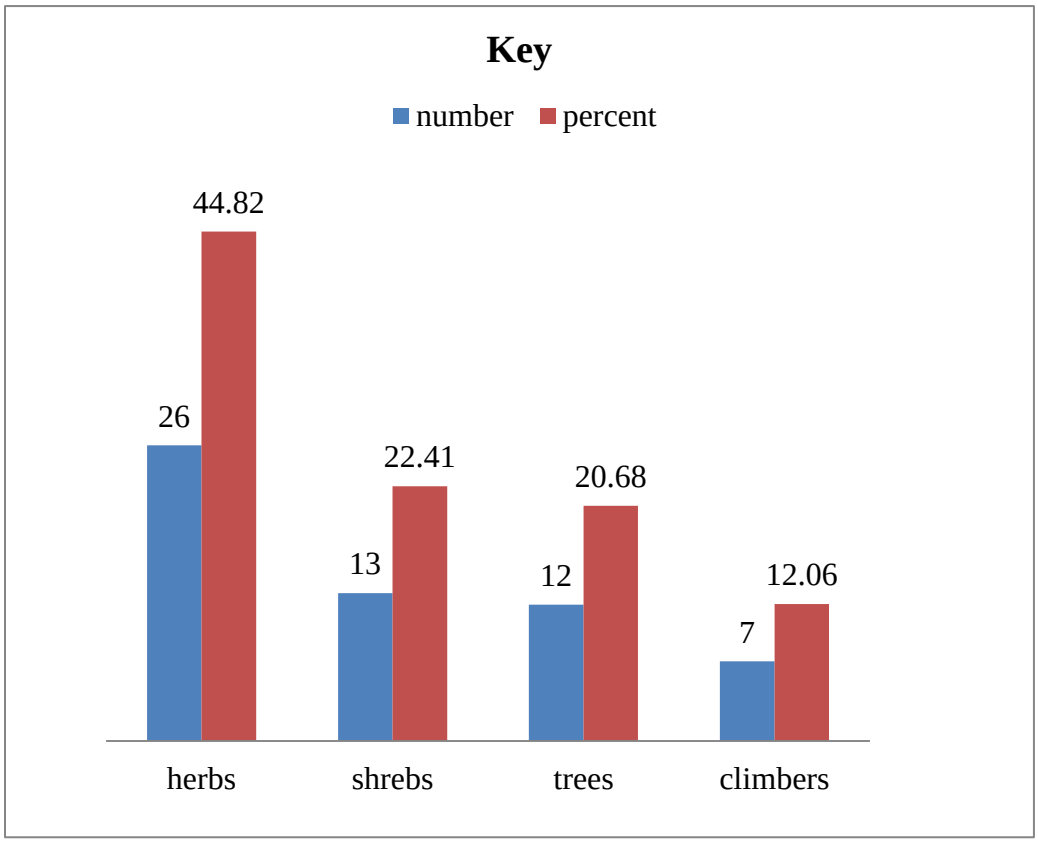

Figure 8. Growth habits of medicinal plants traditionally used to treat humans

The practitioners mostly harvested leaves (23 species, 29.11%), root (14 species, 17.72%) and seed (11species, 13.92%) for treating human ailments. Fruit (8 species, 10.12%), whole plant part (6 species, 7.59%) latex (5 species 6.33), bulb (4 species, 5.06%) and the remaining others (7 8.86 %) (Appendix3).

4.4.2. Disease Types and the Medicinal Plants Used to Treat Livestock Ailments

From the total 87 medicinal plant species found in the study area, 11 species (12.64%) were used to treat only Livestock ailments and these belongs to 9 families and 11 genera. The Family Solanaceae and Lamiaceae were found to consist of two plant species each and the remaining families had one species each. This implied that the local community used few numbers of plant species for treating animal diseases as compared to humans. The majority of the medicinal plants were obtained from the wild and only few from home gardens. This finding agrees with the study

of other researchers like Bogale Haile (2018). Out of 11(12.64%) of plant species used for treating livestock ailments in the study area 6 (55%) species were shrubs, 4(36%) species were herbs and the remaining 1(9%) species was a tree as shown (figure10).

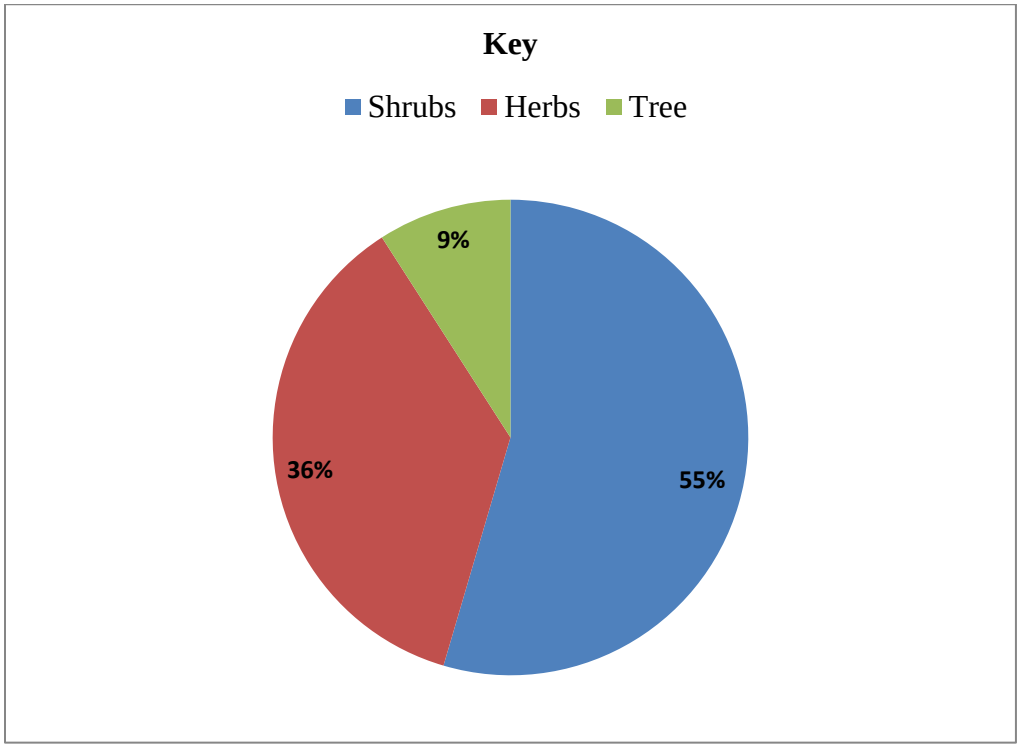

Figure 9. Habits of plants are used for the treatment of livestock ailments

4.4.3. Disease Types and the Medicinal Plants Used to Treat Both Human and Livestock Ailments

A total of 18 species(20.68%) of plants were used to treat both human and livestock ailments and these belongs to 13 families and 18 genera. The family Asteraceae consisted of 3 species followed by Fabaceae, Brassicaceae and Euphorbiaceae with two species each. The remaining 9 families contained one species each.

Table 4. The major families of medicinal plant species used to treat both human and livestock ailments

No.	Family	Number of plant species	Percent
1	Asteraceae	3	16.66
2	Fabaceae	2	11.11
3	Brassicaceae	2	11.11
4	Euphorbitaceae	2	11.11
5	9 Others each	1	50.00

Out of 18(20.68%) of plants used for treating both human and livestock ailments in the study area 8(44.44%) species were shrubs, 5(27.78%) species were herbs, 4(22.22%) species were trees and the remaining 1(5.55%) was a climber.

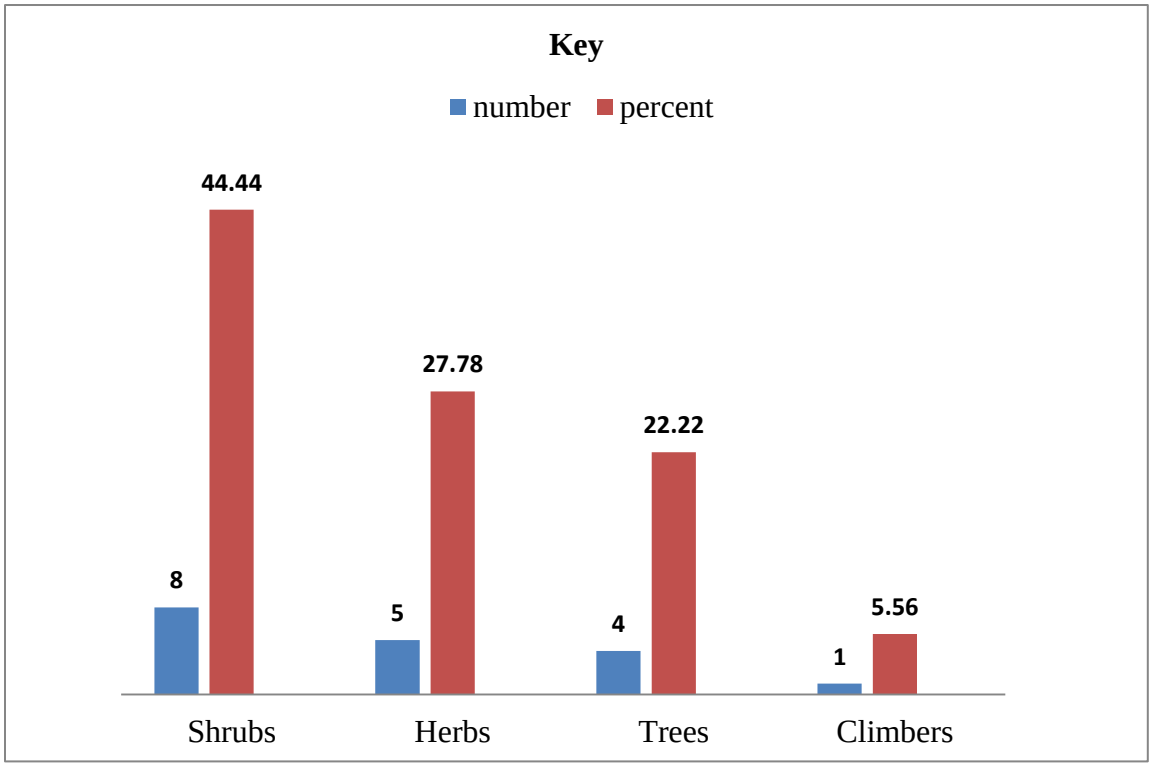

Figure 10. Habits of plants are used to used for both human and livestock ailments

4.5. Major Human Diseases in the Study Area

A total of 59 different types of human ailments were found in the study area. From 87 medicinal plants used to treat ailments, 58 plant species were reported to treat only human ailments and the remaining 18 plant species treated both human and livestock ailments. A particular plant species

can be used to treat only one disease or a number of diseases. For example stomach ache was treated with 10 medicinal plant species. Wound was treated with 8 medicinal plant species, gastritis was treated with 7 medicinal plant species, and febrile illness, common cold, tonsillitis, evil eye and eye diseases were treated with 5 medicinal plant species each. Syphilis, couph, ring worm, toothache, snake bite and malaria were treated with 4 medicinal plant species each. cough, hypertension, dandruff, tape worm, anthrax, stomach worms, ear ache, evil sprit, wart and unstopped menstruation were treated with 3 medicinal plant species each. Medicinal plant products were prescribed through interview and symptoms observed in the patient. They also give the remedies depend on the type of the diseases accordingly.

Table 5. Major human diseases and number of plant species used

No	Human disease	No. of plant species	%	No	Human disease	No. of plant species	Percent
1	Stomachache	10	10.10	13	Cough	3	3.03
2	Wound	8	8.08	14	Hypertension	3	3.03
3	Gastritis	7	7.07	15	Ring worm	4	4.04
4	Febrile illness	5	5.05	16	Dandruff	3	3.03
5	Common cold	5	5.05	17	Tooth ache	3	3.03
6	Tonsillitis	5	5.05	18	Tape worm	3	3.03
7	Evil eye	5	5.05	19	Antrax	3	3.03
8	Snake bite	4	4.04	20	Stomach worms	3	3.03
9	Malaria	4	4.04	21	Eye disease	5	5.05
10	Wart	3	3.03	22	Syphilis	4	4.04
11	Ear ache	3	3.03	23	Evil sprit	3	3.03
12	Unstopped menstruation	3	3.03	Total		99	100%

4.6. Major Livestock Diseases and Plant Species Used

A total of 16 livestock diseases were recorded and treated by 11 plant species treated only livestock diseases and the remaining 18 of them were treated both human and livestock diseases. The major and widespread livestock diseases in the study area includes bloating which was treated with 9 medicinal plant species, eye disease was treated with 5 medicinal plant species, leech was treated with 4 medicinal plant species, rabies was treated with 3 medicinal plant species, bone fracture, evil spirit and retained placenta were treated with 2 medicinal plant species each. The remaining 8 diseases were treated by 1 medicinal plant species each.

Table 6. Major livestock diseases and number of plant species used

No	Disease	No. of plant species	%
1	Bloating	9	24.32
2	Eye disease	5	13.51
3	Leech	4	10.81
4	Rabies	3	8.10
5	Evil sprit	2	5.40
6	Bone fracture	2	5.40
7	Retained placenta	2	5.40
8	Tumor	2	5.40
9	Other 8 diseases	1 each	21.62
10	Total	27	100

4.7. Parts of Medicinal Plants Used by Practitioners to Prepare Remedies

In this study area leaves were the most cited plant parts which accounted for (33.61%) of the total recorded remedies preparation followed by root (18.03%), seeds (14.75%), fruit (7.37%), bulb, whole plant and latex (4.91%) each, bark and root and leaf (2.45%), shoot(2.45%) and the remaining 2 (0.81%) each. Leaves were the most preferable and commonly harvested plant parts in the preparation of remedies due to easy for preparation and treatment of disease.

Table 7. Proportion of plant parts used for the preparation of remedies

No.	Plant parts	No. of parts	Percent%	No.	Plant parts	No. of plant pars	Percent%
1	Leaf	41	34.16	9	Bark	3	2.45
2	Root	22	18.02	10	Leaf and root	3	2.45
3	Seed	18	14.75	11	Shoot	3	2.45
4	Fruit	9	7.37	12	Above ground	1	0.81
5	Whole plant	6	4.91	13	Leaf and fruit	1	0.81
6	Bulb	5	4.09	14	Root and fruit	1	0.81
7	Latex	5	4.09	Total		122	100
8	Stem	4	3.27				

4.8. Methods of Remedies Preparation in the Study Area

A total of 182 remedies were prepared from all medicinal plants documented from the study area. Some remedies were prepared from one species 162 (89.01%) and mixture of two medicinal plant species 20 (10.98%) (Table6).

Traditional practitioners used either a single plant part or mixture of different organs of the same plant or mixture of organs of different plants to prepare remedies. The preparation of remedies

varies depend on the type of disease treated and the actual site of the disease. Different methods of remedy preparations and applications were used to treat human and livestock diseases. The most common remedy preparations were crushing, grinding, boiling, pounding, squeezing and chewing.

Table 8. Methods of remedies preparation in the study area

No.	Method of preparation	No. of preparation	Percentage		No.	Method of preparation	No. of preparation	Percentage
1	Crushing	38	20.87		8	Cooking	2	1.1
2	Boiling	24	13.18		9	Pounding	26	14.28
3	Grinding	32	17.58		10	Smashing	6	3.3
4	Squeezing	18	9.89		11	Powdering	13	7.14
5	Chewing	13	7.14		12	Burn	3	1.65
6	Soaking	2	1.1		13	Latex	3	1.65
7	Roasting	2	1.1					

4.9. Conditions of Preparation of Remedies

Local people of the study area prepare medicinal plants fresh plant collections 111(60.98%) followed by dry conditions 66(36.26%) and fresh/dried 5(2.75%) forms of preparation (Figure 12). Fresh plant parts were ranked first.

