ADDIS ABABA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

ETHNOBOTANICAL STUDY OF MEDICINAL PLANTS USED BY LOCAL PEOPLE IN OFLA WEREDA, SOUTHERN ZONE OF TIGRAY REGION, ETHIOPIA

By

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ADDIS ABABA

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To my elder sister Fatuma Abdurahman & my divine Asfish

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LIST OF ACRONYMS

CBD: Convention on Biodiversity

CSA: Central Statistical Agency

HG: Home Garden

ICF: Informant Consensuses Factor

IK: Indigenous Knowledge

TM: Traditional medicinal

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ABSTRACT: *An ethnobotanical study of medicinal plants was conducted between October 2009 and April 2010, in Ofla Wereda of Southern Tigray, Ethiopia. The study employed common ethnobotanical methods including semi-structured interviews, field observations, preference ranking, paired comparisons and informant consensus. A total of 84 informants from 12 Kebeles (7 informants from each Kebele) were selected randomly and 36 key informants with the help of local administrators, recommendations from elders and members of the local community. In this study, 113 traditional medicinal plants were collected and identified. These species represent 95 genera and 51 families. The family Asteraceae with 12 species (10.62%), Lamiaceae and Solanaceae with 11 species (9.73%) each were commonly used medicinal plants in the study area. From the total of 113 medicinal plants, 82 species (72.57%) were used to treat human ailments for 55 health problems, 16 species (14.16%) were used to 14 livestock health problems and the remaining 15 species (13.27%) were used to treat both humans and livestock diseases. Herbs are the most used plants, accounting for 52 species (46%), shrubs 34 species (30.1%) and trees 27 species (23.9%). Leaves, roots, and fruits are the most used plant parts accounting for 68 species (45.3%), 31 species (20.7%) and 18 species (12%) in that order. Fresh plant parts from 74 species (65.5%) are frequently used in the study area than dried plant materials (27 species, 23.9%) and both dry and fresh materials (12 species, 10.6%). From the collected traditional medicinal plants informants reported that species used as crushed preparations were 39 (26.2%) followed by pounded which were 34 (22.8%) and those used as fumigants were 20 (13.4%). Most herbal preparations are administered externally compared to internal applications accounting for 51.6% and 48.4% respectively.*

Keywords: Ethnobotany, Ofla, medicinal plants, traditional medicine

1. INTRODUCTION

1.1. Background

Ethnobotany is a broad term referring to the study of direct interrelations between humans and plants (Martin, 1995; Balick and Cox, 1996). The indispensable dependency of human beings up on plants for their livelihoods primarily started by domestication and dates back to 10,000 years (Martin, 1995). Ethnobotanical investigation documents the knowledge on cultural interaction of people with plants. It also tries to find out how local people have traditionally used plants for various purposes and how they incorporated plants into their cultural tradition and religion (Balick and Cox, 1996).

In many developing countries, people mostly rely on ethnomedicinal knowledge to treat diseases, because western based health care system is inefficient due to poor staffing or because western drugs are expensive. Ethnomedicine is a system of maintaining health and curing diseases based on folk beliefs and traditional knowledge, skills, methods and practices. Ethnomedicinal knowledge is disappearing because of rapid socio-economic, environmental, and technological changes. Therefore, ethnomedicinal knowledge must be documented and conserved through systematic studies before it is lost forever (Mohammed *et al*., 2006).

The focus of ethnobotany is on how plants have been or are used, managed and perceived in human societies and includes plants used for food, medicine, rituals, social life and others. The relationship between plants and human cultures is not limited to the use of plants for food, clothing and shelter but also includes their use for religious ceremonies, ornamentation and health care (Khan *et al*., 2007, 2008).

The connection of people with plants in earlier times is evidenced as they created durable representations of plants, drawing them in stone or molding them in clay. Such images not only provide modern ethnobotanists with clues concerning plant origins but functional as tangible indicators of the importance of these people attached to plants, (Balick and Cox, 1996). From earliest times, humankind has used plants in attempting to

cure diseases and related physical sufferings. Primitive people in all ages have had some knowledge of medicinal plants, derived as the result of trial and error (Hill, 1989).

Ethiopia is 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. 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). Dawit Abebe and Ahadu Ayhehu (1993) reported that, 80% of the Ethiopian population depends on tradition medicine for their health care. More than 95% of traditional medicinal preparations are of plant origin (Dawit Abebe, 1986).

In Ethiopia like many of the developing countries, medicinal plants have not been well studied, tested or documented. Similar to other region of Ethiopia, people living in Tigray in general and in Ofla Wereda (District) in particular have traditional practices which they accumulated for centuries and has been transferred from generations to treat both human and livestock ailments (Mirutse Giday and Gobena Ameni, 2003).

Nonetheless, most of the information that is in the hands of traditional healers and local people is either lost or passed to generation by word of mouth. Moreover, in the Wereda studied limited research works had been conducted on some medicinal plants used for curing animals with specific ailments (Mirutse Giday and Gobena Ameni, 2003). Therefore, this study will fill the gaps in documenting important plants of ethnoveterinary medicinal interest in depth and medicinal plants used for humans which have not yet been documented so far in order to conserve them for future.

1.2. Statement of the Problem

There is a wide gap in our knowledge about ethnobotanical data and information from various parts of Ethiopia although we have rich and diverse ethnolingustic groups throughout the country. Complete collection, identification and documentation of

ethnobotanical works have not yet been made in the study area too. To a great extent, information to be generated through ethnobotanical studies remains outside the site of the scientific community and the remaining portion of the world until recently, except few reports on some parts of the study area with regard to plant species of veterinary importance.

Biodiversity loss due to natural and anthropogenic factors, distribution and undermining of indigenous knowledge and traditional practices by the younger generation is becoming evident due to limited integration of traditional practices with modern science in the study area. Traditional home gardening in the conservation and management of medically important plant species by indigenous people of the Wereda is not recognized through such practices are varying from kebelle to kebelle. However, some important medicinal plants have been planted like fence and observed as fragments in and around the farm lands. What is more is that, most of the natural vegetation and forests of the study area are almost totally lost by human impact and hence monoculture practices are becoming common phenomena.

1.3. Objectives

1.3.1. General objective

The general objective of this study is to identify, compile and document medicinal plant species used by the indigenous people for the treatments of human and livestock ailments as well as their taxonomic groups emphasizing on future conservation practice.

1.3.2. Specific objectives

- To identify and compile medicinal plants used for the treatment of health problems for both humans and livestock.
- To identify plant parts used to treat health problems, methods of preparation and route of administration as practiced by the local people of the study area.
- To assess the current status and threat to medicinal plants in the area.
- To provide information for future research in drug development using medicinal plants with ethnobotanical leads.