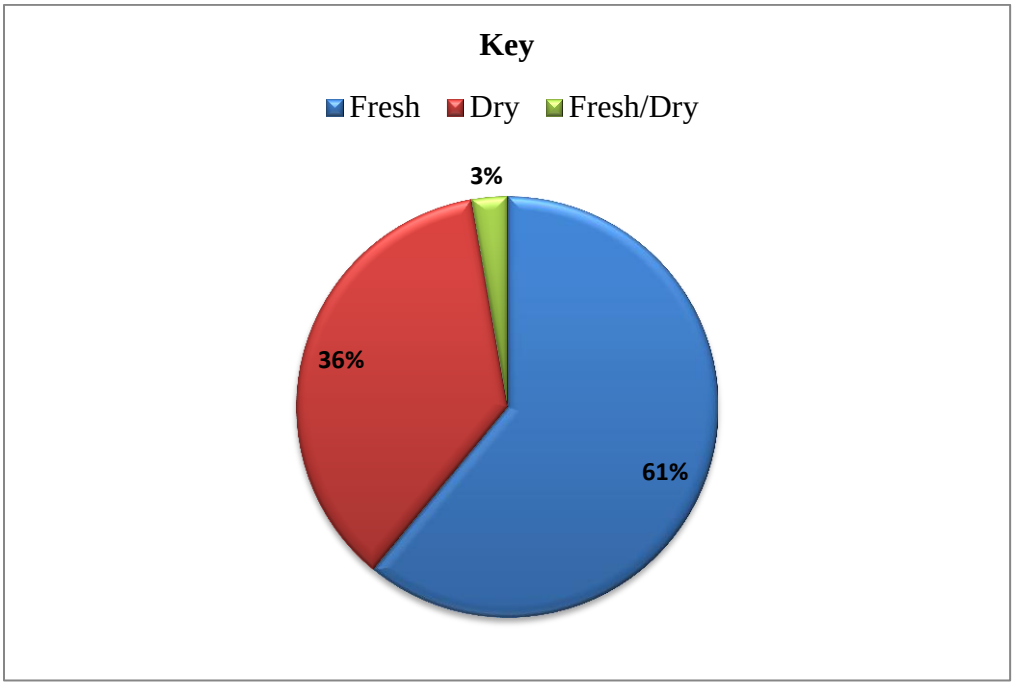

Figure 11. Conditions of preparations of plant remedies in the study area

4.10. Dosage and Route of Administrations

The route of administration includes oral, dermal, fumigation, nasal, ear canal, and ocular. From the reported routes of administration the highest use was reported for oral administration, (65.39%), followed by dermal (27.56%), ocular, (3.01%), nasal and ear canal (1.9%) each (Figure 13).

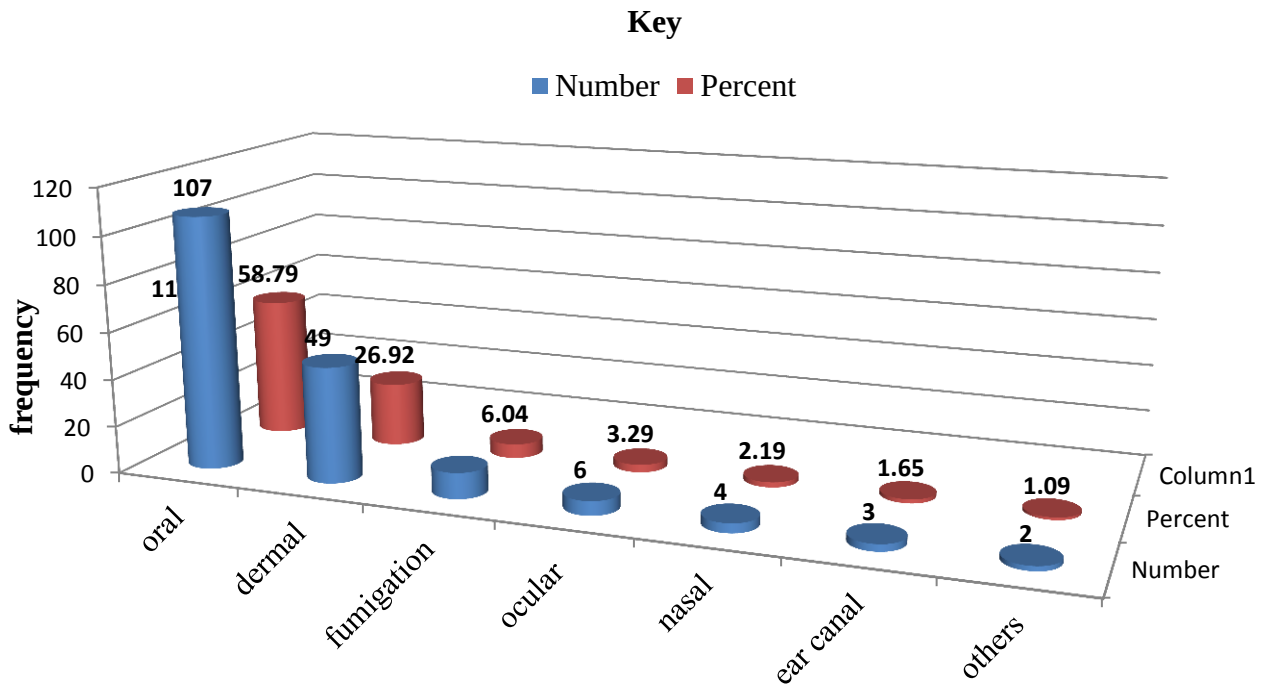

Figure .12. Rout of administration of medicinal plants that used for human and livestock ailments

Figure 12. Dosage and route of administration

4.11. Ways of Applications of Plant Remedies

The prepared traditional medicines were applied in a number of methods, among which drinking (36.48%), tie and put on (16.98%), eaten (16.36%), creamed (11.32%), chewing (6.92%), fumigating (5.66%), smearing (3.77%), and washing (2.52%).

Table 9. Ways of application of plant remedies in human and livestock aliments

No.	Ways of applications	Total responses	Percent
1	Drinking	65	35.50
2	Put on and tied	30	16.48
3	Eating	28	15.38
4	Creamed	18	9.89
5	Chewing	15	8.24
6	Fumigating	12	6.59
7	Smearing	6	3.29
8	Washing	8	4.39

4.12. Dose Administration and Unit of Measurement

Most of the remedies were prescribed and given to patients without any standardized dose. However, approximate dosage was reported to be determined based on age, sex and physical appearance of patients visiting local practitioners. But some remedies were given to patients using traditional unit of measurements like mankia (teaspoon), birchiko (glass), buna seni (coffee cup), tassa, and. Medicinal plant remedies were prescribed by estimation or without standardized unit of measurement ranked first 133 (73.6%), followed by coffee cup or buna seni 17 (9.34%), teaspoon 10(5.49%), birchiko or glass 9(4.95%), tassa 7(3.84%), and alcohol cup (melekia) 6(3.29%).

4.13 Solvent and Additives

Local practitioners or healers of the study area used different kinds of additives and solvents for the preparation of remedies. The most commonly reported additive was water 65(39.10%), followed by butter 10(5.49%), honey 8(4.4%), water and honey, salt and water 5(2.75%), each, water and sugar, coffee and tea were 3(1.45%) each, butter and water, coffee and water, lemon juice, lemon and honey, water and tea were 1(0.55%) each (Table11).

Table 10. Solvents and additives used for remedies preparation

No.	Solvent and additives	No. of preparation	Percentage
1	Water	65	35.71
2	Butter	10	5.49
3	Honey	8	4.4
4	Water and honey	5	2.75
5	Salt and water	5	2.75
6	Sugar and water	3	1.45
7	Coffee and tea	3	1.45
8	Tea	1	0.55
9	Butter and water	1	0.55
10	Coffee and water	1	0.55
11	Egg	1	0.55
12	Tella	1	0.55
13	Water and tea	1	0.55
14	Lemon juice	1	0.55
15	Lemon and honey	1	0.55
16	Others	75	41.21

4.14. Major Sources and Marketability of Medicinal Plants

4.14.1 Major Sources of Medicinal Plants

The first and most important source of medicinal plants of the study area was the natural vegetation. The second major sources of medicinal plants in the study area were cultivated plants including crops, edible fruits and vegetables. The other medicinal plants` source of the area was the market, to getting different products of plant species and other traded medicinal plants that were not growing in the study area, which were thus brought from other parts of the country.

4.14.2. Marketability of Medicinal Plants

In the study area, the results obtained from market assessment of two local markets Siyadebr and Deneba market, showed that most of the medicinal plants were not widely traded for medicinal purposes, but mostly traded for other different uses. Since the local people prefer either collecting these plants by themselves from the available areas (vegetations) in the Woreda to prepare the medicines or other prefer to go directly to the local healers to get treatments instead of buying the medicinal plants from market. However, some of the medicinal plants were widely marketed and used for many additional purposes other than their medicinal uses. Some medicinal plants such as *Allium sativum, Allium cepa, Ricinus communis, Ziziphus spina-christi, Acacia*

abyssinica, Olea europaea subsp. cuspidata, Dodonea angustifolia, Citrus aurantifolia, Phytolacca dodecandera, Coriandrum sativum, Combretum Collinum, Brassica carinata, Cymbopogon citratus, Eragrostis tef, Lycopersicon esculentum, Nigella sativa, Tringonella foenum and *Ruta chalpensis* were sold in the market (Table11).

Table 11. Some of the home garden and wild grown medicinal plants widely traded in the market for different uses other than medicinal values

No.	Scientific name of the medicinal plant	Local name	Used for
1	*Allium sativum*	Nechi shinkurt	Sp,F
2	*Nigella sativa*	Tikur azmud	Sp
3	*Brassica carinata*	Gomenzre	F
4	*Cicer arietinum*	Shimbra	F
5	*Coffea arabica*	Buna	St
6	*Coroton macrostachyus*	Bisana	Fw
7	*Echinops kebercho*	Kebercho	S
8	*Eucalyptus globulus*	Nechi bahirzaf	Co, Fw, Lf
9	*Lepdium sativum*	Feto	F
10	*Linum usitatissimum*	Telba	F
11	*Olea europaea subsp.cuspidata*	Woira	Wf, Co, Ft
12	*Rhamnus prinoides*	Gesho	B
13	*Ruta chalpensis*	Tenadam	Sp
14	*Vicia faba*	Bakela	F
15	*Lycopersicon esculentum*	Timatim	F
16	*Citrus aurantifolium*	Lomy	F
17	*Brassica nigra*	Senafich	F
18	*Guizotia abyssinica*	Nug	F
19	*Zingiber officinale*	Zingble	Sp
20	*Combertom terminilia*	Abalo	S
21	*Pisum sativum*	Ater	F
22	*Ocimum basilicium*	Besobla	Sp
23	*Dodonaea angostifolia*	Kitkta	Ft
24	*Otostegia integrifolia*	Tinjut	S
25	*Acacia abyssinica*	Girar	Fw
26	*Phytolacca dodcandera*	Endod	W

Key: Fw=Fuel Wood, F=Food, Sp=Spice, Lf= Live Fence, St=Stimulant, Co=Construction, B=Beverage, Ft=Farming Tools, S=Smell, W= Wash

4.15. Indigenous Knowledge Transfer

The transfer of indigenous knowledge based on medicinal plants, traditional concepts of illness, methods of diagnosis and treatment among traditional healers of Siyadebr and Wayu Woreda

was by word of mouth to family member, especially to an elder son. Such knowledge is kept secretly and it is passed only within the family circle. None of the participants had any written documents on traditional medicinal plants. All healers reported that they had received the knowledge regarding traditional medicinal plants, from their parents, grandparents or within the family circle orally and observation through practice.

4.16. Comparision of Medicinal Plant Knowledge among Different Age Groups

In this study, the informants (96 in number) 88 (56 male and 32 female) general informants and 8(6 male and 2 female) key informants from whom the basic ethnobotanical data have been gathered where group in to four age groups (Table13). Out of the total 96 informants based on age category 23(23.95%) were found the age between 20-35, (51.04%) 35-50, (14.58%) 51-65 and the remaining informants (8.33%) were found the age between 66-80(Table13).

Table 12. The use knowledge of medicinal plants as compared by age groups

Age group	Age category	Number % of informants		Number of plant species cited by the informants
		Number	% of informants	
1st	20-35	23	23.95	32
2nd	35-50	49	51.04	65
3rd	51-65	14	14.58	45
4th	66-80	8	8.33	27

4.17. Ranking of Most Important Medicinal Plants

4.17.1. Informant Consensus (Medicinal Plant Use Report)

Among the total 87 traditional medicinal plants, (6) traditional medicinal plants were identified as the commonly known and used species by the local communities in the study area. These 6 plant species had 85% of informants' agreements. Plants which were popular due to the wide range of diseases that they treat have local names and would known by the local people/healers. Certain species were independently cited by many of the informants for their medicinal uses against human and livestock ailments. The result of this study showed that some medicinal plants were popular than others, for example *Ocimum lamiifolium* and *Allium sativum* had the highest informant consensus which was cited by 58 and 55 informants respectively.

Table 13. The top six medicinal plants and the corresponding informants

No.	Scientific name of plant species	Local name	No. of informants	Percent
1	*Ocimum lamiifolium*	Dama kessie	58	60.41
2	*Allium sativum*	Nechi shinkurt	55	57.29
3	*Lepdium sativum*	Feto	54	56.25
4	*Otostegia integrifolia*	Tinjut	51	53.12
5	*Zingiber officinale*	Zingible	44	45.83
6	*Rumex nepalensis*	Tult	41	42.70

4.17.2. Informant Consensus Factor (ICF)

The diseases of the study area have been grouped into different categories based on the site of incidence of the disease as well as treatment resemblance of the disease to the local people. The results of the study showed that diseases that are frequent in the study area had 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 factor. (ICF = nur-nt/nur-1 Where, ICF = Informants Consensus Factor, nur = number of use citations in each category, nt = number of species used). The informant consensus factor was calculated on the identified disease categories (Table 15). Accordingly stomach-ache had high ICF scoring (0.83%) followed by wound (0.82%), gastritis (0.81%), febrile illness (0.80%), tonsillitis (0.78%) and common cold(0.77%), (Table 15). This was point out high incidence of these types of diseases in the area. This finding disagrees with the finding of Admasu Mekonen (2018) in which malaria, rabies and snake bite had high ICF (0.92) than stomach ache (0.83%).

Table 14. The top six categories of human diseases and ICF for each group

Diseases category	No. of informant cited(nur)	No. of species used (nt)	ICF	% of ICF
Stomach ache	56	10	0.83	83
Wound	40	8	0,82	82
Gastritis	34	7	0.81	81
Febrile illness	22	5	0.80	80
Tonsillitis	20	5	0.78	78
Common cold	19	5	0.77	77

4.17.3. Preference Ranking of Medicinal Plant

When there is more than one plant species which are used to treat the same ailments, people prefer the better one. Preference ranking of six medicinal plants that were reported for treating stomachache was conducted after selecting eight key informants. The informants were asked to compare the given medicinal plants based on their efficiency and to give the highest number (5)

most effective and the lowest number (1) for the least effective plant in treating stomach ache. *Lepidium sativum* scored (35) ranked first indicating that it is the most effective in treating stomach ache followed by *Zingiber officinale* and the least effective was *Zehneria scabra* scored (23) (Table16).

Table 15. Preference ranking of medicinal plants used for treating stomachache

List of medicinal plants	R1	R2	R3	R4	R5	R6	R7	R8	Total Score	Rank
Lepidium sativum	5	4	5	5	2	5	4	5	35	1st
Zingiber officinale	5	4	3	4	5	4	5	2	32	2nd
Rumex nepalensis	4	5	4	4	5	1	5	2	30	3rd
Cucumis oicifolious	3	4	5	4	4	3	2	2	27	4th
Otostegia integrifolia	4	3	3	1	3	2	5	5	26	5th
Zehneria scabra	3	2	2	5	2	4	1	2	23	6th

Key: R-informants

4.17.4. Direct Matrix Ranking

Local communities used medicinal plants for other purposes in addition to medication. The major use categories include fence, charcoal, building, furniture, firewood and edible (Table 17). This method of analysis was employed in order to assess and checks the multipurpose use of medicinal plants in the study area. To conduct this after selecting 6 medicinal plant species from the total collected plants seven use categories were listed for eight key respondents who indicated to give information for use values of each plant species. Those eight key informants were assigned use values to each species (5 = best, 4 = very good, 3 = good, 2 = less used, 1 = least used and 0 = not used). The result showed that *Cordia africana* ranked first followed by *Ziziphus spina-christi*. Both of them are mostly used societies in different purposes. The remaining medicinal plant species are *Junipers procera*, *Dovyalis abyssinica*, *Olea europaea subsp.cospidata* and *Dodonaea angustifolia* ranking 3rd, 4th, 5th and 6th, respectively.

Table 16. Results of direct matrix ranking with multi use categories of six medicinal plant species

Medicinal plant	Use categories							Total	Rank
	Medicinal	Fire wood	Furniture	Building	Fence	Charcoal	Edible fruit		
Cordia africana	4	4	5	4	5	4	5	26	1st
Ziziphus spina-christi	4	5	2	3	5	3	3	25	2nd
Junipers procera	2	4	5	5	2	4	0	22	3th
Dovyalis abyssinica	4	2	2	2	3	1	5	19	4th
Olea europaea subsp. cospidata	3	3	4	4	2	2	0	18	5th
Dodonaea angustifolia	2	3	2	3	2	2	0	14	6th

4.17.5. Fidelity Level (FL)

Fidelity level value (FL) was calculated for some commonly used medicinal plants against ailments. *Ostostegia integrifolia* has high FL = 0.75 to treat stomachache than *Lepidium sativum and Zingiber offici*nale. *Rumex nepalensis* has high informant consensus than the other having 50 respondents with FL = 0.68 but is found to be the second species next to *Otostegia integrifolia* with FL = 0.75 used to treat stomachache.

Table 17. Results of medicinal use values of plants against stomachache

Disease treated	Scientific name	NP	N	NP/N or FL	(NP/N)*100 or FL%
Stomachache	*Otostegia integrifolia*	30	40	0.75	75
	Rumex nepalensis	34	50	0.68	68
	Lepidium sativum	23	37	0.62	62
	Zingiber officinale	21	35	0.6	60
	Ruta chalpensis	13	26	0.5	50
	Ocimum lamiifolium	4	12	0.33	33

4.18. Threats to and Conservation of Medicinal Plants

4.18.1. Threats to Medicinal Plants in the Study Area

The threats to medicinal plants can be generally grouped in to natural and human induced factors. However, as reported in this study most of the causes for the threats to medicinal plants and associated knowledge were deforestation, due to over exploitation of plants for different uses, such as charcoal, firewoods, construction woods, expansion of farm lands and settlements, fences, over grazing, cutting, flooding and burning of plants to create new agricultural lands, medicinal plants trade for different uses and others.

As the result of the present study showed charcoal fire, fence wood, fuel wood collection were ranked as 1st, 2nd and 3rd respectively followed by harvesting for construction and over grazing ranked as 4th and 5th factors respectively for the threats to medicinal plants and associated knowledge in the study area(Table14). In addition farmland expansion, Flood, medicinal plants trade ranked as 6th, 7th and 8th factors respectively. The threat degree of destructive effects/ values of medicinal plants 1-5 were given 1 = the least destructive threat and 5 = the most destructive.

Table 18. Priority ranking on perceiving factor of threats to medicinal plants used

Respondents label A to F									
Factors	A	B	C	D	E	F	Total	%	Rank
Charcoal fire	4	3	2	2	3	3	17	17.35	1st
Fence wood	4	3	3	2	1	3	16	16.33	2nd
Fuel wood	4	2	1	3	1	4	15	15.31	3rd
Harvest for construction	3	2	3	3	1	1	13	13.27	4th
Farmland expansion	3	2	1	1	1	2	10	10.2	6th
Over gazing	2	3	2	1	2	1	11	11.2	5th
Medicinal plant trade	2	1	1	1	1	1	7	7.14	8th
Flood	3	1	2	1	1	1	9	9.18	7th
Total	25	17	15	14	11	16	98	100	

4.18.2. Conservation of Medicinal Plants and Associated Knowledge in the Study Area

The above cases and other similar reasons were the problems for the conservation of medicinal plants and associated knowledge. Even though, there are many problems plus high population growth there were over exploitation of medicinal plants for different purposes and for getting the daily income, the significancance numbers (73%) of the local people of the study area know the importance of conserving the plants in both ex-situ and in-situ conservation methods. For instance, some people and /or office have started conserving the plants by in-situ method (in original/ natural habitat), fenced/protected pastureland different worship areas (churches, monasteries, etc.) in their (farms, field/farm margins and so on. And also conserving by ex-situ method/outside the original/natural habitat/ like in and around their farmers` home gardens, live fences of the gardens, plantation fields, and so on.

5. DISCUSSION, CONCLUSIONS AND RECOMMONDATIONS

5.1. Discussion

5.1.1. Ethnobotanical Plant Species of the Study Area

A total of 87 medicinal plants were collected, documented and identified from the study area. These plants were distributed or grouped under 78 genera and 40 families. From the total of 87 plant species used by the local people to treat 59 different types of humans and 16 livestock ailments was a good indication of the deep-rooted culture of medicinal plants use in the study area. Out of these, a greater number of medicinal plants (58) were used for treat human ailments only, (11) were used to treat livestock ailments only and the remaining (18) were used to treat both human and livestock ailments. This statistic showed that 66.67%) of medicinal plants was reported for the treatment of human ailments and the local communities and healers gave more attention for themselves than livestock.This result shows that the local communities have more indigenous and local knowledge and give emphasis to the uses of medicinal plants to treat human ailments than livestock ailments. 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; Getaneh Gebeyehu, 2011).

The presence of traditional knowledge and practice on large number of medicinal plants by people of Siyadebr and Wayu Woreda shows that the indigenous people of the area still depend on traditional medicine of plant origin. Most of the medicinal plants recorded in the Wereda are also used as remedies in other parts of Ethiopia Fisseha Mesfin (2007) documented 50 plant species. Among the documented plant species, families; Asteraceae and Fabaceae contained 8 species which may related to its abundance and distribution in the study area. But family, Lamiaceae contained 7 species, family, Solanaceae contained 6 species, family Euphorbiaceae contained 5 species followed by families; Polygnanceae, Brassicaceae, Cucurbitaceae and Poaceae consisting of 3 plant species each. The remaining families; contained two or one plant species each. Similarly the dominance of families Asteraceae and Fabaceae for the treatment of human diseases was reported other works (Zemede Asfaw, 1999; Endalew Amenu, 2007 and Seyoum Getaneh, 2009).

5.1.2. Habits (growth) and Habitats (Sources) of Medicinal Plants

In this study most medicinal plants were collected from the wild 40 (46%). But the rest were collected from homegardens 35(40.22%) and the remaining were collected from both wild and homegardens 12(13.79%) plant species. The finding is similar with the other findings of ethnobotanical studies (Haile Yineger and Delenasew 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 sources or the natural environment were better than homegardens to obtain the medicinal plants across study area.

Of the total 87 medicinal plants collected from the study area, 35 were herb species followed by, 27 were shrub species. This shows that the most widely used medicinal plants in the study area are herbs followed by shrubs. This was in agreement with the studies of Bayafers Tamene (2000) and Debela Hunde (2001). This may be due to high level abundance, distribution and easily accessibility from the nearby areas of herbs in the study area compered to trees and climbers. Relatively high number of herbs and shrubs for medicinal purpose has also been reported previously by Debela Hunde (2004) who studied medicinal plants of Boosat around Welenchiti area.

5.1.3. Plant Parts Used, Conditions and Mode of Preparations

Results of plant parts used for medicinal purposes indicated that, the communities mostly use leaves (33.61%) followed by roots (18.02%). Other plant parts were also used to prepare traditional medicine, i.e., seeds (14.75%), fruits (7.37%), whole plant (4.91%), bulb and latex (4.91% each), stem (3.27%), bark and shoot (2.45% each), above ground, leaf and fruit and root and leaf (0.81% each). The data showed that leaf was the most widely used part for preparation of remedies. Previous reports in Ethiopia have also shown that leaves were the most commonly used parts followed by roots to treat different 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 traditional medicinal plants was found to be minimal, as high threat to the mother plant comes with root, stem and bark harvest. According to Dawit Abebe and Ahadu Ayehu

(1993) medicinal plant harvest involves collection roots, rhizomes, bulbs, barks, and stems which have a serious effect on the survival of mother plants.

There are different methods of traditional medicinal plant preparation of remedies. The most popular mode of preparation was in the form of crushing (20.87%) followed by grinding(17.58%), pounding(14.28%), boiling(13.18%), squeezing (9.89%), chewing and powdering (7.14% each), smashing (3.3%), burn and latex (1.65% each), soaking, cooking and roasting (1.1% each). However Getaneh Gebeyehu (2011), in a similar study on people of Mecha District reported that most of the plant remedies are prepared by squeezing.

The results showed that herbal remedies were prepared by using fresh material (60.98%) followed by dried parts 36.26% and 2.75% were used 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 various health problems is more effective than dry materials because the contents are not lost before use compared to the dried forms.

In this study, the local people also use some other products as additives in their preparations. For instance, water, butter, honey, tea, salt, egg, sugar, tella, water and honey, water and sugar, salt and water, water and butter, coffee and water, water and tea and others are the form of additives that the local people reported to be 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. Such additives were also reported by some previous researchers (Dawit Abebe, 1986; Mirutse Giday, 1999).

5.1.4. Route of Administration Dosage and Application of Medicinal Plants

The route of administration includes oral (58.79%), dermal (26.92%), fumigation (6.045), ocular (3.3%), nasal (2.19%), ear canal (1.65%) and others (1.095). out of this oral administration was reported as a dominant rout of administration followed by dermal route. Both oral and dermal routes permit rapid physiological reaction of the prepared medicines with the pathogens and increase its curative power. This finding agrees with some previous reports (Dawit Abebe, 1986).

The dosages of medicine to be administered were reported to be given by rough estimation of the age, coffee cup, tea spoon, glass, tinn, alcohol cup and physical condition of the patient. But 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 are applied in a number of methods, such as drinking (35.50%), put on and tied (16.48%), eating (15.38%), creamed (9.89%), chewing (8.24%), fumigating (6.59%), smearing (3.29%), and wash (4.39%). This finding is in agreement with other findings of ethnobotanical studies in Ethiopia (Eskedar Abebe, 2011).

5.1.5. Top Ranking Medicinal Plants

Eight respondents were asked to compare *Lepidium sativum*, *Zingiber officinale, Rumex nepalensis, Cucumis ficifolis, Otostegia intergrifolia* and *Zehneria scabra*, medicinal plants based on their efficacy of to identify the most effective medicinal plant used for treating stomachache. The informants were asked to compare the given medicinal plants based on their efficacy and give to the highest number (5) for the medicinal plant which they thought most effective in treating stomachache. *Lepidium sativum* scored 35 and ranked first indicating that it is the most effective in treating stomachache followed by *Zingiber officinale, Rumex nepalensis, Cucumis ficifolis, Otostegia intergrifolia* and *Zehneria scabra*. On the other hand, study by Mohammed Adafa (2009) reported that *Allium sativum* is the most preferred species in the treatment of several diseases followed by *Nigella sativa* in Tuhuledere District, Ethiopia.

Tilahun Teklehaymanot and Mirtsu Giday (2007) stated that medicinal plants that are widely used by the local community to treat one or other very few ailments will have higher fidelity level index (FL) values than others. For example, *Ostostegia integrifolia* has high FL=0.75 to treat stomachache than *Lepidum sativum* and *Zingiber officinale*. So, Informant consensus could not be taken as a measure of potential of any medicinal plant in fidelity level analysis. For example, *Rumex nepalensis* has high informant consensus than the other having 50 respondents with FL =0.68 but is found to be the second species next to *Otostegia integrifolia* with FL= 0.75 used to treat stomach ache. This finding disagrees with the result of Admasu Mekonen (2018) in

which *Ocimum lamiifolium* were ranked first to treat stomach ache having FL= 0.76 than the others.

The result showed some that medicinal plants were popular than others. The medicinal plants were supposed to be effective in treating certain disease had higher ICF values which indicated that these diseases were more 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 0.83 to 0.77 per illness category. Problems of Stomachache had the highest ICF value (0.83) due to the high incidence of the disease in the study area where as Common cold had the lowest ICF value (0.77) may be due to the rare occurrence of these diseases and the fact the most are successfully treated by local healers. According to Tilahun Teklehaymanot 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 indicates that the respondents rely most on the same taxa to be used in the treatment of a given treatments.

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, Firewood, Furniture making, Building, Charcoal, Fence, and Edible Fruit as Food. Six commonly reported multipurpose species and 6 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. *Cordia africana* and *Ziziphus spina-christi*, were ranked 1^{st} and 2^{nd} and hence are the most preferred medicinal plants by local people for various uses and are the most abundant species as the informants reported, which was not evidently shown by their distribution scarcity and time required for collection of these species.

Similarly, the values for use reports across the selected plant species were summed up and ranked. The results show that the local people harvest 6 multipurpose species mainly for Fire Wood, Building, Medicine, (fencing, Charcoal, Furniture), and Edible Fruit and with the rank of 1^{st}, 2^{nd},3^{rd},4^{th},5^{th} and 6^{th} respectively. Thus the long-term survival of the top-ranked species is under question, as the daily demand of the local society is usual and continuous with lesser rate of re-plantation. This was evidenced by the high rate of lose of *Junipers procera* in the study

area. This finding disagrees with the result of Asmare Amde (2017) in which *Olea europaea subsp. cuspidata* ranked first followed by *Acacia abyssinica*.

5.1.6. Marketability of Medicinal Plants

In the study area, the results obtained from market assessment of two local markets Siyadebr market and Deneba, showed that most of the medicinal plants were not widely traded for medicinal purposes, but mostly traded for other different uses. Since the local people prefer either collecting these plants by themselves from the available areas (vegetation) in the Woreda to prepare the medicines or other prefer to go directly to the local healers to get treatments instead of buying the medicinal plants from market. However, some of the medicinal plants were widely marketed and used for many additional purposes other than their medicinal uses. There were no medicinal plants that are sold in the market legally. During the interview, the respondents explained that most healers prepared and sold TMPs 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 *Allium sativum*, *Allium cepa, Ricinus communis*, *Ziziphus spina-christi, Acacia abyssinica, Olea europaea subsp. cospidata, Dodonea angustifolia, Citrus aurantifolia, Phytolacca dodecandera, Coriandrum sativum, Combretum Collinum, Brassica carinata, Cymbopogon citratus, Eragrostis tef, Lycopersicon esculentum*, *Nigella sativa*, *Tringonella foenum* and *Ruta chalpensis* were sold in the market. For instance, *Nigella sativa*, *Tringonella foenum* and *Ruta chalpensis* were widely traded and used for spices; *Eucalyptus globulus*, *Olea europae* were used fire wood, construction, house hold tools and farming tools; *Phytolacca dodcandera* used for washing cloth other than medicinal uses (Table12). This result was agreed with the oher study reports (Tena Regassa, 2008 and Eskedar Abebe, 2011), conducted in Debark District, North Gonder.

5.1. 7. Indigenous Medicinal Plant Knowledge Transfer

The local people of the study area have been found very willing to share and transfer their ethnomedicinal knowledge to their family members mysteriously and orally. The youngest generation live in the Woreda have no interest about traditional medicinal plants. Similar

findings were reported for other cultural groups in Ethiopia (Kebu Balemie *et al*., 2004; Ermias Lulekal *et al*., 2008a; Mirutse Giday *et al*., 2009). It was also found that traditional healers show maximum secrecy in handling medicinal plant knowledge, a trend which is also reported for other ethnic groups in the country (Haile Yineger *et al*., 2007; Mirutse Giday *et al*., 2009). Moreover, the observed secrecy by knowledgeable healers not to leak medicinal plant knowledge beyond the specific family circle might be taken as a guarantee for social respect and means of securing charges from patients. These facts, coupled with the absence of any written document on medicinal plants of the area, show the threat on continuity in indigenous medicinal plant knowledge down the generation ladder in the Woreda.

5.1.8. Comparision of Medicinal Plant Knowledge among Different Age Groups

Out of the total 96 informants based on age category 23(23.95%) were found the age between 20-35, 49(51.04%) 35-50, 14(14.58%), 51-65 and the remaining informants 8(8.33%) were found the age between 66-80(Table13).

As observing during the data collection and interviews made in the study area the second and the third age categories had the highest contribution for identification and associated knowledge of most of the medicinal plants used in the study area.These observations should similar pattern to the study results by Debela Hunde (2001); Tigist Wondimu (2003) and Hussen Adale (2004).

5.1.9. Threats to and Conservation of Medicinal Plants

Results showed that the accessibility of medicinal plants in the study area is less when compared to the past decade; because informants reported that they don't give attention to the wise use of medicinal plants. The main medicinal plants trade for different purposes other than the medicinal values is shown on table 13. Generally due to population growth the demand of woods, agricultural expansion and urbanization are increased and thus have also significant effects on the threats to medicinal plants and associated knowledge of the study area. The threat or losses of medicinal plants were the causes for the losses of the associated knowledge of the plants too. The other reasons for the losses (threats) of the knowledge of medicinal plants were modernization and refusal to practice the knowledge by new generation. As reported by the informants the expansion of modern health institutions, schools, some environmental and cultural modifications reasons for the losses of the knowledge of medicinal plant.

In this study information gathered from the key informants indicated that the threats agricultural expansion is the most serious threat to medicinal plants followed by fire wood. Similarly, this finding agrees with other works (Mirutse Giday, 2001).

Many conservationists suggested the promotion of home gardening and cultivation of medicinal plants as a mechanism to assure a continuous survival of medicinal plants down the generation ladder (Cunningham, 1996). Similarly, in the current study, it could be induced that the conservation of medicinal plants has started in small scale in and around home gardens and wild habitats by the community in the study area but, it is not satisfactory. The majority of medicinal plants in the study area were collected from the wild vegetation which in turn implied that conservation effort in these wild habitats was very little. Furthermore, some members of the community cultivate different plant species in home gardens and around their vicinities, serving as food, spice, shade, wind break, live fence and to some extent for their medicinal purpose. Plants are also left as remnants of trees, shrubs and herbs in and around agricultural fields by agro-pastoralists due to their multi-purpose use which has to be expanded and strengthened.

Cultural and spiritual beliefs some how helped in the conservation of medicinal plants in and around the church and monastery compounds. No one tries to cut a single plant from the church and monastery surroundings because of the culture and norm of the people. Moreover, traditional beliefs have an indirect contribution to the conservation of plants of medicinal importance, since they limit the excessive harvesting of these plants in one way or another. For instance, the claim of the traditional healers stating that medicinal plants are effective only if cut or collected and administered by the knowledgeable persons and healers help in the conservation of medicinal plants. These can contribute to the conservation of biodiversity in general and in this case medicinal plants in particular.