2. LITERATURE REVIEW

2.1. Traditional Medicine

Since time immemorial human beings have found remedies within their habitat, and have different therapeutic strategies depending up on the climatic, physiographic, floral and faunal characteristics, as well as up on the peculiar cultural and socio-structural typologies. In doing so people have used traditional medicine to cure and prevent various disorders. Traditional medicine (TM) is defined as the sum total of the knowledge and practices weather explicable or inexplicable, used in the diagnosis, prevention and elimination of physical, mental and/or social imbalance(WHO, 1979). It has incorporated plant, animal and mineral based medicines, spiritual therapies, include techniques and exercises, applied singularly or in combination (Adewumi, 1991). It depends exclusively on past practical experience and observations handed down from generation to generation, verbally or in writing. And also comprises therapeutic practices that have been in existence often for hundreds of years before the development of modern scientific medicine and are still in use today without documented evidence of adverse effect (Elujoba *et al*., 2005).

2.2. Indigenous Knowledge

Indigenous knowledge (IK) is defined as the local knowledge that is unique to a given culture or society. It is the bases for the local level decision making in agriculture, health care, food preparation, education, natural resources, management and a host of other activities in rural communities (Warren, 1991). According to Balick and Cox (1996) indigenous people are defined as "peoples who follow tradition, non-industrial life styles in areas that they have occupied for generations".

It is a result of many generations', long years' experience, careful observations and trial and error experiments (Martin, 1995). Thus over centuries, indigenous people of different localities have developed their own specific knowledge on plant resources use, management and conservation (Cotton, 1996). IK develops and changes with time and space. Hence, such knowledge includes time-tested practice that developed in the process

of interaction of human with their environment. One of the widely used indigenous knowledge system in many countries is the knowledge and application of traditional medicinal plants. Such knowledge known as ethno medicinal knowledge involves traditional diagnosis, collection of raw materials, and preparation of the indigenous knowledge on plant remedies in many countries include Ethiopia, pass from one generation to the other generation verbally with great secrecy. Such secret and verbal transfer makes the indigenous knowledge or ethno medicinal knowledge vulnerable to distortion and in most cases some of the lore is lost at each point of transfer (Amare Getahun,, 1976). Hence, the need for systematic documentation of such a useful knowledge now a days through ethno botanical research.

Local knowledge of indigenous people includes information about the ecosystem in general, but also about specific plants used as medicine, food, building material and the like (Leonti *et al.,* 2003). Researches show that the indigenous knowledge of medicinal plants by human beings is decreasing in alarming rate. The main reasons that contribute in the loss of IK are rapid land degradation such as accelerated destruction of forests, peoples access to modern medicine and exposure to modern culture and acculturation (adoption of modern culture) (Kong *et al.*, 2003; Shrestha and Dhillion, 2003). The complex knowledge, beliefs and practices generally known as IK develops and change with time and space. Hence such knowledge includes time-tested practice that develops in the process of interaction of humans with their environment (Alcorn, 1984). IK is a body of knowledge built up by a group of people through generation of living in close contact with nature and it is cumulative and dynamic. It builds up on the historic experience of people and adapts to social, economic, environmental, spiritual and political change. The quantity and quality of traditional knowledge differs among community members according to their gender, age, social-standing, profession and intellectual capabilities (Balick and Cox, 1996). Thus, systematic application of IK is important for sustainable use of resources and sustainable development (Thomas, 1995).

2.3. Status of Indigenous Knowledge on Medicinal Plants in Ethiopia

IK of medicinal plants in Ethiopia is unevenly distributed among community members (Zemede Asfaw, 2001). The distribution of knowledge and services are hierarchically placed. Services are obtained from the family, the neighborhood, the village or beyond (Hareya Fassil, 2005). In Ethiopia, the loss of IK is not to far from the developed countries. The vast knowledge on traditional uses of plants is not fully documented and most of the knowledge is conveyed from generation to generation by word of mouth. This process together with the increasing acculturation, mobility and displacement of communities due to different factors (Famine, water etc..), secretive nature of traditional knowledge and skills and the negligence of the contemporary generation to acquire the knowledge on traditional medicine (TM) due to expansion of modern education and to some extent modern medicine, pots to question the future of the cultural heritage of the country which was known and practiced for the centuries(Getachew Addis *et al*., 2001).

Ethiopia's traditional medicine, as else where in Africa, is faced with problems of continuity sustainability primarily due to loss taxa, habitats of medicinal plants and other category of plants (Ensermu Kelbessa *et al*., 1992). In the same work it has been pointed out that there is a real genetic danger of genetic erosion, which in turn calls for the need of collection, investigation and conservation of these resources and the indigenous knowledge on them.

2.4. Plants in Ethnoveternary Medicine

In most developing countries, particularly in sub-Saharan Africa, diseases remains one of the principal causes of poor livestock performance leading to an ever increasing gap between supply demand for livestock and products (Tafese Mesfin and Mekonen Lemma, 2001). Ethnoveternary medicine provides traditional medicines, which are locally available and usually cheaper than standard treatments. Livestock holders can prepare use home made remedies with minimum expense. So far many livestock holders in rural areas where there are relatively few veterinaries and shortages of other facilities, traditional medicinal plants are the only choice to treat many ailments. (McCorkle, 1995).

Ethnoveternary medicine can be useful whenever wherever stock raisers have no other animal health care options, whether in rural or peri-urban areas. In spite of its paramount importance as livestock health care system the various traditional veterinary practices remained undocumented in Africa and Ethiopia (Dawit Abebe and Ahadu Ayenu, 1993). Thus creation of awareness on ethnoveternary medicine emphasizing on useful plant used for treatment of livestock has paramount importance to livestock management. In addition, proper documentation and understanding of farmers' knowledge, attitude and practices about the occurrence, cause, treatment, prevention and control of various ailments is important in designing and implementing successful livestock production (Tafese Mesfin and Mekonen Lemma, 2001).

2.5. The importance of Medicinal Plants for Development of Modern Drugs

Medicinal plants are important element of indigenous medicinal systems world wide. Ethno pharmacological surveys provide the rational for selection and scientific investigation of medicinal plants, since some of these indigenous remedies have successfully been used by significant number of people. Over extended periods of time (Geerling, 2001) the importance of traditional knowledge system in drug discovery process is exemplified by the isolation of artemisinin from the herb sweet worm wood *(Artemisia annua*) this plant was used in traditional Chinese herbal medicine for over 2000 years for the treatment of fever and malaria, and was rediscovered by Chinese scientists in the 1970's. Historically, botanicals have been our most fruitful arena in the search for new medicine. Searching new drug from traditionally used medicinal plants can therefore be the shortest path of success. However, a report has showed that, a success rate in the search of new drugs from randomly synthesized chemicals is only one in 10,000 (Chadwick, 1994). Historically**,** plants have provided a source of inspiration for novel drug compounds, as plants derived medicine have made large contribution to human health and well-being. Their role in the development of new drugs could be either by serving as a natural blue print for the development of new drugs, or as phytomedicine to be used for the treatment of diseases (Andrew *et al.;* 2000).