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. Fore xample in the study area communities used medicinal plant as a source of medicine or other values. According to Zemede Asfaw (2001), cultivation for medicinal value accounted for 6% of the plants maintained in home gardens in Ethiopia.

Medicinal plants were also maintained or preserved by using a live fence to avoid enemies as spices and for food. Plants are also left as remnants of forest in agricultural field due to their uses for construction, fuel wood and other values. Similarly Behailu Etana (2010), cited that agricultural expansion and firewood are the most threating factors.

5.2. Conclusion

Siyadebr and Wayu Woreda is relatively rich in diversity of traditional medicinal plants together with a rich indigenous and local knowledge in the local communities to collect and effectively utilize medicinal plants for the management of both human and livestock diseases. Local community in district used traditional medicinal plants to treat their own primary health care and livestock diseases because the traditional remedies were easily available and not costy. In this study area 87 medicinal plant species were recorded and documented among those 58 plant species were important to treat human diseases only. 11 of them were for livestock medicinal plant species only and the rest 18 of them were used to treat both human and livestock diseases. Most of the medicinal plants were obtained from wild followed by home garden and both. This indicated that medicinal plant species located in the wild habit exposed to different anthropogenic factors like agricultural expansions, fuel wood, charcoal, fence and other unwanted human activities. In the study area families Asteraceae and Fabaceae were ranked first containing 8 species each, followed by Lamiaceae (7), Solanaceae (6), Euphorbiaceae (5) and others from the above total medicinal plant species. Herbs were the most dominant medicinal plant species followed by shrubs, trees and climbers to treat both human and livestock diseases. Theses may be important for the survival of shrub, tree and climber plant species.

Local practitioners mostly used fresh leaves of medicinal plant species to make remedies than roots, seeds, bulb, stem, bark and shoots for the treatment of disease; this may also help for the survival of the mother plant.

To prepare most remedies traditional practitioners used fresh plant parts than dried and mainly crushed method of preparation than the others. They also used different kinds of solvents and additives such as water, honey, butter, coffee, tea, salt and eggs for remedies preparation and the administered the remedies using different traditional unit of measurements like birchiko/glass, tassa/tinn, buna seni/ coffee cup, mankia/ spoon and others.

The ethnobotanical study of medicinal plant species indicated that the study area is rich in medicinal plant composition and the associated indigenous and local knowledge which confirms that the local community is still dependent on traditional medicinal plant species fore primary health care. The local people used medicinal plants for healing of both human and livestock aliments in various ways. One plant species can treat a single or a number of diseases and similarly, one ailment can be treated with multiple plant species or a single plant species. Traveling of long distance to collect medicinal plants and rareness of some species indicated that medicinal plant species are under threats of different factors which might eventually lead to extinction. For instance to gather information from the respondents *Withania somnifera* family Solanaceae (gizawa in Amharic) and *Echinops kebercho* family Asteraceae (kebercho in Amharic) are tin a blink to extinct from the selected kebeles by the unwise use of the plant. Though conservation efforts were not sufficient, local people practice different management strategies to save the life of medicinal plant species from extinction.

5.3. Recommendation

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

- The indigenous people should be identifying effective medicinal plants and promoting their production and cultivation.
- The Woreda Agricultural Office create awareness for the local community attention should be given for the use of those medicinal plant parts like roots, shoots and stem of medicinal plants for traditional remedies preparation if they are few in number.
- The Government should encourage the community including practitioners to cultivate and grow medicinal plants in their home gardens, farm lands and live fences.
- Woreda Agricultural Office and Woreda Traditional and Tourism Office create awareness for the local community to conserve, protect, management and sustainable utilization of plant resources.
- 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.

- Woreda Health Office creat awareness traditional medication system should be integrated with modern health care system to insure effective primary health care of the local community.
- Government officers and NGOs should participate in conservation of medicinal plants, support local medicines and provide incentives to farmers for cultivation of medicinal plants in homegardens.
- The indigenous people of the study area should be involved in conservation and management plans of plant resources or their indigenous knowledge in their locality.

References

Abbink, J. (1995). Medicinal and ritual plants of South Western Ethiopia. An account of recent research. *Indigenous Knowledge and Development Monitor,* 3(2)**:** 6-8.

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

Abdu, H.S. and Hamed, S. (1982).*The Complete Book of Rome Remedies. Orient Papers Backs, pvt. Ltd. New Deli, Bomay.* pp. 25-159.

Adepoju, A.O. (2017). Cultivation and conservation of medicinal plants for her *Viciafaba* BAL drug production. Nigeria.

Admasu Mekonen (2018). Traditional Medicinal Plants used by Indigenous People of Waghemra Zone, Dehna woreda, Amhara Regional state of Ethiopia. M.Sc. Thesis, Haramaya University.

Adom, D. (2018). Traditional Biodiversity Conservation Strategy as a Complement to the Existing Scientific Biodiversity Conservation Models in Ghana. *Environment and Natural Resources Research.*

Ahn, K. (2017). "The worldwide trend of using botanical drugs and strategies for developing global drugs". *BMB Reports*.

Alexiades, M.N. (1996). Collecting Ethnobotanical Data: An Introduction to Basic Concepts and Techniques. In: *Selected Guidelines for Ethnobotanical Research*: *A Field Manual,* Alexiades, M. N.and Sheldon, J, W. (ed), The New York Botanical Garden, Bronx, New York, pp.53-94.

Alexiades, M.N. and Cotton, C.M. (1996). Ethnobotany: *Principles and Applications. In J.Wiley and Sons, New York,* 412pp.

Amare Getahun (1976). The role of wild plants in the native diet in Ethiopia. *Agro-Ecosystems* 1:45-46.

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

Asmare Amde (2017). Ethino botanical study of traditional medicinal plants in Debark District, North Gonder, Ethiopia. M.Sc. Thesis GUN, Ethiopia.

Balick, M.J. and Cox, P.A. (1996). *Plants, People and Culture: The science of Ethnobotany*. Scientific American Library, New Yoek, USA.

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

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

Behailu Etana (2010). Ethnobotanical study of traditional medicinal plants medicinal plants of Goma Woreda, Jima Zone Oromia Region, Ethiopia. MSc. Thesis. AAU. Ethiopia.

Bogale Haile (2018). Ethnobotanical study of medicinal plants in Wadla Woreda, North Wollo Zone, Amhara Regional State. M.Sc. Thesis, Haramaya University.

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

CSA (2007). Population pyramid: Central stastical agency of Ethiopia.

Cunningham, A.B., Jasper. P. J. and Hasen, L.C.B. (1992). The indigenous plant use program, Paris, France: Foundation for Research Development.

Cunningham, A.B. and Mbenkum, F.T. (1993). Sustainability of Harvesting *Prunus africana* Bark in Cameroon. People and Plants working paper 2, Paris, France: UNSCO.

Cunningham, A.B. (1996). People, Park and Plants use recommendations for multiple use zones and development alternatives around Bwindi: Impenetrable National Park, Uganda. In: *People and Plant working paper 4*, Sample, A. (ed.), UNESCO, Paris pp.18-23.

Dait Abebe (1986). Traditional medicine in Ethiopia: The attempts being made to promote it for effective and better utilization. *SINET*: *Ethiopian Journal of Science* 9 (Suppl.):61-69.

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

Dawit Abebe (2001). The role of medicinal plants in healthcare coverage of Ethiopia, the possible benefits of integration. In: *Proceedings of Workshop on Biodiversity Conservation and Sustainable Use of Medicinal Plants in Ethiopia*, Medhin Zewdu, Abebe Demissie (eds), Institute of Biodiversity Conservation and Research, Addis Ababa, Ethiopia, 28 April-May 2001, pp.6-21.

Dawit Abebe, Asfaw Debela, Kelbessa Urga (2003). Medicinal plants and other Useful plants of Ethiopia: Illustrated Checklist.EHNRI, Addis Ababa.

Debela Hunde (2001). Use and Management of Traditional Medicinal plants by Indigenous People of Boosat Woreda, Wolenchiti Area: *An Ethnobotanical Aproach* M.sc.Thesis Addis Ababa University, Addis Ababa.

Debela Hunde (2004). Use and Management of Ethnoveternary Medicinal Plants by indigenous people in Boosat, Welenchiti area. *Ethiop. J. Biol. Sci*., 3(2):113-132.

Dery, B.B., Ofsynia, R.and Ngatigwa, C. (1999). Indigenous Knowledge of Medicinal Trees and Setting Priorities for their Domestications in Shinyanga Region,Tanzania. International Center for Research on Agroforestery, Nairobi.

Dessalegn Dessissa (2001). A preliminary economic valuation of medicinal plants in Ethiopia; threat, volume and price. In:*Proceedings of Workshop on Biodiversity Conservation and Sustainable Use of Medicinal Plants in Ethiopia*, Medhin Zewdu, Abebe Demissie (eds), Inistitute of Biodiversity Conservation and Research, Addis Ababa, Ethiopia, 28 April – may 2001, pp. 107-119.

Edwards, S. (2001). The ecology and conservation status of medicinal plants in Ethiopia: What do we know? pp.46 _55, In:Medhin Zewdu and Abebe Demissie (eds.) Conservation and Sustainable use of medicinal plants in Ethiopia, Proceedings of National Workshop on Biodiversity Conservation and Sustainable use of medicinal plants in Ethiopia, Instsitute of Biodiversity Conservation and Research, Addis Ababa.

Endalew Amenu (2007). Use and management of medicinal plants by indigenous people of Ejaji area (Chelya Woreda). West Shewa, Ethiopia: *Anethnobotanical approach*. MSc. Thesis. Addis Ababa University, Addis Ababa, Ethiopia.

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

Ermias Lulekal, Ensermu Kelbessa, Tamirat Bekele and Haile Yineger (2008a). An ethnobotanical study of medicinal plants in Mana Angetu District, south eastern Ethiopia. *Journal of Ethnobiology and Ethnomedicine* 2008, 4:10.

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

Eskedar Abebe (2011). Ethnobotanical study on medicinal plants used by indigenous local communities, in Debark Woreda North Gonder Zone of Amhara Region, Ethiopia Msc thesis.AAU.

FAO (2001). International Treaty on Plant Genetic Resources for Food and Agriculture. *Food and Agriculture Organization of the United Nations*.

Facil Kibebew (2001). The status and availability of oral and written knowledge on traditional health care in Ethiopia. In: *Conservation and sustainable use of medicinal plants in Ethiopia*. Proceeding of national work shop on biodiversity conservation and sustainable use of medicinal plants in Ethiopia, 28April-01May 1998, pp,107-119,(Medhin Zewdu and Abebe Demissie eds.).IBCR, Addis Ababa.

Farnsworth, N.R. (1994). Ethnopharmacology and Drug development. In: *Ethnobiology and the search for new drugs*, Ciba Foundation (ed), Wiley Chichester, Chicago, USA, pp.42-59.

Fisseha Mesfin (2007). An Ethnobotanical study of Medicinal Plants inWonago Wereda, SNNPR, Ethiopia, M.Sc. Thesis.AddisAbabaUniversity, Addis Ababa.

Fisseha Mesfin, Sebsebe Demissew and TilahunTeklehaymanot(2009). An ethnobotanical study of medicinal plants in Wonago Wereda, SNNPR, Ethiopia. *Journal of ethnobiology and ethnomedicine* 2009, 5:28.

Getachew Addis, Dawit Abebe and Kelebisa Urga (2001). Survey of traditional medicinal plants in Shirka District, Arisi Zone, Ethiopia. *Ethiopian Pharmaceutical Journal*.19:30-47. Gimbi Woreda, MSc.Thesis, Addis Ababa University, Addis Ababa.

Getaneh Gebeyehu (2011). An Ethnobotanical study of traditional use of medicinal plants and their conservation status in Mecha Woreda, West Gojam Zone of Amhara Region. M.Sc. Thesis, Addis Ababa University, Ethiopia.

Getu Alemayehu (2010). Ethnobotanical study on medicinal plants and Floristic Composition of the Dry Afromontane Forest at Bale Mountains National Park. M.Sc. Thesis. Addis Ababa, Ethiopia.

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

Grenier, L. (1998). Working with Indigenous Knowledge: A Guide for researchers. Ottawa, Canada: International Development Research Center (IDRC).

Haile Yineger and Delansaw Yewhalaw (2007). Traditional medicinal plant knowledge used by local healers in Sekoru District, Jimma Zone, South western Ethiopia. *Journal of Ethnobiology and ethnomedicine* 3:1-24.

Haile Yineger, Ensermu Kelbessa, Tamirat Bekele and Ermias Lulekal (2007). Ethnoveternary medicinal plants at Bale Mountains National Park, Ethiopia. *Jornal of ethnopharmacology* 112:55-70.

Hamilton, A.C., Shengji, P., Kessy, J., Khan, A.A., Lagos-Witte, S. and Shinwari, Z.K. (2003).*The Purpose and Teaching of Applied Ethnobotany*. People and plants working paper 11.WWF, Godalming.

Hareya Fassil (2003). "We do what we know": Local health knowledge and home-based medicinal plant use in Ethiopia. PhD Thesis, international development centre, Queen Elizabeth house, Oxfored University.

Heinrich, M., Ankli, A., Frei, B., Weimann, C. (1998).Medicinal plants in Mexico: Healers` consensus and cultural importance. *Social Science and Medicine* 47:1859-1871.

Husen Adale Mohammed (2004). Traditional use, Management and Conservation of useful Plants in dry land Ppart of North Shewa Zone of the Amhara National Region: An ethnobotanical approach M.Sc. Thesis Addis Ababa University.

IBC (2009). Ethiopias 4th Country Report to the conservation on Biological Diversty (CBD): *Institute of Biodiversty Conservation*. Addis Ababa, Ethiopia, pp.1-161.

Idu, M. (2009). The plant called medicine: The 104th Inaugural Lecture Series of University of Benin City, Nigeria: *Calameo; in Agriculture, Forestry and Fisheries*. Satellite event on the occasion of the Ninth Regular Session of the Commission on Genetic Resources for Food and Agriculture.Inter-Departmental Working Group on Biological Diversity for Food and Agriculture. Rome. Food and Agriculture Organization.

Jansen, P.C.M. (1981). *Species Condiments and Medicinal Plants in Ethiopia, their Taxonomy and Agricultural Significance*. Center for Agricultural Publishing and Documentation, Wageningen, Netherlands.

Kandell, J. (2001)."Richard E.Schultes, 86, Dies; Trailblazing Authority on Hallucinogenic Plants". *The New York Times. The New York Times Company*.

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

Kling, J. (2016). Protecting medicine`s wild pharmacy. Nature Plants. 2(5): 16064. Dio: 10. 1038/nplants. 2016.64. PMID27243657.

Kloos, H. (1976). Preliminary studies of traditional medicinal plants and plant products in Ethiopian markets. *Journal of the Ethiopian Pharmaceutical Association* 2:18-28.

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

Mander, M., Bezabih Emana, Zemede Asfaw and Badassa Busa (2006). Marketing of Medicinal Plants in Ethiopia: A survey of the Trade in Medicinal Plants (unpublished). A research report prepared by Sustainable Use of Medicnal Plants Project, Inistitute of Biodiversity Conservation, aAddis Ababa, Ethiopia.

Martin, G. J. (1995). *Ethnobotany: A method Manual*. Chapman and Hall, London. pp. 265-270.

Mathias, E. (2004). *Ethnoveterinary medicine*: Harnessing its potential.Veterinary Bulletin 74, 27- 37.

Medihn Zewdu, Tsige Gebre-Mariam and Kaleab Asres (2001). Global perspectives of medicinal plants. In: *Proceedings of Workshop on Biodiversity Conservation and Sustainable Use of Medicinal Plants in Ethiopia*, Medhin Zewdu, Abebe Demissie (eds), Institute of Biodiversity Conservation and Research, Addis Ababa, Ethiopia, 28 April-May 2001, pp. 198-203.

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

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

Mirutse Giday and Endalew Amenu (2003). An ethnobotanical survey on plants of veterinary importance in two Woredas of southern Tigray, northern Ethiopia. *SINT:Ethiopian Journal of science and technology* 26(2**):**123-126.

Mirutse Giday and Gobena Ameni (2003). An ethnobotanical survey on plants of veterinary importance in two Woredas of Southern Tigray, Northern Ethiopia. *SINET: Ethiopian Journal of Science and Technology* 26(2):123-126.

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

Mirutse Giday (1999). An Ethnobotanical study of medicinal plants used by the Zay People in Ethiopia. M.Sc. Thesis. Uppsala, Sweden.Ababa, Ethiopia.

Mirutse Giday, Zemede Asfaw, Zerihun Woldu and Tilahun Teklehaymanot (2009). Medicinal plant knowledge of the Bench ethnicgroup of Ethiopia: *An ethnobotanical investigation. Journal of Ethnobiology and Ethnomedicine*, 5:1-34

Mirutse Giday (2001). An Ethnobotanical study of Medicinal plants used by the zay people in Ethiopia. CMB: skriftserie 3:81-99.

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

Mohammed Adafa (2009). Ethnobotanical Investigation of Traditional Medicinal Plants in Tehuledere District. MSc thesis, BDU, Ethiopia.

Nigussie Amsalu (2010). An ethnobotanical study of Medicinal plants in Farta Wereda,South Gonder Zone, Amhara Region, Ethiopia. Msc.Thesis.AAU.

Pena, D. G. (2005).Mexican Americans and the Environment. The University of Arizona Press, p. 198.

Phillips, O. L. (1996). Some quantitative methods for analyzing ethnobotanical knowledge. In: *Selected guidelines for Ethnobotanical Research: A Field Manual*, M. N. Alexiades (ed), The New York Botanical Garden Press, New York pp.171-197.

Phondani OC, Bhatt ID, Negi VS, Kothyari BP, Batt A, Maikhuri RK (2016). Promoting medicinal plants cultivation as a tool for biodiversity conservation and livelihood enhancement in Indian Himalya. *Journal of Asia-Pacific Biodiversity*. 9(1):39-46.

Pierce, A.R. & Laaird, S.A. (2003). In search of comprehensive standards for non-timber forest products in the botanicals trade. *International Forestry Reviews*, 1(2): 138-147).

Posey, D. A. (2008). Indigenous Management of Tropical Forest Ecosystems: "The case of the Kayapo Indians of the Brazilian Amazon" in Dove and Carpenter, Environmental Anthropology: a historical reader, Blackwell Publishing, Oxford, p. 90.

Quanash, N. (1988). Biocultural diversity and integrated health care in Madagascar. *Nature and Resources* 30:18.22.

Russell SJ, Karunaratne NS, MahindalaRT(2006). Rapid inventory of wild medicinal plant populations in Sri Lanka. *Journal of Biological Conservation*. 132(4):22-32.

Seyoum Getaneh(2009). Ethobotanical study of Medicinal Plants in Debre-Libanos Wereda, North Shewa Zone of Oromia Region, Ethiopia M.Sc. Thesis, Addis Abeba University, pp. 94.

Smith-Hall, C., Larsen, H.O., Pouliot, M. (2012). "People, plants and health: a conceptual framework for assessing changes in medicinal plant consumption". *J. Ethnobiol Ethnomed*. 8: 43. Doi:10.1186/1746-4269-8-43.

SWWAO (2022). Report of Siyadebr and Wayu Woreda Agricultural Office.

SWWCO (2022). Reports of Siyadebr and Wayu Woreda Communication Office.

SWWHO (2022). Reports of Siyadebr and Wayu Woreda Health Office.

Tena Regassa (2008). Ethnobotanical Study on Traditional Medicinal plants of Limu District, Eastern Wollega. M.Sc. Thesis Addis Ababa University, Ethiopia.

Tesfaye Awas (2015).Conservation and sustainable use of Ethiopiantradional medicine: Challenges and the way of forward.In: *Ethiopia traditional medicine: past, current and future,* pp.60-72.

Tesfaye Awas and Sebsebe Demissew (2009). Ethnobotanical study of medicinal plants in Kafficho people, Southern Ethiopia. In:*proceedings of the 16th International Conference of Ethiopian Studies* (seven Ege, Harald Aspen, Birhanu Teferra and Shiferaw Bekele, Trodheim, eds.). pp.711-716, Addis Ababa University, Addis Ababa.

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

Tesfaye Seifu, Kaleb Asres and Tsige Gebre-Mariam (2006). Ethnobotanical and Ethnopharmaceutical studies on Medicinal Plants of Chifra District, Afar Rregion, NorthEstern Ethiopia. *Ethiop. Pharm.J.*24:41-58.

Tigist Wondimu (2003). Study of useful plants in Dodota, Sire Wereda: An ethnobotanical Approach. M.Sc. Thesis Addis Ababa University., Ethiopia.

Tilahun Teklehaymanot and Mirutse Giday (2007). Ethnobotanical Study of Medicinal Plants used by People in Zegie Peninsula, Northwestern Ethiopia. *Journal of.Ethnobiol and Ethno med*, 3:12.

Wasongo, V.O., Kambewa, D., and Bekalo, I. (2011). Community-Based Natural Resource Management (p. 194). In W.O. Ochola, P.C. Sanginga, I. Bekalo (Eds.), Managing Natural Resources for Development in Africa. *A Resource Book. Nairobi, Kenya: Univ. of Nairobi Press*, (Chapter 4: pp. 165-210).

WHO (1978). The promotion and development of traditional Medicine. Technical report series 622. World Health Organization, Geneva.

WHO (2003). Fact Sheet. Family, Body, Sexuality and Health. *Geneva health organization*. Pp.205-219.

WHO (2001). Planning for cost effective traditional health services in the new century. Geneva.

WHO (2002). Regional strategy for traditional medicine in the Western Pacific Region. Geneva.

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

WHO (2011). The world medicines situation, traditional medicines: Global situation, issues and challenges, Geneva.

Zemede Asfaw (2001). The Role of Home gardens in Production and Conservation of Medicinal Plants. In: *Proceedings of the National Workshop on Biodiversity Conservation and Sustainable Use of Medicinal Plants in Ethiopia*, pp.76-91, (Medhin Zewdu and Abebe Demisssie, eds.). IBCR, Addis Ababa, Ethiopia.

Zemede Asfaw (1997). Survey of Indigenous food plants, their preparation and homa gardens in Ethiopia. In: *indigenous African food crops and useful plants*; pp 65 (Bede, N. and Okigabo, B.N. eds), ICIPF sciences press, Nairobi.

Zemede Asfaw (1999). The role of Homegardens in Production and Conservation of Medicinal Plants. In: *Proccedings of the National Workshop on Biodiversity Conservation and*

Sustainable Use of Medicinal Plants in Ethiopia (Medhin Zewdu ana Abebe Demissie, eds,). Pp. 76-91, IBCR, Add.

Zemede Asfaw and Teklehymanot Wondimu (2007). Ethnobotanical study of medicinal plants around Dheeraa town, Arsis Zone, Ethiopia. *J Ethnopharmacology*. 112(1):152-16

List of Appendices

Appendix1. List of medicinal plants encountered in the study area

Key; main use diversity Dgree of Management (DM), Wild (WD), Homegarden (HG), Wild and Homegarden, (WH), Only medicinal (M); Food (F); Spice (Sp); Stimulant(St); Washing; Construction(Co); Fooder(Fo); Fuelwood (Fw); Liveshade(Ls); Habit(Ha); Trees(T); Herbs (H); Shrubs (Sh); Climber (Cl); Local Name (LN)

No	Scientific name	Family name	Local name	Habit	DM	Main use	Coll. No.
1	*Croton macrostachyus* Del.	Euphorbiaceae	Bisana	T	WD	M	AB01
2	*Eucalyptus globulus* Labill.	Myrtaceae	Nech Bahirzaf	T	HG	M;Co	AB02
3	*Cucumis ficifolius* A. Rich	Cucurbitaceae	yemidr imbuay	Cl	WD	M	AB03
4	*Carissa spinarum* L.	Apocynaceae	Agam	S	WD	M	AB04
5	*Jasminum abyssinicum* Hochst.ex DC	Oleaceae	Tembelel	Cl	WD	M	AB05
6	*Justica schimperiana* (Hochst.ex Nees.) T.Anders.	Acanthaceae	Sensel	S	HG	M	AB6
7	*Ricinus comminus* L.	Euphorbiaceae	Gulo	T	HG	M	AB07
8	*Calpurnia aurea* (Ait.) Benth	Fabaceae	Digita	S	WD	M	AB08
9	*Buddleja polystachya* Flesen.	Loganiaceae	Anfar	S	WH	M	AB09
10	*Ficus vasta* Forssk.	Moraceae	Warka	T	WD	M;Co	AB10
11	*Laggera tomentosa* (Sch.Bip.ex A.Rich.) Oliv. And Hiern.	Asteraceae	Keskesso	H	WD	M	AB11
12	*Urtica simensis* Steudel	Urticaceae	Sama	H	WH	M;F	AB12
13	*Artemisia abyssinica* Sch. Bip. Ex A.Rich	Asteraceae	Chiqugn	H	WD	M	AB13
14	*Dichrostachys cinerea* (L.) Wight and Arm.	Fabaceae	Ader	S	WD	M	AB14
15	*Zehneria scabra* (Lnn.f.) Sond	Cucurbitaceae	Haregressa	Cl	WH	M	AB15
16	*Ruta chalepensis* L.	Rutaceae	Tenadam	H	HG	M;F	AB16
17	*Kalanchoe petitiana* A.Rich	Crassulaceae	Indahula	S	WD	M	AB17
18	*Euphorbia tirucalli* L.	Euphorbiaceae	Kinchib	T	WH	M	AB18
19	*Ocimum lamiifolium* hochst. Ex	Lamiaceae	Damakesie	S	WH	M	AB19

	Benth.						
20	*Ziziphus spina-christi* (L.) Desf	Rhaminaceae	Geba	T	WD	M;Fw	AB20
21	*Rumex nervosus* Vahl	Polygonaceae	Embuacho	S	WD	M;Fo	AB21
22	*Acacia abyssinica* Hochst.ex Benth	Fabaceae	Girar	T	WD	M;Fw	AB22
23	*Olea europea* L. Subsp. cuspidata (Wall. Ex G. Don) Cif.L. olivicoltore	Oleaceae	Woira	T	WH	M;Co ;Fw	AB23
24	*Acokanthera schimperi* (A.DC.) Schweinf.	Apocynaceae	Merenz	S	WH	M	AB24
25	*Dodonea angustifolia* L.f.	Spindaceae	Kitkita	S	WH	M	AB25
26	Dovyalis abyssinica (A.Rich.) Warb.	Flacourtiaceae	Koshim	T	WD	M;Fw	AB26
27	*Juniperus procera* Hochst. Ex Endl.	Cupressaceae	Yehabesha tid	T	HG	M;Co ;Fw	AB27
28	*Sida schimperiana* Hochst.ex A. Rich.	Malvaceae	Chifrg	S	WD	M	AB28
29	*Cordia africana* Lam.	Boraginaceae	Wanza	T	WD	M;Co	AB29
30	*Citrus aurantifolia* (christm.) Swingle	Rutaceae	Lomi	T	HG	M;F	AB30
31	*Hagenia abyssinica* (Brace) J.F.Gmel.	Rosaceae	Kosso	T	WD	M;Co	AB31
32	*Clutia abyssinica* jaub.and Spach.	Euphorbiacea e	Fyelefej	S	WD	M	AB32
33	*Phytolacca dodecandra* L' Herit.	Phytolaccacea e	Endod	S	WD	M;W	AB33
34	*Solanum marginatum* L. f.	Solanaceae	Imbuay	S	WD	M	AB34
35	*Trigonella foenum-graecum* L.	Fabaceae	Abish	H	HG	M;F; Sp	AB35
36	*Coriandrum sativum* L.	Apiaceae	Dinblal	H	HG	M;F; Sp	AB36
37	*Malva verticillata* L.	Malvaceae	Lut	H	WD	M;Fo	AB37
38	*Combretum collinum* Fresen.	Combretaceae	Abalo	T	WD	M;Fw	AB38
39	*Stephania abyssinica* (Dillon and A.Rich.) Walp	Menispermac eae	Ingochit	Cl	WD	M	AB39
40	*Clematis simensis* Fresen	Ranunculacea e	Azohareg	Cl	WH	M	AB40
41	*Cynodon dactylon* (L.) Pers.	Poaceae	Serdo	Cl	WD	M;Fo	AB41
42	*Rumex abyssinicus* Jacq.	Polygonaceae	Mekmeko	H	WD	M;Fo	AB42
43	*Menta spicata* L.	Lamiaceae	Nana	H	WH	M;Sp	AB43
44	*Allium cepa* L.	Alliaceae	Key shinkurt	H	HG	M;F	AB44

45	*Brassica carinata* A.Br	Brassicaceae	Gomenzer	H	HG	M;F	AB45
46	*Cupressus lusitanica* Mill.	Cupressaceae	Yeferenj tid	T	HG	M;Co	AB46
47	*Cymbopogon citratus* (DC.) Stapf.	Poaceae	Tejesar	H	HG	M;Fo	AB47
48	*Musa X paradisiaca* L.	Musaceae	Koba	H	HG	M;Fo	AB48
49	*Eragrostis tef* (Zucc.) Trotter.	Poaceae	Teff	H	HG	M;F	AB49
50	*Lycopersicon esculentum* Mill	Solanaceae	Timatim	H	HG	M;F	AB50
51	*Nicotina tabacum* L.	Solanaceae	Tinbaho	H	HG	M	AB51
52	*Vicia faba* L.	Fabaceae	Bakela	H	HG	M;F	AB52
53	*Saliva nilotica* Jacq	Lamiaceae	Hulegeb	H	WD	M;Fo	AB53
54	*Coffee arabica* L.	Rubiaceae	Buna	S	WH	M;St	AB54
55	*Cucurbita pepo* L.	Cucurbitaceae	Duba	Cl	HG	M;F	AB55
56	*Aloe macrocarpa* Tod.	Aloaceae	Wonde ret	S	WD	M	AB56
57	*Aloe montocola* Reynolds.	Aloaceae	Sete ret	S	WD	M	AB57
58	*Euphorbia abyssinica* Gmel	Euphorbiaceae	Qulqual	T	WH	M	AB58
59	*Gallium simense* Fresen	Rubiaceae	Ashkit	Cl	WD	M	AB59
60	*Achynanthes aspera* L.	Amaranthaceae	Telenji	H	HG	M	AB60
61	*Guizotia scabra* (Vis.) Chiov	Asteraceae	Mech	H	HG	M;Fo	AB61
62	*Pisum sativum* L.	Fabaceae	Ater	H	HG	M;F	AB62
63	*Crinum abyssinicum* Hochst. Ex A. Rich	Amaryllidaceae	Yejib shinkurt	H	WD	M	AB63
64	*Discopodium penninervium* Hochst.	Solanaceae	Almit	S	WD	M	AB64
65	*Linum usitatissimum* L.	Linaceae	Telba	H	HG	M;F	AB65
66	*Guizotia abyssinica* (L.f.) Cass.	Asteraceae	Nug	H	HG	M;F	AB66
67	*Cicer arietinum* L.	Fabaceae	Shimbra	H	HG	M;F	AB67
68	*Brassica nigra* (L.) Koch.	Brassicaceae	Sinafich	H	HG	M;F	AB68
69	*Pterolobium stellatum* (Forssk.) Brenan	Fabaceae	Kentefa	S	WD	M	AB69
70	*Premna schimperi* Engl.	Lamiaceae	Chocho	S	WD	M	AB70
71	*Inula confertiflora* A.Rich	Asteraceae	Woynagift	S	WD	M	AB71
72	*Verbascum sinaiticum* Benth	Scrphulariaceae	Yeahiyajoro	S	WD	M	AB72
73	*Otostegia integrifolia* Benth	Lamiaceae	Tinjut	S	WD	M	AB73
74	*Withania somnifera* (L.) Dunal in DC.	Solanaceae	Gizewa	S	WD	M	AB74
75	*Rhamnus prinoides* L' Herit	Rhamnaceae	Gesho	S	HG	M;St	AB75
76	*Lepidium sativum* L.	Brassicaceae	Feto	H	HG	M;F	AB76
77	*Foeniculum vulgare* Mill.	Apiaceae	Ensilal	H	HG	M	AB77

78	*Datura stramonium L.*	Solanaceae	Atsefaris	H	HG	M	AB78
79	*Echinops kebercho* Mesfin	Asteraceae	Kebercho	S	WD	M	AB79
80	*Ocimum basilicum* L.	Lamiaceae	Besobla	H	HG	M ;F	AB80
81	*Rumex nepalensis* Spreng.	Polygonaceae	Tult	H	WD	M;Fo	AB81
82	*Vernonia amygdalina* Del.	Asteraceae	Girawa	T	HG	M	AB82
83	*Allium sativum* L.	Alliaceae	Nech shinkurt	H	HG	M;F	AB83
84	*Asparagus africanus* Lam.	Asparagaceae	Serite	S	WD	M	AB84
85	*Artemisia absinthium* L.	Asteraceae	Ariti	H	HG	M	AB85
86	*Nigella sativa* L.	Ranunculaceae	Tikur azmud	H	HG	M;Sp	AB86
87	*Zingiber officinale* Rscoe.	Zingiberraceae	Zingible	H	HG	M;F	AB87

Appendix2. Family of Medicinal Plant Species Diversity in the Study Area

No	Family	No genera	Number of plant species	% of plant species
1	Acanthaceae	1	1	1.14
2	Alliaceae	1	2	2.3
3	Aloaceae	1	2	2.3
4	Amaranthaceae	1	1	1.14
5	Amaryllidaceae	1	1	1.14
6	Apiaceae	2	2	2.3
7	Apocynaceae	2	2	2.3
8	Asteraceae	6	8	9.19
9	Asparagaceae	1	1	1.14
10	Brassicaceae	2	3	3.44
11	Boranginaceae	1	1	1.14
12	Crassulaceae	1	1	1.14
13	Cucurbitaceae	3	3	3.44
14	Cuperssaceae	2	2	2.3
15	Combertaceae	1	1	1.14
16	Euphobiaceae	4	5	5.75
17	Fabaceae	8	8	9.19
18	Flacourtiaceae	1	1	1.14
19	Lamiaceae	6	7	8.05
20	Linaceae	1	1	1.14
21	Loganiaceae	1	1	1.14
22	Malvaceae	2	2	2.3
23	Menispermaceae	1	1	1.14
24	Moraceae	1	1	1.14
25	Musaceae	1	1	1.14
26	Myrtaceae	1	1	1.14
27	Oleaceae	2	2	2.3
28	Phytolaccaceae	1	1	1.14
29	Poaceae	3	3	3.44
30	Polygonaceae	1	3	3.44
31	Ranunculaceae	1	1	1.14
32	Rhamnaceae	2	2	2.3
33	Rubiaceae	2	2	2.3
34	Rosaceae	1	1	1.14
35	Rutaceae	2	2	2.3
36	Scrophulariaceae	1	1	1.14
37	Spindaceae	1	1	1.14
38	Solanceae	6	6	6.89
39	Utricaceae	1	1	1.14
40	Zingiberaceae	1	1	1.14
Total	40	78	87	100

Apendix.3.List of Medicinal Plants Used For Treating Only Human (Hu) Ailments in the Study Area

With Scientific Name, Family Name, Local Name, Habit, Parts Used, Condition Of Preparation (CP), Fresh (F), Used For (Uf), Diease Treated, Method Of Preparations With Dosage Used, Rout Of Application. Key: Local Name;Amharic(LN),Habit(Ha), Herb(H), Shrub(S), Tree(T), Climber(Cl), Parts Used(PU), Bark(B), Root(R), Stem(St), Leaf(L), Fruit(Fu), Seed(Se), Shoot(Sh), Sap (Sa)Or Latex(La), Bulb(Bu), Whole Plant(Wp), Root And Fruit (RF), Rout Of Application(RA), Oral(Or), Nasal(Na), Dermal(Dr), Ocular(Oc), Anal(An), Fumigation(Fum) and Canal(Ca).