Rapid development and advances in science, technology, and the world economy have drastically changed the world and environment. With remarkable improvement in human health care on one hand and environmental deterioration on the other a growing demand for natural products and phytomedicine has shifted research and development works in to new drug discover. Many research institutions in this field have turned to TM, mainly the use of plants as source of new drugs. TMs play a key role in the development and advancement of modern studies by serving as a starting point for the development of novelty in drug (Pramono, 2002). In addition, an increasing reliance on the use of medicinal plants in the industrialized societies has been traced to the extraction and development of several drugs and chemotherapeutics from these plants as well as from traditionally used rural herbal remedies (UNESCO, 1998). Furthermore, chemical structures derived from plants can be used as models for synthetic compounds (WHO, 2000). Most of plant derived drugs were originally discovered through the study of traditional cures and folk knowledge of indigenous people (Balick and Cox, 1996). Analysis of the number and sources of anticancer and anti-infective agents, reported from 1984 to 1995 indicates that over 60% of the approved drugs and pre-DNA (New Drug Application) candidates (for the period 1989-1995), excluding biological aspects developed in this disease are of natural origin. A recent review reported that at least 119 compounds derived from 90 species could be considered as important drugs currently in use in one or more countries, with 77% of this being derived used in traditional medicine. Further evidence of the importance of natural products is provided by the fact that closes to half of the best selling. Pharmaceuticals in 1983 to 1987 were either natural products or their derivatives (Douglas, 1987). This elaborates that traditional medical knowledge of medicinal plants and their use by indigenous cultures are not only useful for conservation of cultural traditional and biodiversity but also for community health care and drug development in the present and future (Muthu *et al.,* 2006).

In general, many investigations indicated the relevance of ethnobotanical information on medicinal plants is often used to guide chemical screening of drug development. Traditional herbs which have proven clinical efficacy and safety were the first chosen for screening. Then plant materials collected and identified with reference to Ethnobotanical

information and photochemical analysis were screened in consultation with local users of the herbal medicines are tested through photochemistry, pharmacy, animal experiments and clinical trials. It is then possible to use them in the formulation of new medicines according to government regulations concerning new medicinal developments (Sheng-Ji, 2001).

2.6. Threats and Conservation of Traditional Medicinal Plants

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). Ethiopia's traditional medicine as elsewhere in Africa is faced with problems of continuity and sustainability (Ensermu Kelbessa *et al.,* 1992). The primary cause of this problem is loss of taxa of medicinal plants, loss of habitats of medicinal plants and loss of indigenous knowledge. Some studies have shown that most of the medicinal plants utilized by Ethiopian people are harvested from wild habitats (Mirutse Giday, 1999; Zemede Asfaw, 1999). And hence, this aggravates the rate of loss of taxa with related indigenous knowledge and loss widely occurring medicinal plant species.

There are two sources of threats to medicinal plants, i.e. man made `and natural causes. Rapid increase in population, the need for fuel, urbanization, timber production, over harvesting, destructive harvesting, invasive species commercialization, honey collection degradation, agriculture expansion and habitat distraction are human caused threats to medicinal plants. Moreover, Mirutse Giday and Gobena Ameni (2003) have reported that threats on medicinal plants in southern Tigray are deforestation, over grazing and recurrent drought as well as overexploitation and destructive harvesting. Some causes of threat of medicinal plants in Fentalle area in the order of importance as, over grazing, expansion of agriculture, harvest for charcoal, firewood, drought, home use and trade (Kebu Balemie *et al.*, 2004). Furthermore, Debela Hunde *et al*. (2004) indicated that leaves and roots provide most remedies in Boosat area and the common usage of these parts of the plant (particularly roots) contribute a lot to the destruction of the natural vegetation in the locality. The same authors also accounted the popularity of roots, barks,

rhizomes, stems and whole plants in Boosat area may also have negative consequence on biodiversity and sustainability of the medicinal plant species. Similarly, studies carried out in the Zay people and in different parts of Ethiopia by Mirutse Giday *et al.* (2003) indicated that, as the plants that have been serving as a raw material for preparation of different remedies get destroyed the traditional practice and culture associated with them would also get diminished. Likewise, natural causes include recurrent drought, bushfire, diseases and pest outbreaks (Ensermu Kelbessa *et al.,* 1992). As elsewhere, in Ethiopia, the problem is manifested in Ofla Wereda due to the above mentioned factors.

Conservation is defined as the sustainable use of biological resources. The concept of sustainability is now seen as the guiding principle for economic and social development, particularly with reference to biological resources. According to Zemede Asfaw (2001), medicinal plants are considered to be at conservation risk due to over use and destructive harvesting (Roots and bark collection). In a broad sense, conservation is achieved through in-situ and ex-situ means. In-situ conservation is conservation of species in their natural habitat. Some traditional plants have to be conserved in-situ due to difficulty for domestication and management (Zemede Asfaw, 2001). Moreover, some plants fail to produce the desired amount and quantity of the active principles under cultivation out of their natural habitats. Medicinal plants can also be conserved by ensuring and encouraging their growth in special places, as they have been traditionally (Zemede Asfaw, 2001). This can be possible in places of worship (churches, Mosques, graveyards, etc…). Sacred groves, farm margins, river banks, road sides, live fences of gardens and fields. According to Zemede Asfaw (2001), medicinal plants can be conserved using appropriate conservational method in gene banks and botanical gardens. As the earth's population continues to grow, more resources are demanded. Thus, it is understandable that an increase in population is demanding more resources, but with careful management of our natural resources, a sustainable balance can be achieved. According to Cunningham (1993), sustainable management of traditional medicinal plant resources is important, not only because of their value as a potential source of new drugs, but due to reliance on traditional medicine for health.

The diversity of plants in Ethiopia is on the process of erosion due to anthropogenic pressure like habitat destruction and deforestation by commercial timber production and for agriculture which harbor useful medicinal plants over the past several decades (Abebe Demisse, 2001). Conservation of medicinal plant resource is a critical ecological, cultural and economic issue (Vanon, 2001). In order to achieve this, Ethiopia has polices and strategies that support the development and utilization of plant resources in a sustainable manner. The policies are reflected under various sectors including environmental protection, development of the natural resources and diversification of the domestic and export commodities.