SN	**FN**	**LN**	**Hu**	**Pu**	**Cp**	**UF**	**DT**	**MP**	**RA**
Saliva nilotica Jacq	Lamiaceae	Hulegeb	H	L	F	Hu	Febrile illnes(mich)	The leaf of *Saliva nilotica* with the life of *Lucus abyssinica* are ground, powdered together mixed with some cold water then coffee cup of the mixture is drunk during sickness time	or
Nigella sativa L.	Ranunculaceae	Tikur azmud	H	Se	D	Hu	Cough	Grind dry seeds of *Nigella sativa*, boil the powder in water and mix with honey then drunk every day at night until recovery.	or
				S e	D	Hu	Tonsillitis	Pound dry seeds of *Nigella sativa* and mix with coffee then drunk twice per day for three days.	or

Tringonella foenum-graecum L.	Fabaceae	Abish	H	Se	D	Hu	Gastritis	Germinate seeds of *Trigonella foenum*, dry, grind and immerse the powder in water for 12 hrs, and decant the water, mix with sugar properly then drunk before breakfast.	or
				Se	D	Hu	Tumor	Pounded seeds of *Trigonella foenum*, mix with pouder of bean and water then tie on the wound.	dr
Foenuculum vulgare Mill.	Apiaceae	Ensilal	H	Wp	F	Hu	Asthma or sinus	Boil the whole plant of *Foenuculum vulgare* with water and fumigate the steam.	fum
				Sh	F	Hu	Kidney problem	Boiled the fresh shoot of *Foenuculum vulgare* in water, cooled down then drunk.	or
Vachellia abyssinica Hochst. ex Benth	Fabaceae	Girar	T	Se	D	Hu	STDs	The dry seed of *Acacia abyssinica* is crushed pounded, mixed with little water then drunk.	or
Cymbopogon citratus (DC.) Stapf.	Poaceae	Tejesar	H	Wp	F	Hu	Stomach ache	The whole parts of *Cymbopogon citratus* is smashed and mixed with water and cooked with salt then then the filtrate is drunk.	or
Withania somnifera (L.) Dunal in DC.	Solanaceae	Gizewa	S	L	F	Hu	Evil eye	The leaves of Withania somnifera with leaves of *Artemisia abyssinica*, *Vernonia amygdalina*, *Ruta chalepensis*, *Allium sativum* with root of *Carissa spinarum* are finally crushed together and sniffed at the sickness time	n
Artemisia absinthium L.	Asteraceae	Ariti	H	Ag	F	Hu	Syphilis	The above ground of *Artemisia absinthium* is ground powdered and mixed with little water one coffee cup is drunk every morning	or

								for two days.	
				L	F	Hu	Stomach ache	Soaked the fresh leaf of *Artemisia absinthium* in water for one day then drunk the filtrate.	or
				Wp	F	Hu	Un stoped menustration	Grinded the whole plant of *Artemisia absinthium,* mix with water and honey, decant it then, drunk one bottle per day	or
Mentha spicata L.	Lamiaceae	Nana	H	L	F	Hu	Syphilis	The fresh leaf of *Mentha spicata* is pounded, with butter and creamed on the affected part.	dr
Eucalyptus globules Labill.	Myrtaceae	Nechi Bahirzaf	T	Sh	F	Hu	Common cold	Boil fresh shoot of *Eucalyptus globules* and fresh leaf of *Zehneria scabra* together with water and fumigated the steam at night.	fum
*Zehneria scabra (*Linn.f.) Sond	Cucurbitaceae	Haregriesa	Cl	R	F	Hu	Emergency	Pounded fresh root of *Zehneria scabra,* mix with water then drunken one glass per day.	or
				L	D	Hu	Stomach ache	The leaf of *Zehneria scabra* is pounded mix with honey then eaten	or
				L	F	Hu	Febrile illness or mich	The leaf of *Zehneria scabra* is Pounded, squeezed and mixed with sugar and then drunk.	or
					F	Hu	Febrile illness	The fresh leaf of *Zehneria scabra* is squeezed to made juice and creamed on the affected parts.	dr
Rumex abyssinicus Jacq.	Polygonaceae	Mekmeko	H	R	D	Hu	Hypertension	Pounded dry root of *Rumex abyssinicus* and add to tea or coffee then, drunk.	or

					D	Hu	Ring worm	Pounded dry root of *Rumex abyssinicus* with root of *Rumex nepalensis* together.mix with lemon juice then creamed on the affected part.	dr
Clematis simensis Fresen	Ranunculaceae	Yeazohareg	Cl	L	F	Hu	Wound	Squeezed the fresh leaf of *Clematis simensis* with water then creamed until heal.	dr
Coffee arabica L.	Rubiaceae	Buna	S	Se	D	Hu	Diarrhea	Grinded the dry seed of *Coffee arabica* mix the powder with honey then swallow before eating food.	or
					D	Hu	Wound (fire burn)	Grinded the dry seed of *Coffee arabica* and put on the affected part.	dr
					D	Hu	Spider poison	Roasted the dry seed of *Coffee arabica*, pounded, powdered, and then apply the affected part.	dr
Vicia faba L.	Fabaceae	Bakela	H	Se	D	Hu	Boil(bgunj)	Grinded dry seed of *Vicia faba* and seeds of *Lepidium sativum* together, mix with salt then apply the mixture in opened boil until disappearance of the swelling.	dr
					D	Hu	Gastritis	Boil the dry seed of *Vicia faba* with water then feed.	or
Ziziphus spina-christi (L.) Desf	Rhamnaceae	Geba	T	L	D	Hu	Dandruff	The leaf of *Ziziphus spina-christi* is pounded, powdered, mixed with butter then creamed on the affected part.	dr
Datura stramonium L.	Solanaceae	Atsefaris	H	L	F	Hu	Tooth ache	Crushed fresh leaf of *Datura stramonium* and chew it by affected teeth.	or
					F	Hu	Dandruff	The fresh leaf of *Datura*	Dr

								stramonium is squeezed and creamed on the affected part until recovery.	
Ocimum lamiifolium Hochst. ex Benth	Lamiaceae	Damakessie	S	L	F	Hu	Febrile illness	Squeezed fresh leaf of *Ocimum lamiifolium* in water then drunken one coffee cup and creamed the remaining on the affected area.	o&d
					F	Hu	Head ache	Boil fresh leaf of *Ocimum lamifolium* and honey or sugar then drunk or ground its leaf, boil with water then fumigate the steam.	o/f
					F	Hu	Tooth ache	Chew fresh leaf of *Ocimum lamifolium* by affected teeth.	or
					F	Hu	Eye disease	2 to 3 drops of the leaves juice of *Ocimum lamifolium* is applied at night time to each eye for 2 to 3 days.	oc
Cucurbita pepo L.	Cucurbitaceae	Duba	Cl	Fu	F	Hu	Urine retention	Boiled fresh fruit of *Cucurbita pepo* and take as a food.	or
					F	Hu	Gastritis	Remove the bark of *Cucurbita pepo* and boil in water then take it.	or
				Se	F	Hu	Tape worm	Roasted its seed and eaten before breakfast	or
Coriandrum sativum L.	Apiaceae	Dinblal	H	Se	D	Hu	Cough	Grind the seed of *Coriandrum sativum*, mix with water, then drunk.	or
					D	Hu	Ascaris	Mix the powder of *Coriandrum sativum* with water, then drunk.	or
Aloe macrocarpa Tod.	Aloaceae	Wonde eret	S	R	D	Hu	Male sex organ problem	Crush dry root of *Aloe macrocarpa* and mix the powder with butter then creamed every night for seven days.	dr

				La	F	Hu	Hemorrhoid	Cream the fresh latex of *Aloe macrocarpa* on the affected part until recovery.	or
Aloe momticola Reynolds.	Aloaceae	Sete eret	S	R	F	Hu	Constipation	Ground fresh root of *Aloe monticolla* squeezed in water then drunk.	or
				La	F	Hu	Tape worm	Boil fresh latex of *Aloe monticolla* in water then drunk.	or
Rhamnus prinoides L' Herit	Rhamnaceae	Gesho	S	L	F	Hu	Tonsillitis	Crush seven shoots of *Rhamnus prinoides* malt together and squeezed then place on the fontanel.	dr
					F	Hu	Liver problem	The leaf of *Rhamnus prinoides* is pounded powdered mixed with honey and then eaten for three days before food.	or
Brassica carinata A.Br	Brassicaceae	Gomenzer	H	Se	D	Hu	Chife	Ground dry seed of *Brassica carinata*, mixed with water then wash the affected part.	or
					D	Hu	Anthrax	Ground dry seed of *Brassica carinata* and, mix the powder with water and ash then drunk.	or
Laggera tomentosa (Sch.Bip.ex.A.Rich.) oliv.and Herin.	Asteraceae	Shetetu/keskeso	H	L	F	Hu	Asthma	Boil fresh leaf of *Laggera tomentosa*, cool down and mix with honey then drunk a cup per day.	or
					F	Hu	Febrile illness	Boil fresh leaf of *Laggera tomentosa* in water then fumigate the steam.	fu
					D	Hu	Tumor	Crushed dry leaf of *Laggera tomentosa* mix with honey in half of the lemon then tie on the tumor.	or

Allium cepa L.	Alliaceae	Key shinkurt	H	Bu	F	Hu	Male sex organ problem	Crushed and squeezed one bulb of *Allium cepa* and mix with honey then take two tea spoons every day at night.	or
				Bu	F	Hu	Typhoid	Sock its bulb and seed of *Allium cepa* in water then take one cup per a day.	or
Dovyalis abyssinica (A.Rich.) Warb	Flacourtiaceae	Koshim	T	Fu	F	Hu	Intestinal parasite	Eat fresh fruit of *Dovyalis abyssinica* before breakfast.	or
Verbascum sinaiticum Benth	Scrophulariaceae	Ye ahiya jero	S	R	D	Hu	Wound	Crushed dry root of *Verbascum sinaiticum* and mix with butter then cream on the wound.	dr
				R	F	Hu	Anthrax	Chew fresh root of *Verbascum sinaiticum* then swallow its juice.	or
				R	F	Hu	Snake bite	The root of *Verbascum sinaiticum* is smashed and 4-5 drop of the sap is drunk to human.	or
Euphorbia abyssinica Gmel.	Euphorbiaceae	Qulqual	T	La	F	Hu	Chife	Smeared the affected part by using the latex of *Euphorbia abyssinica.*	dr
				La	F	Hu	Ascaris	Mix latex of *Euphorbia abyssinica* with water then drunk after eating food.	or
				St	F	Hu	Hemorrhoid	Boil fresh stem bark of *Euphorbia abyssinica* and apply the affected area.	or
Citrus aurantifolia (Christm.) Swingle	Rutaceae	Lomi	T	Fu	F	Hu	Bigur/granule	Squeezed fresh fruit of *Citrus aurantifolia* and mix with yolk of the egg then smear at night every day and wash early in the morning until recovery.	dr

					F	Hu	Hypertensio n	Squeeze the fresh fruit of *Citrus aurantifolia* in a cup of tea then drunk.	or
Allium sativum L.	Alliaceae	Nechi shinkurt	H	Se	F	Hu	Evil eye	Ground fresh seed of *Allium sativum* with leaf of *Ruta chalpensis* together and tie with clean cloth then fumigate by nose.	na
				Bu	F	Hu	Madiat	Remove the cover of *Allium sativum* and divide the seed in to two then smear the affected area every day at night.	dr
					F	Hu	Malaria	Crush bulb of *Allium sativum*, mix with berbere and butter then cook properly and eat with enjera.	or
					F	Hu	Megagna	Pound its bulb of *Allium sativum* with seeds of *Lepdium sativum* together, mix with little water, boil it for few minutes then eaten with injera.	or
Urtica simensis Steudel	Urticaceae	Sama	H	W p	D	Hu	Wart	Crushed the whole plant of *Urtica simensis* and mix with butter then rub the affected part.	dr
				L	F	Hu	Gastritis	Rub fresh leaf of *Urtica simensis* until the remove spike and boil it with water properly then cooked and eaten with injera.	or
Cynodon dactylon (L.) Pers.	Poaceae	Serdo	Cl	W p	D	Hu	Wound	Crushed the whole plants of *Cynodon dactylon*, and then rubbed the wound two times per day for seven days.	dr
Cordia africana Lam.	Boraginacea e	Wanza	T	Fu	F	Hu	Gastritis	Take the fresh latex of the fruit *Cordia africana* before breakfast.	or

				Fu	D	Hu	Stomach worms	The fruit of *Cordia africana* is eaten as food for the case of stomach before food for 5 days.	or
				Ba	F	Hu	Un stopped menstruation	Pounded fresh bark of *Cordia africana* mix with water, decanted then drunk one coffee cup for 5 consecutive days.	dr
Musa X paradisiaca L.	Musaceae	Koba	H	Bu	F	Hu	Abortion	Grind the bulb of *Musa X paradisiaca*, mix with salt and water, then drunk.	or
Ruta chalpensis L.	Rutaceae	Tenaadam	H	L/se	F	Hu	Emergency	Soaked the fresh seed or leaf of *Ruta chalpensis* in tea or coffee then drunk.	or
				L	F	Hu	Evil eye	Ground fresh leaf of *Ruta chalpensis* with bulb of *Allium sativum* and fumigate.	fu
				L	F	Hu	Common cold	Squeeze fresh leaf of *Ruta chalpensis* on tea then drunk.	or
				L	F	Hu	Tonsillitis	The whole part of *Ruta chalepensis* is smashed boiled with 3-5 drop of *Citrus aurentifola* and then one coffee cup is drunk during sickness time.	or
Juniperus procera Hochst.ex Endl.	Cuperssaceae	Ye habesha tid	T	St	D	Hu	Cough	Crush dry stem of *Juniperus procera* and burn with fire then fumigate its smoke,	fu
				L	F	Hu	Wound	Pound fresh leaf of *Juniperus procera* and mix with butter then tie on the wound.	dr
					F	Hu	Stomach ache	Crushed fresh leaf of *Juniperus procera* and mix with water, filter it then drunk.	or

Lycopersicon esculentum Mill.	Solanaceae	Timatim	H	Fu	F	Hu	Madiat/melathma	Smear juice of fresh fruit of *Lycopersicon esculentum* on the affected part early in the morning and at night	dr
				L	F	Hu	Urine problem	Boiled fresh leaf of *Lycopersicon esculentum* with foeniculum vulgare, cool down, filter it then drunk.	or
							Stomach ache	Chew fresh leaf of *Lycopersicon esculentum* and swallow its juice.	or
Rumex nepalensis Spreng.	Polygonaceae	Tult	H	R	F	Hu	Retained placenta	Remove the bark of root of *Rumex nepalensis* then insert in the reproductive organ of women and leave it 3-5 minutes.	oc
					F	Hu	Spider poison	Pound fresh root of of *Rumex nepalensis* and mix with butter then creamed on the affected part.	dr
					F	Hu	Stomach ache	Pound root of *Rumex nepalensis*, mix with one cup of coffee and tea then drunk.	or
Otostegia integrifolia Benth	Lamiaceae	Tinjut	S	L	D	Hu	Common cold	Placed dry leaf of *Otostegia integrifolia* on fire then fumigate the smoke.	fu
				R	F	Hu	Stomach ache	Chewed the fresh root of *Otostegia integrifolia* and suck its juice.	or
Zingiber officinale Roscoe	Zingiberaceae	Zingbl	H	R	F	Hu	Stomach ache	Chew fresh root of *Zingiber officinale* then swallow the juice.	or
					F	Hu	Common cold	Crushed fresh root of *Zingiber officinale* and boil in water, filter it, mix with honey then drunken early morning and at night.	Or

Malva verticillata L.	Malvaceae	Lut	H	R	F	Hu	Anthrax /kurba	Chew fresh root of *Malva verticillata* and swallow the juice early morning before breakfast.	or
					F	Hu	Head ache	Crushed the fresh root of *Malva verticillata* and mix with water and wash the head.	dr
					F	Hu	Wound and ring worms	The root of *Malva vertcillata* is pounded, squeezed and creamed on affected part.	dr
Cupressus lusitanica Mill.	Cupressaceae	Yeferenji tid	T	La	F	Hu	Ring worm	Smeared latex of *Cupresses lusitanica* on the affected part.	dr
Gallium simense Fresen.	Rubiaceae	Ashkit	Cl	Wp	F	Hu	Ear ache	Smashed the whole plant of *Gallium simense* and mix little water then add a few drops through ear during feeling.	ca
Petrolobium stellatum (Forssk.) Brenan	Fabaceae	Kentefa	S	L	D	Hu	Goiter	Crushed dry leaves of *Petrolobium stellatum* and mix with fresh butter and apply the paste, then tie on the neck.	dr
Achynanthes aspera L.	Amaranthaceae	Telenji	H	L	F	Hu	Diabetes & Hypertension	Crushed the fresh leaves of *Achynanthes aspera* and boil with water and drunk.	or
Combretum collinum Fresen.	Combretaceae	Abalo	T	Bu	F	Hu	Eye disease	Squeezed the buds of *Combretum collinum* one-seven buds and paint on the eye.	Dr
				Fu	D	Hu	Leprosy	Crush the fruit of *Combretum collinum* and mix with honey and paint on wound.	dr
				Wp	D	Hu	Malaria	Ground the seeds and fruits of *Combretum collinum*, powdered, and *Allium sativum* bulb, water and then one coffee cup is drunk every morning for 2-5 days.	or

Dichrostachys cinerea (L.) Wight and Arm.	Fabaceae	Ader	S	R	D	Hu	Snake bite	The root of *Dichrostachys cinerea* and leaf of *Aloa Cbrana* Christian smashed together finally tied on the affeceted area with clean bandage.	dr
				L	F	Hu	Yegdgdewua	Crushed the fresh leaf of *Dichrostachys cinerea* and mix with water then creamed on the affected part until recovery.	dr
Euphorbia tirucalli L.	Euphorbiaceae	Kinchib	T	La	F	Hu	Ring worm	Two-three drop of milky latex of *Euphorbia tirucalli* is mixed with powdered root of *Gladiolus candidus*, water and applied on the affected part.	dr
Hagenia abyssinica (Brace.)J. F.Gmel.	Rosaceae	Kosso	T	Fu	F	Hu	Stomach worms	Crushed the fruit of *Hagenia abyssinica*, powdered and mix with local alcohol (tella) and one coffee cup is taken before food for three days.	or
Guizotia scabra (vis.) Chiov	Asteraceae	Mechi	H	R	F	Hu	Snake bite	*Guizotia scabra* root with leaves of *cissus guadra ngularis* is smashed powdered mixed with water, boiled and then 1-2 coffee cups are taken for 3 days.	or
Clutia abyssinica Jaub. And spach.	Euphorbiaceae	Fyelefeji	S	L	F	Hu	Ear disease	Pouded and squeezed the fresh leaf of *Clutia abyssinica*, then drop through ear.	ca
					F	Hu	Dandruff	The leaf of *Clutia abyssinica* is pounded, squeezed and creamed on affected part until recovery.	dr
Kalanchoe petitiana A.Rich	Crassulaceae	Endahula	S	L	F	Hu	Body swelling	The fresh leaf of *Kalanchoe petitiana* is first heated and then	dr

								put on the infected body.	
				R	F	Hu	Ear disease	Squeezed the fresh leaf of *Kalanchoe petitiana* and added few drops through ear.	dr
					F	Hu	Tooth ache	Chewing the fresh root of *Kalanchoe petitiana.*	or
					F	Hu	Tonsillitis	Crushed the fresh root of *Kalanchoe petitiana* and mix with water then drunk.	or
Pisum sativum L.	Fabaceae	Ater	H	Se	D	Hu	Bugunj	Crushed the seed of *Pisum sativum* and then placed on the wound until disappearance of the swelling.	dr
Jasminum abyssinicum Hochst.ex DC	Oleaceae	Tenbelel	Cl	L	F	Hu	Eye disease	The fresh leves of *Jasminum abyssinicum* are ground, powdered and mixed with water 3-4 drops of mixture is applied on infected part for 3 days.	dr
Artemisa abyssinica Sch.Bip.ex A.Rich	Asteraceae	Chiqugn	H	L	F	Hu	Common cold	Boil fresh leaf of *Artemisa abyssinica* with water then fumigate the stem.	or
							Evil eye	Crush fresh leaf of *Artemisa abyssinica* and tie around the neck.	dr
Stephania abyssinica (Dillon and A.Rich.)Walp	Menispermaceae	Ingochit	Cl	Fu	F	Hu	Wart	Pound fresh fruit of *Stephania abyssinica* and squeezed its juice then smear the affected part.	dr
				LR	F	Hu	Rabies	Crushed fresh leaf of and root of *Stephania abyssinica* together and mix with water and honey, leave for 24hr then drunken one glass per day for seven days.	or

				R	F	Hu	Wound	Crushed the fresh root of *stephania abyssinica* and paint on wound surface.	dr
Asparagus africanus Lam.	Asparagaceae	Serite	S	L	D	Hu	Epidemic	The leaf of *Asparagus africanus* is pounded.powdered and on fire fumigated by its smoke.	dr
				R	DF	Hu	Gonoria &syphilis	Crushed and mix with honey for seven days then drunk.	or
				R	DF	Hu	Iching or likft	Crushed and powdered then creamed with fresh butter.	dr
				R	F	Hu	Unstopped mesturation	Chewed until the flow is stoped then drunk.	or

Apenddix.4.List of medicinal plants used for treating only Livestock (Ls) ailments in the study area

With scientific name, family name, local name, habit, parts used, condition of preparation (CP), Fresh (F), used for (UF), disease treated(DT), method of preparations with dosage used (MP), **Key**: local name in Amharic(LN), Habit(Ha), Herb(H), Shrub(S), Tree(T), Climber(Cl), Parts used(PU), Root(R), Leaf(L), Seed(Se), Rout of Application(RA), Oral(or), Dermal(dr), Ocular(oc), Fumigation(Fum).

SN	FN	LM	HA	PU	CP	UF	DT	MP	RA
Justica schimperiana (Hochst .ex Nees.)T.Anders.	Acanthaceae	Sensel	S	L	D	Ls	Febrile illness	Pound dry leaf of *Justicia schimperiana* and with leaf of *Croton macrostachyus* together and mix with water then give to cattle.	or
				L	F	Ls	Bloating	Crushed fresh leaf of *Justicia schimperina* mix with water then give to cattle orally	or
Ficus vasta forssk.	Moraceae	Warka	T	L	F	Ls	Wound	The fresh leaf of *Ficus vasta* is pounded, squeezed and creamed on the affected part.	dr
Crinum abyssinicum	Amaryllidaceae	Yejib shinkurt	H	L	D	Ls	Tumor	Gring dry leaf of *Crinum abyssinicum* and mix with butter then tie on the tumor.	dr

Hochst. ex A.Rich				L	F	Ls	Bloating	Crush fresh leaf of *Crinum abyssinicum*, mix with water then give to cattle.	or
Eragrostis tef (Zucc.) Trotter.	Poaceae	Tef	H	Se	D	Ls	Bone fracture	Boil the powder of *Eragrostis tef* with water then give to cattle.	or
Ocimum basilicum L.	Lamiaceae	Besobla	H	L	F	Ls	Bloating	Ground fresh leaf of *Ocimum bacilicum* with bulb of *Allium sativm* together and mix with salt and water then give to cattle	or
Nicotina tabacum L.	Solanaceae	Tmbaho	H	L	F	Ls	Leech	Ground freshi leaf of *Nicotina tabacum* squeezed In water then give to cattle.	or
Dodenaea angustifolia L. f.	Sapindaceae	Kitkta	S	L	D	Ls	Bone fracture	Crushed dry leaf of *Dodennaea angustifoia* and placed its powder on the wound.	dr
Acokanthera schimperi (A.DC.)Schweinf.	Apocynaceae	Merenz	S	R	D	Ls	Rabies	The root of *Acokanthera schimperi* with the root of *Cucumis ficifolius* pounded together mixed with water and one littre is given to cattle	or
Dispcopodium punninervum Hochst.	Solanaceae	Almit	S	L	F	Ls	Leech	The leaf of *Dispcopodium punninervum* is pounded, mixed with little water and then drunk.	or
Premna schimperi Engl.	Lamiaceae	Chocho	S	L	FD	Ls	Evil sprit	The fresh or dry root of *Permna schimperi* is on fire and fumigates the smoke.	fum
				L	F	Ls	Eye disease	Crushed and powdered of the leaf of *Permna schimperi* and mixed with water then applied on the affected part.	oc
Inula confertiflora A.Rich	Asteraceae	Woynagift	S	L	F	Ls	Eye disease	The leaf of *Inula confertiflora* with the leaf of *Olea europaea* are crushed mixed with water 3-5 drops of the mixture is applied on each eyes for days.	oc

Apendix.5.List of medicinal plants used for treating both human being (Hu) and Livestock (Ls) ailments in the study area

With scientific name, family name, local name, habit, parts used, condition of preparation (CP), Fresh (F), used for (UF), diease treated, and method of preparations with dosage used, Rout of application. **Key:** local name in Amharic(LN),Habit(Ha), Herb(H), Shrub(S), Tree(T), Climber(Cl), Parts used(PU), Bark(B), Root(R), Stem(St), Leaf(L), Seed(Se), Bulb(Bu), Root and Leaf(RL), Seed and Bark(LB), Root and Bark(RB), Bark and Leaf (BL), Leaf and Fruit(LF), Root and Fruir (RF), Whole plant(Wp), Rout of Application(RA), Oral(or), Nasal(na), Dermal(dr), Ocular(oc), Canal(ca), Fumigation(Fum).

SN	FN	LM	HA	UP	CP	UF	DT	MP	RA
Carissa spinarum L.	Apocynaceae	Agam	S	R	D	Hu	Evil sprit	Placed dry root of *Carissa spinarum* on fire then fumigate the smoke.	fu m
				St	D	Ls	Eye infection	Burn dry stem of *Carissa spinarum*, crushed and mix with butter and water then stained the affected eye	dr
				L	D	Ls	Diarrhea	Pounded dry leaf of *Carissa spinarum*, mix with powder of *Coffee arabica* and water then give one tassa per day until recovery.	or
				RF	D	Hu	Malaria	The roots and leafs of *Crassia spinarum* crushed. Mixed with water and a tea cup is drunk every morning for 5 days.	or
Linum usitatissimum L.	Linanceae	Telba	H	Se	D	Hu	Gastric	The seed of *Linum usitatissimum* is crushed, powdered, mixed water and and sugar and then drunk during feeling pain.	or
				Se	D	Hu	Eye,s dirt	Add few seeds of *Linum usitatissimum* in the eye at night then clean with clean close early in the morning.	dr
				Se	D	Ls	Retained placenta	The seed of *Linum usitatissimum* is mixed water and boiled and then drunk the solotion is cooled.	or
Calpurnia	Fabaceae	Digta	S	Se	D	Hu	Amoeba	Grind dry seed of *Calpurnia aurea* mix with	or

aurea (Ait.) Benth								honey then take only one spoon early in the morning.	
				L	F	Hu	Diarrhea	Crushed fresh leaf of *Calpurnia aurea*, socked in water for two hours, decant it then take one glass per day until recovery.	or
				L	D	Ls	Body lice	Ground dry leaf of *Calpurnia aurea* mix with water then wash their body.	or
Rumex nervosus Vahl	Polygonaceae	Embuacho	S	L	F	Ls	External parasite	Grind the leaf of *Rumex nervosus* and mix with water the wash the body of cattle for seven days.	or
				L	F	Hu	Snake bite	Chew the fresh leaf of *Rumex nervosus* and swallow its juice at a time.	or
				L	D	Hu	Wart	Rubbed the dry leaf of *Rumex nervosus* squeezed then creamed the affected area.	or
Cucumis ficifolius A.Rich	Cucurbitacea e	Yemidr embuay	Cl	R	F	Ls	Removal of retained placenta	Crushed fesh root of *Cucumis ficifolius* and squeezed in water then given for cattle diseas	or
				R	D	Hu	Stomach ache	The root of *Cucumis ficifolius* is chewing and swallowing during the orfeeling on ache.	or
				L	FD	Hu	Evil sprit	The leaf of *Cucumis ficifolius* add on fire and fumigate the soke.	na
				R	D	Hu	Rabies	The root of *Cucumis ficifolius* is crushed and mixed with water or domestic alcohol cup (melekia) is given for 12 years old baby. And one tea cup is given for more than 12 years human early morning for seven days.	or
Phytolacca dodecandra L'Herit.	Phytolacceae	Endod	S	L	F	Hu	Rabies	Pounded the leaf of *Phytolacca dodecandra* mix with *coffee arabica* then drunk a tea cup per a day at evening for several days.	or
				L	F	Ls	Bloating	Crush fresh leaf of *Phytolacca dodecandra* and immersed for one day with water, decant it then give one tassa.	or

				LF	F	Hu	Abortion	Pounded both fresh leaf and fruit of *Phytolacca dodecandra* together, squeezed and mix with water then drunk one glass	or
				R	D	Ls	Rabies	Dried root of *Phytolacca dodcandra* is powdered and three-four cup of domestic alcohol is used for cattle.	or
Lepidium sativum L.	Brassicaceae	Feto	H	Se	D	Hu	Stomach ache	Ground dry seed of *Lepidium sativum* and mix with salt and water then eat with injera.	or
				Se	F	Ls	Bloating	Chew fresh ssed of *Lepidium sativum* and suck the juice.	or
				Se	D	Hu	Tape worm	Ground dry seed of *Lepidium sativum*, mix with honey and water then drunk one glass per day for a week.	or
Sida schimperiana Hochst. ex A.Rich	Malvaceae	Chifrg	S	L	F	Hu	Skin rash	The leaf of *Sida schimperiana* is smashed and rubbed on the affected skin	dr
				R	F	Hu	Evil sprit	Tie one ‘atik’ fresh root of *Sida schimperiana* on the shoulder.	dr
				R	D	Ls	Horse disease	Grinded dry root of *Sida schimperiana* and mix with water then drunk orally or apply through nosstrills.	or
Vernonia amygdalina Del.	Asteraceae	Grawa	T	L	F	Hu	Tonsillitis	Crushed fresh leaf of *Vernonia amygdalina* and squeezed the drunk.	or
						Ls	Bloating	Crushed fresh leaf of *Vernonia amygdalina* and mix with water then give one tassa to cattle per day for five days.	or
						Hu	Athletes foot	The fresh leaf of *Vernonia amygdalina* iscrushed squeezed and creamed on affected part for continuous days.	dr
Ricinus commnus L.	Euphorbiacea e	Gulo	T	Se	F	Ls	Ear infection	Crushed fresh seed of *Ricinus commnus* and mix with little water decant it then add two-five drops through ear.	ca
				R	F	Hu	Tooth ache	Chew fresh root of *Ricinus commnus* then swallow its juice.	or