The country also has developed policy and a guide line for intellectual property rights protection of traditional medicine (Endashaw Bekele, 2007). The policies are inline with the convention on biological diversity (CBD) which was adopted at the earth summit in Rio de Janeiro, Brazil in June 1992, and entered in to force on December 1993 CBD provides the legal framework for biodiversity conservation. Moreover, documenting the indigenous knowledge through ethnobotanical studies is important for the conservation and utilization of biological resources particularly traditional medicinal plants (Sirvastava, 2000). These plants play an important role in the biodiversity of the region and have great conservation value for global biodiversity. Meanwhile, the planning for natural resources development should continue by establishing close dialogue and communication with indigenous peoples using ethnobotanical approaches. This will also ensure local peoples participation in future management, and avoid the adverse impact on the local people and the environment that might be caused otherwise (Pei, 1991). According to Cunningham (1993), there are some conservation measures that have been undertaken around the world aimed at protecting threatened medicinal plant species from further destruction including in-situ and ex-situ conservation.

3. MATERIALS AND METHODS

3.1. Characteristic Features of the Study Area

3.1.1. Location

Ofla Wereda (District) is located in northern part of Ethiopia, Tigray National Regional State. It is one of the eight Weredas in southern Tigray Zone and with a total of 20 Kebels. Its relative location is 20^0 30' N and 39^0 37' E at 630 Km north of Addis Ababa. The Wereda covers an area of 133,300 hectare and bounded by Endamohoni wereda in north, Alamata wereda in south, Raya Azebo wereda in the east and Wag humra zone of the Amhara National Regional State in the western direction (CSA, 2005) (**Fig. 1**).

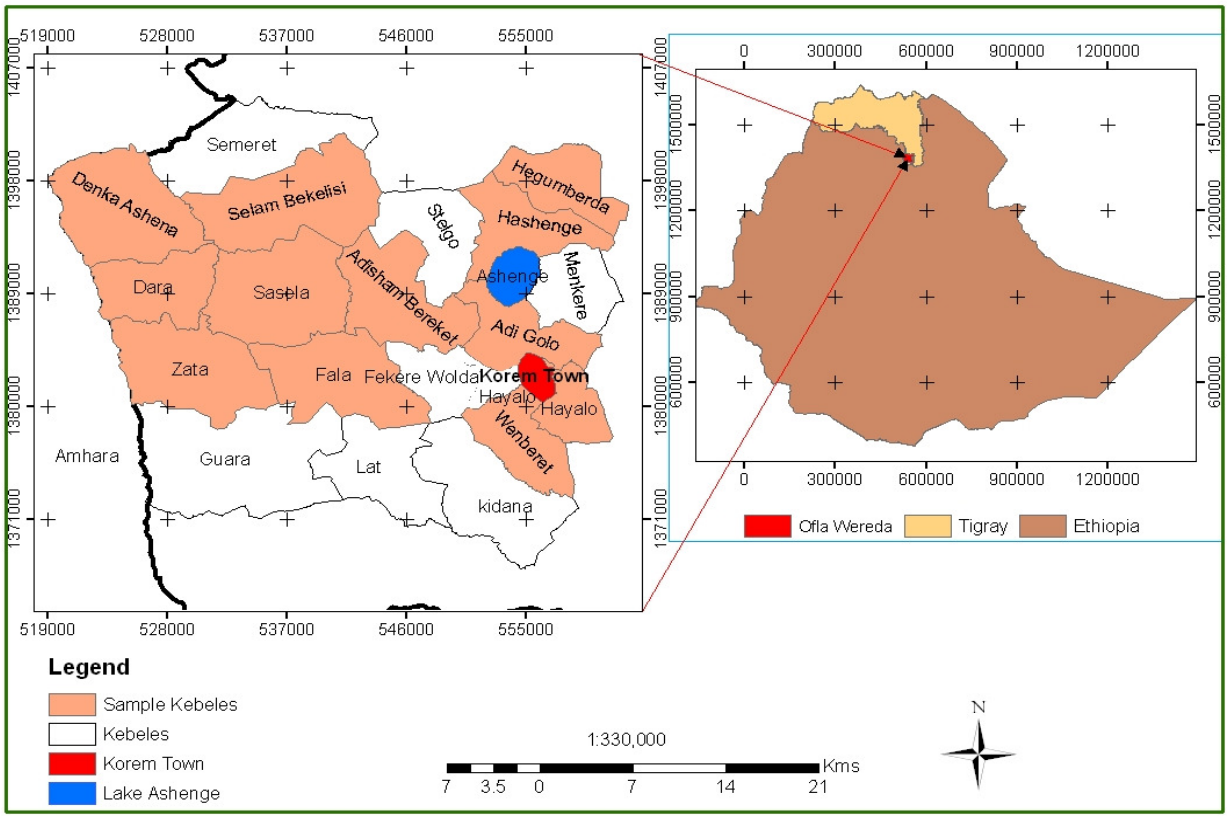

Fig 1: Map of Ofla Wereda

3.1.2. Topography

Ofla Wereda is found within the domain of northern highlands of Ethiopia bounded by the Western escarpment of the rift valley in the east. Altitude of the Wereda rises from 1700 to 3288 meters and it decreases east wards from the west where the elevation reaches its peak. The topography of the Wereda is 40% hill (Gedelama), 25% flat, 15% mountain and valleys, and 20% in between. The land in the Wereda is 25,012 hectare for cultivation, 22,275 hectare for grazing, 44,635 for forestry, 1,570 hectare covered by water and 36,519 hectare with no use (unpublished data, Development of Ofla from where to where, 1999).

3.1.3. Climate

Based on 1997- 2006 climate data, the average maximum temperature in the study area observed in June (25.78 ^{O}C) and May (24.85 ^{O}C) respectively. On the other hand, average minimum temperature observed was during July (12.31 ^{O}C) and August (11.62 ^{O}C). But throughout the year the maximum and minimum temperature ranges from 19. 86 ^{0}C to 25.78 ^{0}C and 4.14 ^{0}C to 12.31 ^{0}C, respectively (Fig. 2).

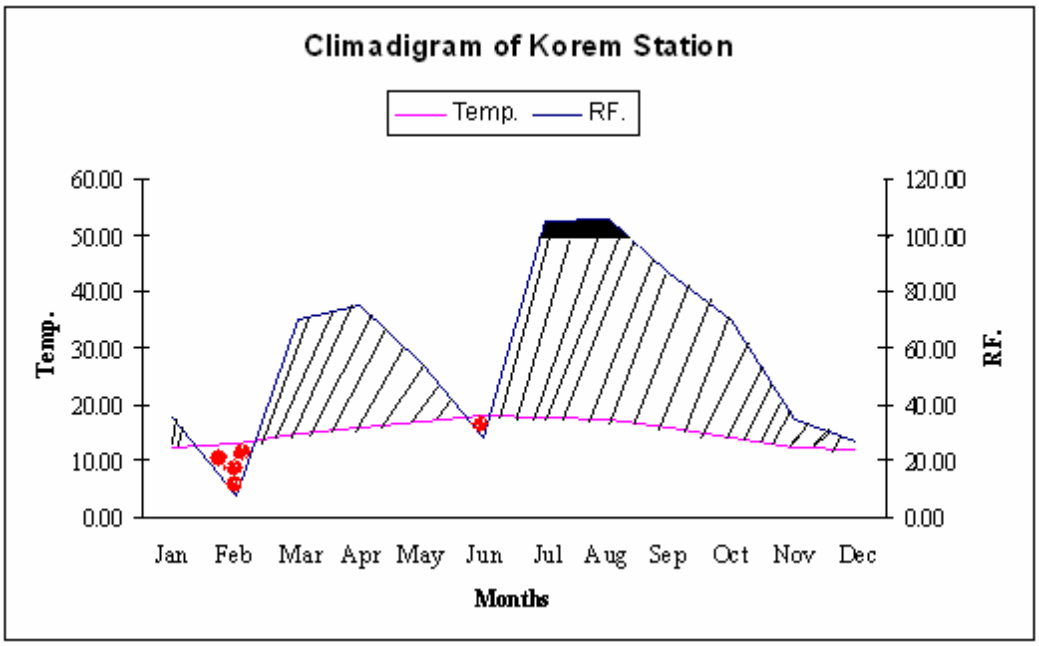

Fig 2: Climadiagram of Ofla Wereda from 1997- 2006.

Data Source: National Metrological Service Agency

3.1.4. Rainfall

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According to the ten years rainfall summarized data, the study area has a high rainfall distribution between July and August and a little bit between March and April. The mean monthly rainfall of the study area is 83.8 mm (**Fig 2**). There are three agro-climatic zones in the Wereda with greater domination of the high land or "Dega". The Dega zone comprises about 42% of the Wereda followed by "Woina dega" and "Kola" 29% each (unpublished data, Development of Ofla from where to where, 1999).

3.1.5. Vegetation

According to Zerihun Woldu (1999), the natural vegetation of the study area belongs to "Dry ever green montane forest." The upper canopy species found are *Croton macrostachyus, Hagenia abyssinica, Juniperus procera, Myrica salicifolia, Nuxia congesta, Prunus africana, Bersama abyssinica, Calpurina aurea Euclea racemosa, Hyperecum revuoltum, Maytenus arbutifolia, Myrsine africana, Rhus glutinosa, Otostegia integrifolia, Maeasa lanceolata, Vernonia amygdalina, Lippia adoensis, Olea europaea subsp. cuspidata, Pterolobium stellatum, Justicia schimperiana, Withania somnifera, Acacia etabica, Balanites aegyptiaca* and *Dodonaea angustifolia*. Where as in the lower canopy species such as*, Dovyalis abyssinica, Rhamnus prinoides, Jasminum abyssinicum,and Rosa abyssinica.*

3.1.6. Population

Based on the population and housing census of 2008, population size of the Wereda is 149,262. From this figure, males and females account for 72, 570 and 76,755 respectively. The Wereda has been divided in to 20 peasant associations (locally known as 'Tabias') and 72 sub peasant associations (also known as 'Kushets') for administrative purpose (CSA, 2005).

3.1.7. Farming System

Crop production and livestock husbandry are the main economic activities of the study area. Farmers in the study area follow mixed farming systems. Barely, bean, pea, maize and sorghum are the major crops produced in the area. Whereas cattle, chicken, sheep,

goat, horse and donkey constitute the livestock population (From agricultural bureau of Ofla Wereda). Of all the domestic animals raised in the Wereda, cattle population is high, claimed to be 72,924 heads, chicken 97,248 and sheep 49,772 (central agricultural census commission, 2003). Anthrax, fasciolpasis and trypanosomes are among the diseases occurring in the area (unpublished data, Ofla Wereda Agricultural Office, 2007).

3.1.8. Health and sanitation

Health and sanitation coverage of Ofla Wereda are 78% and 64% respectively. There are 21 health posts and five functional health centers serving for the existing 149, 246 total population of the Wereda in 2009 (unpublished information from the Ofla Wereda health office, 2009). There are higher prevalence communicable and non-communicable diseases in the wereda. Health problem in general are related to poor nutrition status, poor water supply, poor environmental sanitation and poor hygienic practices.

3.2. Methods

3.2.1. Site selection

A reconnaissance survey of the study area was conducted from 15-30 September 2009. Data collection trip was made from October 17 to 20 December 2009. A total of 12 Kebeles were selected for ethnobotanical data collection based on availability of traditional healers identified with the assistance of local authorities, elders and knowledgeable persons. These kebeles are Hayalo. Wenberet, Adigolo, Higumbrda, Hashenge, Fala, Zata, Dara-bekeda, Dinka-ashena, Sesela, Adishimbirkit and selam bikalsi.

3.2.2. Selection of Informants

Selection of informants was performed following Martin (1995) who indicated that when recording indigenous knowledge held by knowledgably traditional healers or by certain social groups the choice of key informant is crucial. Eighty four informants (36 females and 48 males) were randomly selected by tossing of coin. The age of informants was between 15 and 81. From each site of Kebelle, 7 individual informants were selected. About 36 key informants (15 females and 21 males), 3 from each of the study sites were

preferentially selected with the help of local administers, elders and other community members. The key informants include healers, elders and knowledgeable persons. The age of the key informants was between 27 and 81.

3.3. Collection of Ethnobotanical Data

Ethnobotanical data were collected by the method semi-structured interview following Martin (1995) and Cotton (1996), field observation and group discussion. Information regarding the gathering, preparation, use, status, distribution, threats and conservation aspects of medicinal plants and other related ethnobotanical information was also collected by the researcher. Most of the interviews and discussions were conducted in the local language of the Wereda (Tigrigna), which is a common language in the study area. The necessary information about the plants such as habit, habitat, altitude, latitude and longitude were recorded. Each collection was given collection number.

3.3.1. Field observation

Field observation was performed with the help of local guides and interviewed informants in the study area. Full notes on facts and information about the respondents, history of the traditional healers, history of the medicinal plants and other essential information based on the questions were recorded on site.

3.3.2. Group discussion

A brief group discussion was made with the informants at each kebelle and site prior to ethno botanical data collection.

3.3.3. Plant identification

Voucher specimens were collected for each plant species and identification of some common and well known species were made in the field. The specimens were dried, deep frozen and identified in the national Herbarium (ETH), Addis Ababa University. The

identification work was performed by using the published volumes of the Flora of Ethiopia and Eritrea and by comparing with authentic specimens deposited in the national Herbarium (ETH), Addis Ababa University and by getting assistance from taxonomic personnel and taxonomists. Finally, the identified voucher specimens are deposited at the national Herbarium (AAU).

3.4. Data Analysis

Ethnobotanical information collected from the semi-structured interviews and field observation was computed by preference ranking, paired comparison and direct matrix ranking according to Martin (1995), Alexiades (1996) and Cotton (1996). Informant consensus, ranking and informant consensus factor were computed.