Echinops kebercho Mesfin	Asteraceae	Kebercho	S	R	D	Ls	Evil sprit	Burn dry root of *Echinops kebercho* then fumigate its smoke	fu m
				Ba	D	Hu	Evil eye	Crushed the dry bark of, *Echinops kebercho* place on fire then fumigate its smoke.	fu m
Guizotia abyssinica (L.f.) Cass.	Asteraceae	Nug	H	Se	D	Hu	Gastritis	Grind dry seeds of *Guizotia abyssinica* and mix the powder with one glass water then drunk.	or
					D	Ls	Leech	Mix powder of *Guizotia abyssinica* with water and give to cattle until the leech rejected.	or
Cicer arietinum L.	Fabaceae	Shimbra	H	Se	D	Hu	Malaria	Immerse dry seed of *Cicer arietinum* in water for one day, filter it and mix with *Allium sativum* then eat.	or
				Wp	D	Ls	Leech	Grind the whole plant of *Cicer arietinum* and mix with *Nicotina tabacum* and water then give to cattle one tassa per day.	or
Olea europaea L.Subsp. Cuspidata (Wall.ex G.Don) Cif. L. Olivcoltore	Oleaceae	Woira	T	L	F	Hu	Eye disease	Squeezed the fresh leaf of *Olea europaea* then add few drops of extract in the eye.	or
				St	D	H L	Eye disease	Its stem with leaves of *Jasminum abyssinicum*, ground, mixed with water and 2-3 drop of the illiterate is applied on eye.	oc
Croton macrostachyus Del.	Euphorbiacea e	Bsana	T	Bu	F	Hu	Mental disorder	Ground fresh bulb of *Croton macrostachyus* and seeds of *Ruta chalpensis* and take one spoon per day early morning.	or
				Ba	D	Ls	Bloating	Ground dry bark of *Croton macrostachyus* and mix with water then give to cattle.	or
Buddleja polystacha Flesen.	Loganiaceae	Anfar	S	L	FD	Hu	Wound	The leaf of *Buddleja polystacha* is pounded, powdered and applied on wound.	dr
				L	F	Ls	Eye disease	Chewing the fresh leaves of *Buddleja polystacha* and spitting on the affected part.	oc
Brassica nigra	Brassicaceae	Sinafchi	H	Se	D	H	Stomach	The seed of *Brassica nigra* is crushed,	or

(L.) Koch.						L	worms	powdered, mixed with water, and then eaten with injera.	
				RL	D	Ls	Bloating	The seed of this plant with the leaves of *Melia azedarach* are pounded, mixed with water then one litter is given to cattle during pain time.	or
Solanum marginatum L.f.	Solanaceae	Embuay	S	R	F	Hu	Syphilis	The roots of *Solanum marginatum* are chewed then swallowed the sap.	or
				RL	F	Ls	Rabies	The roots and leaves of *Solanum marginatum* are steeped in water and the water is applied to scabies; root pulp is given to dogs as a cure for rabies.	or

Appendix.6. Human disease with corresponding number of plant species used by local people

No	Disease treated	Local name	No.plant species	% of plant spp.
1	Stomach ache	Yehod beshita	10	5.88
2	Wound	Kusle	8	5.22
3	Gastritis	Cheguara beshita	7	4.57
4	Febrile illness	Mich	5	3.26
5	Common cold	Gunfan	5	3.26
6	Tonssilitis	Tonsil	5	3.26
7	Evil eye	Buda	5	3.26
8	Hemorrhoids	Ye ahya Kintarot	2	3.26
9	Eye diseases	Ye ayn himem	5	3.26
10	Malaria	Woba	4	2.61
11	Unstopped menstration	Yewer abebe mefses	3	1.96
12	Snake bite	Yebab niksha	4	2.61
13	Tooth ache	Yetirs himem	4	2.61
14	Stomach worms	Yehod tilatl	3	1.96
15	Syphilis	Kitign	4	2.61
16	Ring worm	Kuakucha	4	2.61

17	Dandruff	Forefor	3	1.96
18	Tape worm	Koso tl	3	1.96
19	Hypertention	Yedem gifit	3	1.96
20	Anthrax	Kurba	3	1.96
21	Cough	Sal	3	1.96
22	Ear ache	Yejoro himem	3	1.96
23	Rabies	Yewusha beshita	2	1.3
24	Evil sprit	Buda menfes	3	1.96
25	Tumor	Eti	2	1.3
26	eczema	Chife	2	1.3
27	Asthma	Asm	2	1.3
28	Emergency	Dngetagna	2	1.3
29	Diarrhea	Tekmat	2	1.3
30	Spider poision	Yeshrerit merz	2	1.3
31	Boil	Bgunji	2	1.3
32	Urine retaintion	Yeshint mekoyet	2	1.3
33	Ascaries	Wesfat	2	1.3
34	Male sex organ problem	Yewend yetsota blt chigr	2	1.3
35	Removal of reained placenta	Yengde liji mekret	2	1.3
36	Melasma	Madiat	2	1.3
37	Abortion	Wurja	2	1.3
38	Head ache	Years hmem	2	1.3
39	Constipation	Hod drket	1	0.65
40	Liver problem	Yegubet beshita	1	0.65
41	Thyphoid		1	0.65
42	Granule	Bigur	1	0.65
43	Kidney problem	Yekulalit beshita	1	0.65
44	Goiter	Enkirt	1	0.65
45	Diabetes	Skuar beshita	1	0.65
46	Leprosy	Sga dewie	1	0.65
47		Yegdgdewua	1	0.65

48	STDs	Be tsotawi gngnunet yemimeta beshita	1	0.65
49	Dody swelling	Yesewnet ebtet	1	0.65
50	Mental disorder	Aymro mezabat	1	0.65
51	Athlete,s foot	Fenges beshita	1	0.65
52	Amoeba	Amieba	1	0.65
53	Eye,s dirt	Ayn mekosheshi	1	0.65
54	Gonorrhea	Gonorrhea	1	0.65
55	Wart	Kintarot	3	1.96
56	Epidemic	Worershign	1	0.65
57	Iching	Likft	1	0.65
58	Intestinal parasite	Ye anjet tlatl	1	0.65
59	Skin rash	Yekoda megurebreb	1	0.65

Appendi.7. Major Livestock disease with plant species used in the study area

No.	Disease treated	Local name	No. of plant spp.	% of plant spp.
1	Bloating	Yehod menefat	9	24.32
2	Eye diseases	Yeayn beshita	5	13.51
3	Leech	Alkit	4	10.81
4	Rabies	Yewusha beshita	3	8.10
5	Bone fracture	Yeatint sibrat	2	5.40
6	Evil sprit	Buda menfes	2	5.40
7	Removal of retained placenta	Yengdie liji mekret	2	5.40
8	Febrile illness	Mich	1	2.70
9	Tumor	Eti	1	2.70
10	Ear infection	Yejoro himem	1	2.70
11	Horse diseases	Yeferes beshita	1	2.70
12	Wound	Kusle	1	2.70
13	Stomach worms	Yehod tlatl	1	2.70
14	Externanl parasite	Tgegna beshita	1	2.70
15	Body lice	Kicham	1	2.70
16	Diarrhea	Tekmat	1	2.70

Appendix.8. List of Informants in the Study Area

No	Name	Sex	Age	Marital status	Education status	Residence kebeles	Occupation
1	Simegn G/Tsadik	M	60	Married	Read and write	Siyadebr	Farmer Key informant
2	Assegedech Demere	F	56	Divorce	G->12	Siyadebr	Teacher
3	Kies Habtamu	M	70	Married	Read and write	Siyadebr	Prist
4	Hiwot Kebede	F	36	Married	G-> 12	Siyadebr	Teacher Key informant
5	Zewdu	M	61	Married	Read and write	Siyadebr	Farmer
6	Mamush	M	63	Married	Illiterate	Siyadebr	Farmer
7	Addis Getye	M	43	Married	Illiterate	Siyadebr	Farmer
8	Bereket Tsegu	M	22	Single	G-12	Siyadebr	Student Key informant
9	Mesifin Tena	M	40	Married	Read and write	Siyadebr	Merchant
10	Sintayehu Zewdu	F	30	Single	Read and write	Siyadebr	Merchant
11	Kies Shewangizew Behabtu	M	56	Married	Read and write	Siyadebr	Prist
12	Abebayehu	F	40	Marred	Illiterate	Siyadebr	House wife
13	Fanaye Zewdu	F	56	Married	Illiterate	Siyadebr	Farmer
14	Mesfin Tadesse	M	41	Married	Read and write	Siyadebr	Merchant
15	Belachew Demis	M	40	Married	Read and write	Siyadebr	Merchant
16	Kies Tsegu W/ Senbet	M	80	Married	Read and write	Senketa	Prist key informant
17	Demewoz Tsegu	F	51	Single	Illiterate	Senketa	House wife
18	Endayilalu Yeshita	M	55	Married	Illiterate	Senketa	Farmer
19	Askale Mengesha	F	41	Married	G->12	Senketa	Teacher Key informant
20	Worku Tsegu	M	36	Married	Illiterate	Senketa	Farmer
21	Sisay Desalegn	M	65	Married	Illiterate	Senketa	Farmer
22	Fantaye Degefe	M	78	Married	Illitrate	Senketa	Farmer

23	Nibo Gizaw	M	70	Married	Illiterate	Senketa	Farmer
24	Sintayehu Zewudu	F	26	Single	Read and write	Senketa	Merchant
25	Alayush Endalayu	F	27	Single	Read and write	Senketa	Merchant
26	Atsede Birhan	F	20	Single	G-12	Senketa	Student
27	Birhan Belete	M	51	Married	Illiterate	Senketa	Farmer
28	Getachew Degefu	M	66	Married	Illiterate	Senketa	Farmer
29	Tesintu Tefera	F	55	Married	Read and write	Senketa	House wife
30	Chernet Molla	M	47	Married	Read and write	Senketa	Farmer
31	Addis Getye	M	45	Married	Read and write	Senketa	Farmer
32	Kies Habtamu	M	56	Married	Read and write	Senketa	Prist
33	Geteneh tesfaye	M	56	Married	Illiterate	Motelemi	Farmer
34	Kies Tena Demisie	M	45	Married	Read and write	Motelemi	Prist
35	Dimm Wondmsisha	F	30	Married	Read and write	Motelemi	Farmer
36	Desalegn Teshale	M	40	Married	Read and write	Motelemi	Farmer Key informant
37	Demewoz Geteneh	F	29	Single	Read and write	Motelemi	Merchant
38	W/Yohanes Bekele	M	36	Single	G ->12	Motelemi	Teacher key informant
39	Kebede Admasu	M	40	Married	Illiterate	Motelemi	Farmer
40	T/Yohanes Admasu	M	36	Married	Illiterate	Motelemi	Farmer
41	Fentanesh Belay	F	20	Single	Read and write	Motelemi	Student
42	Awule Ygrem	M	38	Married	G > 10	Motelemi	Farmer
43	Mssa Zewude	F	36	Married	Illiterate	Motelemi	House wife
44	Tegu Zemedkun	M	45	Married	Illiterate	Motelemi	Farmer
45	Geto Dejen	M	42	Married	G >5	Motelemi	Farmer
46	Agune Dejen	M	68	Married	Illiterate	Motelemi	Farmer
47	Assefa Mammo	M	31	Single	Read and write	Motelemi	Farmer
48	Betelhem Getaneh	F	21	Single	G-10	Motelemi	Student
49	Medeset Geto	F	20	Single	G-10	Motelemi	Student

50	Mekonen Getachew	M	36	Married	G->12	Deneba 01	Teacher: Key informant
51	Dereje Yadete	M	40	Married	G->12	Deneba 01	Teacher
52	Meqoya Alemu	F	38	Married	Read and write	Deneba 01	House wife
53	Alemshet Dejene	F	36	Married	Read and write	Deneba 01	Merchant
54	Bashah Eshete	M	40	Divorce	Read and write	Deneba 01	Farmer
55	Dejen Benebere	M	36	Married	Illiterate	Deneba 01	Farmer
56	Geto Astatkie	M	40	Married	Illiterate	Deneba01	Farmer
57	Etagegn Mulushewa	F	31	Married	G>12	Deneba 01	Teacher
58	Amezen Getachew	F	40	Divorce	G>12	Deneba 01	Teacher
59	Yehualashet Bogale	M	43	Married	G>12	Deneba 01	Teacher
60	Tenaye Asegd	F	39	Single	Read and write	Denrba 01	Merchant
61	Shifera Feleke	M	40	Married	G>12	Deneba 01	Teacher
62	Tsegaw Beshir	M	45	Married	Read and write	Deneba 01	Merchant
63	Fikadu Yilma	M	41	Married	G>12	Deneba 01	Teacher
64	Yeshaw Mekonen	M	45	Married	Read and write	Deneba 01	Merchant
65	Zewudu Azerefegn	M	43	Married	Illiterate	Deneba 01	Farmer
66	Fanos Demere	F	40	Married	G->12	Deneba	Teacher
67	Yilma Yeshingus	M	24	Single	G -12	Gashuamba	Student
68	Tewodedewu Wondimhun	M	67	Married	Illiterate	Gashuamba	Farmer: Key informant
69	Emebet Kidane	F	20	Single	G-12	Gashuamba	Student
70	Lemlem Shimels	F	36	Single	Read and write	Gashuamba	Merchant
71	Tsehay Tesfaw	F	36	Married	Read and write	Gashuamba	House wife
72	Beza Alemu	F	36	Single	Read and write	Gashuamba	Hous wife
73	Wondim Betla	M	51	Married	Illiterate	Gashuamba	Farmer
74	Mamush Wolde	M	80	Married	Illiterate	Gashuamba	Farmer
75	Mewded Bire	F	21	Single	Read and write	Gashuamba	Marchant
76	Mebratu Simegn	M	20	Single	G-10	Gashuamba	Student
77	T/Mariam Shibru	M	24	Single	G-11	Gashuamba	Student

78	Tigst Girma	F	26	Single	Read and write	Gashuamba	House wife
79	Getenesh Wuletaw	F	40	Married	Illiterate	Gashuamba	House wife
80	Fantayenesh Assefa	F	29	Single	G-> 12	Woledeneba	Teacher
81	Manalebush Kifle	F	36	Married	G->12	Woledeneba	Teacher
82	Chilotaw Beshahwured	M	40	Married	G >12	Woledeneba	Teacher
83	Eshetu Melese	M	47	Married	G >12	Woledeneba	Teacher
84	Worku Bekure	M	30	Married	Read and write	Woledeneba	Farmer
85	Desta Muluneh	M	45	Married	Read and write	Woledeneba	Farmer
86	Yirgalem Bekele	M	37	Married	Read and write	Woledeneba	Marchant
87	Kassaw Shiferaw	M	30	Married	Read and write	Wole denba	Farmer
88	Melsew Tekle	M	36	Married	G-> 12	Woledeneba	Teacher
89	Tesfahun Tarekegn	M	36	Married	G->12	Woledeneba	Teacher
90	Getaw W/ Gebrael	M	40	Married	G->12	Woledeneba	Teacher
91	Asefashi Asegid	F	30	Single	G->12	Woledeneba	Librarist
92	Alemayehu	M	39	Single	G->12	Woledeneba	Director
93	Alemwosen Simegn	M	37	Married	Read and write	Woledeneba	Farmer
94	Meseret yohanes	F	27	Married	Read and write	Woledeneba	House wife
95	Yikrsew Simegn	M	24	Single	Read and write	Woledeneba	Mechanics
96	Mengiste	M	40	Married	G->12	Woledeneba	Teacher

Appendix.9.Check list of semi-structured interview questions for collecting ethnobotanical data

Siyadebr and Wayu Woreda

I. General Information about Respondents

Information about informant

1. Date----------Residence Area (village) ----------Kebele code----------

2. Name of the Respondent----------

3. Sex; Male------Female----Age--------

4. Marital status of the respondent: Married------ Divorced--------Single----------

5. Occupation (Main job) ---------- educational status--------

6. Religion: Orthodox----------Protestant----------Muslim----------Other

II. Question asked to traditional practitioners in the area

7. How local people prevent and control a given disease in your areas?

8. Do you have knowledge of traditional medicine?

9. What is the most common human disease in your area?

10. What are the most common livestock diseases in your area

11. What are the mechanisms to diagnose different types of diseases?

12. List the sign and symptoms of different disease in your area

13. What are the most medicinal plants used to treat both human and livestock diseases?

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

A. Plant used to treat human disease

B. Plant used to treat livestock disease

C. Plants used to treat both human and livestock disease

No	**Local name**	**Disease treated**	**Plant collected from**	**Modeof preparation**	**Rout of administration**
1					
2					
3					

15. Where do the plants grow? (From they can be obtained)? In the wild, in homegardens, both in the wild and home gardens.

16. What is the habit of the plant? Tree (T)., Shrubs (S), Herb (H), Hemi-parasite(HP), Grass(G),Climber (U), Liana(Li)

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

18. What part of the medicinal plant is used?

19. Leaf (L), Root(R), Bark (B), Stem (St), Flower (Fr), Fruit (Ft), Seed(Se), Sap or Latex (Lt), Whole plant (WP)

20. What is the method of preparation of the medicinal plant Fresh (F), Dried(D), Crushed (C), Powdered (P), used alone (Va). Mixed with water (MW), Exudation (Ex), Concoction (Cn).

21. Which plant species are the most preferred in Q20 and why?

22. Dosage; Dose it vary among age groups, sex? If yes state each.

23. Is there any side effect of the medicine? If yes, list side effects.

24. Which member of the community uses the medicinal plant frequently? Why

25. Is the medicinal plant marketable?

26. Is the medicinal plant easily accessible? If not, why?

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

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

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

30. What are the major problems associated with medicinal plant in the area?

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

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

Appendix 10. Photographs illustrating field work activities in Siyadebr and Wayu Woreda

Appendix 11. Photographs illustrating some medicinal plants sold in Siyadebr and Deneba 01 kebele markets

Appendix 12. Photographs illustrating deforestation in Motelemi and Siyadebr kebeles

Appendix13. Photographs illustrating some herbarium works in Addis Ababa University