3.4.1. Preference ranking

Following Martin (1995), preference ranking was made for five medicinal plants used to treat fibril illness that was found to be the most frequently encountered disease in the study area and for which they have several alternative plants as readily. Ten preferentially selected key informants were made to participate in this exercise. The informants were given the plants and asked to arrange the five medicinal plants based on their personal preference of efficacy. The medicinal plant that was believed to be the most effective was given the highest value i.e. 5, and the one with the least effectiveness received the lowest value i.e. 1. Based on the total score of each species the rank was determined, and this helped to indicate the most effective medicinal plants used by the community to treat fibril illness.

3.4.2. Paired Comparison

After identification of the five most important plants based on their high use values as perceived by the informants, paired comparisons were employed as described by Martin (1995). Paired comparisons on the five most effective plants in treating abdominal pain mentioned by most of the informants were selected and conducted using random number table and tossing coins. Ten informants were preferentially selected from the key

informants and allowed to show their response independently for pairs of traditional medicinal plants noted for treating abdominal pain.

3.4.3. Informant consensus

During the survey, different informants indicated the same plants and same uses especially for some widely used medicinal plants. The informant consensus is helpful to see the similarity of information given by the informants to confirm the authenticity of information by comparing it with other information given by other informants on the same topic. Accordingly, diseases of humans, numbers of citation and percentages are recorded. The same was done to livestock.

3.4.4. Informant consensus factor (ICF)

The Informant Consensus Factor (ICF) was calculated for each category 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 (n_{ur}) minus the number of species used (n_t), divided by the numbers of use citations in each category minus one (Alexiades, 1996).

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

3.4.5. Ranking of threatened medicinal plants

Using the method applied by Martin (1995) and Alexiades (1996), ranking of five medicinal plants that were reported by the informants as threatened in the study area was conducted with ten key informants (knowledgeable traditional healers). The preferentially selected informants were given the names of five traditional medicinal plant species considered threatened by the community and arrange the plants based on the degree of threat /scarcity by giving 5 for the most threatened and 1 for the least threatened plant species in the study area. Finally, the scores of each species are summed and ranked. This information helps to determine the most threatened species in order to suggest appropriate conservation measures.

3.4.6. Ranking of threats to medicinal plants

Ranking of threats to medicinal plants that were reported by most of the informants in the study area was conducted using 10 selected key informants as described by Martin (1995) and Alexiades (1996). As mentioned by most of the informants seven threats were selected and the informants were asked to give seven for the most threatening factor and one for the least threatening factor in the study area. This information is used to determine the highest threats to traditional medicinal plants in the study area and helps to suggest the necessary appropriate conservation measures.

3.4.7. Direct matrix ranking for multiple uses of traditional medicinal plant species

Direct matrix ranking was conducted following Cotton (1996) for 7 multipurpose medicinal plants commonly reported by informants. Based on the relative benefits obtained from each plant, 10 informants were preferentially selected and asked to give value to each attribute. The list of attributes included medicinal, fire wood, building, charcoal, furniture, edible fruits and fence. The scores were added in order to compare use values of medicinal plants and help to identify the main causes of over harvesting of the medicinal plants.

4. RESULT AND DISCUSSION

4.1. Types of Medicinal Plants

A total of 113 plant species with their medicinal use were recorded (**Appendix 1**). The species were represented 95 genera and 51 families (**Appendix 7**). In terms of species composition, the family Asteraceae consists of 12 species (10.62%) followed by Lamiaceae and Solanaceae with 11 species each (9.73%), Fabaceae 8 species (7.08%) and Euphorbiaceae and Cucurbitaceae consists of 6 (5.30 %) and 5 (4.42 %) species respectively (Table 1). The plants were found to treat 69 different health problems affecting the health of both humans and livestock (55 in human and 14 in livestock) **(Appendices 8 and 9).**

Similarly, 53 medicinal plants recorded in Adigrat wereda are also used as remedies in other parts of Ethiopia (Taddesse Beyene, 2007). Fifty one plant species were also mentioned in Mirutse Giday and Gobena Ameni, (2003). Also 7 species have been reported by Ragunathan and Solomon Mequanente (2009). The existence and utilization of such a large number of medicinal plants by people in the study area indicates that the majority of the people used indigenous medicinal practices to take care of medication problems.

Table 1. Types of medicinal plants

Family	Genera	Species number	Percentage (%)
Asteraceae	9	12	10.62
Lamiaceae	9	11	9.73
Solanaceae	6	11	9.73
Fabaceae	7	8	7.08
Euphorbiaceae	4	6	5.30
Cucurbitaceae	4	5	4.42
Other 45 families	56	60	52.40
Total	95	113	100

4.2. Source of Medicinal Plants

Regarding the distribution of medicinal plants, out of the 113 plant species, 65 (57.5 %) were obtained from wild followed by 29 (25.7%) and 19 (16.8%) from home garden (cultivated and both cultivated and wild) (Fig.3). Thus, this indicated that majority of medicinal plants have been obtained from wild vegetation. Since, except few herbs, trees and some cultivated crops the local people relies on medicinal plants from wild habitats. Mirutse Giday (1999) presented similar findings in his work on medicinal plants of the Zay people. A comparable finding was also reported by Haile Yinger and Delensaw Yewhalaw (2007) in Sekoru District, Jimma Zone of Oromia Regional State, South Western Ethiopia, which showed that among the cited medicinal plant species of the study area, the majority (85.71%) were collected from the wild.

The local people cultivate some popular medicinal plants in their home garden for the purpose of medicine such as *Ruta chalepensis*, *Verbena officinalis* and *Ocimum lamiifolium*. The work by Zemede Asfaw (1997) showed that 6% of the plants maintained in home gardens in Ethiopia are primarily cultivated for their medicinal value. It was found from the present study area that some traditional healers do not have interest to grow in their home garden some plant species that are used to treat specific ailments in order to keep the secret of their medicinal value. This means that most of the medicinal plants found in the home gardens are those also known to have other uses particularly as food.

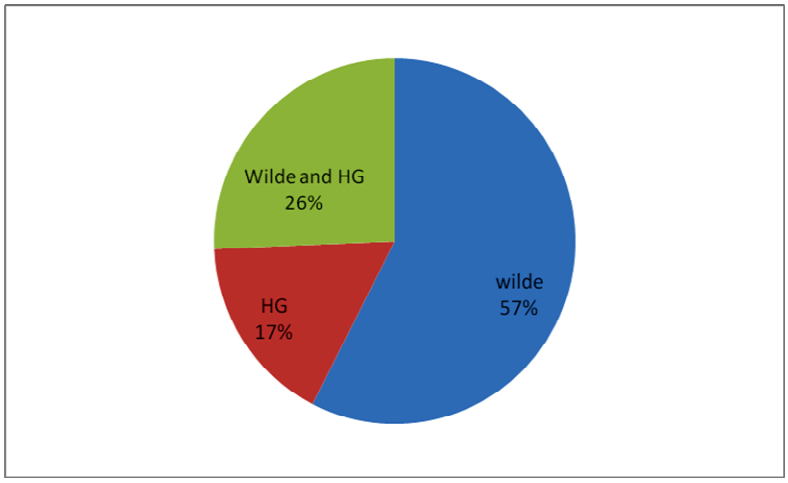

Fig. 3. Source of medicinal plants

4.3. Habits of Medicinal Plants

Of the total 113 medicinal plants collected from the study area, 52 species (46 %) were herbs followed by 34 species (30.1 %) shrubs and 27 species (23.9%) trees (Fig.4). The might be owing to the easily occurrence of these species in the study area and high level of abundance. In the same way high number of herbs and shrubs for medicinal purpose were also previously reported by (Debela Hundie, 2004). Mirutse Giday *et al.* (2003) noted that, more than half of the Zay plant remedies were obtained from herbs because; it takes much time and effort to harvest medicinal trees. However, it is a fact in the country that woody plants (forest and wood land species) are declining and most of the easily available plants become the herbs.

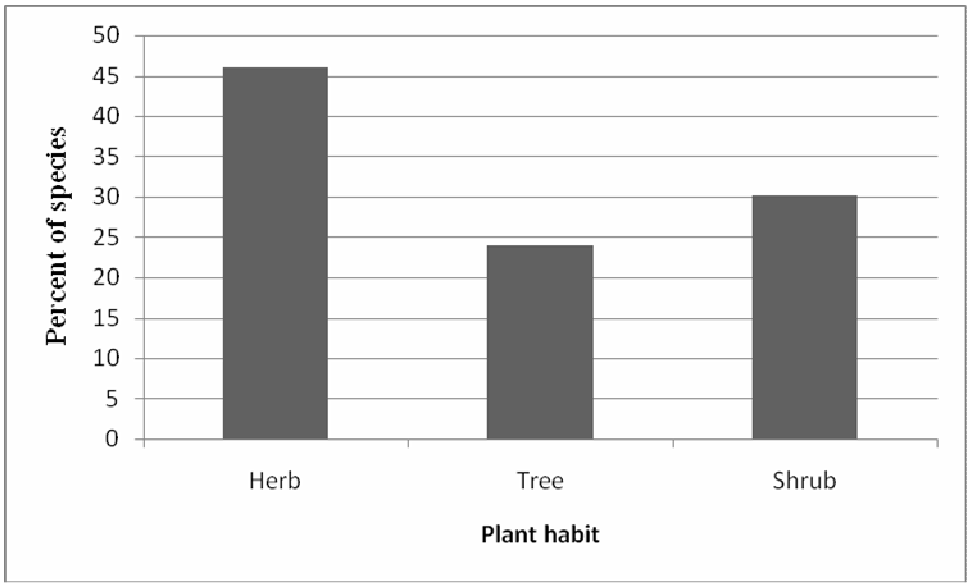

Fig.4. Habits of medicinal plants

4.4. Medicinal Plants and their main uses by the local People

Out of the collected 113 medicinal plants of the study area, 82 species (72.57%) were used against 55 human ailments (**Appendix 3**). Those used for the treatment of livestock ailments are 16 species (14.16%) (**Appendix 4**), the remaining 15 species (13.27%) are used to treat both human and livestock ailments.

4.5. Plant Parts Used for Medicine

According to the interview result leaves are the most commonly used plant parts accounting for 45.3% of the total, followed by roots (20.7%) and fruit (12%). Use of other plant parts is as indicated in Table 2. In agreement with this study conducted in different parts of Ethiopia indicated that leaves being used more than the other parts of the plant (Mirutse Giday *et al*., 2003; Mirutse Giday and Gobena Ameni, 2003; Haile Yinger and Delensaw Yewhalaw, 2007). This practice helps to reduce the rate of threat on plant species or helps for sustainable harvesting of plants. Therefore, the existence of the plant will be ensured (Mirutse Giday *et al*., 2003). According to Dawit Abebe and Ahadu Ayehu (1993), medicinal plant harvest that involves root, rhizomes, bulbs, barks and steams have serious effect on the survival of mother plant.

Table 2. Plant parts used for medicine preparations

Plant parts	**Total responses**	**% of total**
Leaf	68	45.30
Root	31	20.70
Fruit	18	12.00
Seed	7	4.70
Latex	6	4.00
Flower	4	2.70
Other parts	16	10.70
Total	150	100

4.6. Conditions of Preparation of Herbal Remedies

Herbal remedies are prepared using fresh material from 74 of the species (65.5%), while 27(23.9%) species is used in the case of dried plant material. There were 12(10.6%) species in which the local people use either dried or fresh materials for the treatment of ailments (Fig.5). Similarly, a study conducted by Teshale Sori *et al*. (2004) in Borena,

Oromia Reginal State, south Western Ethiopia. Showed that using fresh materials for different health problems is more than dry or dry and fresh materials.

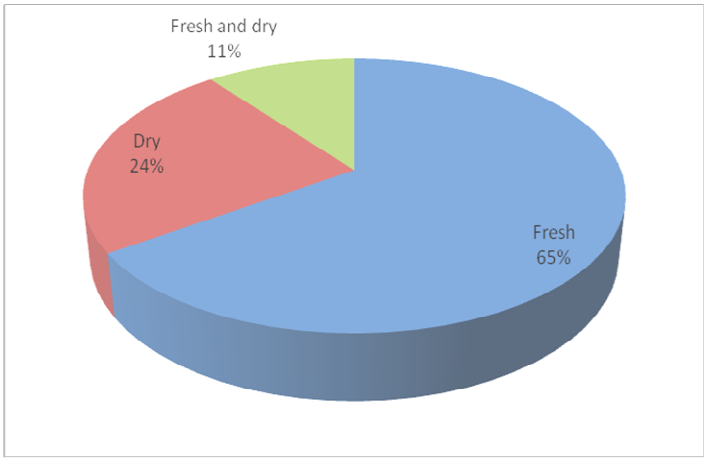

Fig.5.Condition of remedial preparation from plants

4.7. Preparation, Routes of Administration and Application of Medicinal Plants

Crushing 39 (26.25%), pounding 34 (22.8%) and fumigation 20 (13.4%) are the three main methods of preparation of medicine. Other modes of preparation used one given in Table 3. The local people employ several methods of preparation of traditional medicines. The result of the current study showed that the most popular mode of preparation was in the form of crushing 39 (26.2%) followed by pounding 34 (22.8%), 20 (13.4%) as fumigant, 14 (9.4%) in the form of juice and chewing and 5 (3.4%) by concoction. In a similar study done by Haile Yinger and Delensaw Yewhalaw (2007), in Oromia Reginal State, Southwestern Ethiopia the popular mode of preparation was crushing (Juice). Others medicines are mixed with food, placed on the bent of bed, show to patient and made to wear as necklace.

Table 3. Preparation methods of herbal medicine

Forms of preparation	Total responses	%
Crushing	39	26.20
Pounding	34	22.80
Fumigant(smoke and vapour)	20	13.40
Juice	14	9.40
Chewing	14	9.40
Decoction	5	3.40
Others	23	15.40
Total	149	100

The majority of the preparations are made from mixture of different plant species with water and different additive substances like honey, sugar, butter, and salt and milk. These additive substances have different functions i.e. to reduce poisons, improve flavor and as antidotes during adverse effects such as vomiting and diarrhea. Dawit Abebe (1986) has also identified the additive substances in herbal remedy preparations with their possible benefits. It was also reported that some medicinal plants are mixed with food and drinks in such manner that, they change their flavor and simple to take. For instance, *Hagenia abssinica* is added with a local drink (korffe) to improve its taste

4.7.1. Modes of administration

According to the informants indicated that drinking was the highest with 38 (24.50%) reported case followed by 34 (21.90%) creaming, rubbing and smearing. Others are administered through making the patients inhale the smoke and vapour of the plants in 20 (12.9%) cases and others are as shown in Table 4.

Table 4. Method of administration of medicinal plants

Ways of application	**Total responses**	**% of total**
Drinking	38	24.50
Cream, rub & smearing	34	21.90
Fumigating (smoke & vapour)	20	12.90
Tie	13	8.40
Eating mixing with food	13	8.40
Smelling	10	6.50
Dropping	9	5.80
Chew & swallow the liquid	5	3.20
Soaking	2	1.30
Others	11	7.09
Total	155	100

4.7.2. Modes of application of traditional medicines

The greater proportion of application of medicinal plant preparation is external with 51.60% and internal application was slightly lower with 48.40% (Table 5). There are various routes of administration routes of traditional medicinal plants in the study area by the local community. The major routs of administration by the peoples under study are in the study area oral, dermal, nasal, anal, oracular and local. The most popular rout of administration is oral 56 (36.1%) followed by dermal 34 (21.9%) fumigation 20 (12.9%), nasal 10 (6.5%) and the least is oracular and optical. Mirutse Giday *et al*. (2003) investigated that, most of the remedies in Zay people are taken orally. Debela Hunde *et al*. (2004) showed that, most of the remedies given by orally (52%) and the external application accounting for 35% of the total medicinal preparations.

Table. 5. Mode of application of traditional medicines

Route of application total		Total	Percentage (%)
Internal	Oral	56	36.1
	Nasal	10	6.5
	Local and oracular	9	5.8
External	Dermal	34	21.9
	Fumigant	20	12.9
	Tie on	13	8.4
	Other	13	8.4
Total		155	100

With regard to the measurement of medicinal plants, there is no standardized measure of the dose of herbal remedies in the study area. This indicates that there were variations in the unit of measurement. Amare Getahun (1976) and Dawit Abebe (1986) indicated that lack of precision and standardization as one of the drawbacks for the recognition of traditional health care system. Mirutse Giday *et al*., (2003) also noted that, there is lack of agreement among the informant on doses of certain remedies prescribed.

4.8. Factors Threatening Medicinal Plants

Informants ranked fire wood collection as the most serious threat to the medicinal plants followed by agricultural expansion and drought (Table 6). Being a wildness of the cited medicinal plants expose to various anthropogenic factors. From these factors the main threats to medicinal in the study area, fire wood was ranked first by selected key informants followed by agricultural expansion and drought respectively; the least one is fodder. Similar study by Haile Yinger and Delensaw Yewhalaw (2007) in Sekoru District shows that, there are different threats in medicinal plants in the study area such as deforestation (40%), drought (17.5%), agricultural expansion (12.5%) and fire (12.5%).

Table 6. Ranking of threats to medicinal plants

Threats	R_1	R_2	R_3	R_4	R_5	R_6	R_7	R_8	R_9	R_{10}	Total	Rank
Drought	5	4	7	5	6	5	5	7	4	6	54	3rd
Agricultural expansion	6	7	5	4	5	6	7	5	7	7	59	2nd
Fire wood	7	6	6	6	7	7	6	6	5	5	61	1st
Charcoal	2	2	1	1	3	2	2	2	1	2	18	6th
Construction	3	5	3	3	2	3	3	3	3	4	32	5th
Urbanization	4	3	4	7	4	4	4	4	6	3	43	4th
Fodder	1	1	2	2	1	1	1	1	2	1	13	7th

Key: R= represented respondents

4.9. Threatened Medicinal Plants

The ranking of five medicinal plants based on the degree of threats was conducted using 10 key informants. The results (Table 7) indicated that *Olea europaea* supsp. *cuspidata* is the most threatened followed by *Clerodendrum myricoides* and *Myrica salicifolia* and the least threatened one is *Acokanthera schimperi.*

Table 7. Ranking of threatened plants

Threatened plants	Informants											
	1	2	3	4	5	6	7	8	9	10	Total	Rank
Olea europaea . subsp. Cuspidate	4	5	5	5	4	4	4	3	3	5	42	1st
Myrica salicifolia	5	3	3	4	3	3	3	2	2	2	30	3rd
Clerodendrum myricoides	3	4	4	3	5	5	2	4	5	4	39	2nd
Juniperus procera	1	2	2	1	2	2	5	1	4	2	22	4th
Acokanthera schimperi	2	1	1	2	1	1	1	5	1	1	16	5th

4.10. Ranking of Most Important Medicinal Plants

Preference ranking of five medicinal plants that were reported as effective to threat fibril illness which is the most common disease in the study area, was conducted after selecting 10 key informants. *Cynoglossum lanceolatum* scored 44 ranked first indicating that it is the most effective in treating fibril illness followed by *Zehneria scabra* and the least effective was *Withania somnifera* (Table 8).

Table 8. Preference ranking of medicinal plants used for treating fibril illness

List of medicinal plants	**R_1**	**R_2**	**R_3**	**R_4**	**R_5**	**R_6**	**R_7**	**R_8**	**R_9**	**R_{10}**	**Total**	**Rank**
Zehneria scabra	4	4	5	4	4	3	4	3	5	2	38	2nd
Eucalyptus globules	3	2	3	3	5	5	3	2	4	3	33	3rd
Withania somnifera	1	1	2	1	2	1	2	1	1	2	14	5th
Ocimum lamiifolium	2	3	1	2	1	2	1	2	2	4	20	4th
Cynoglossum lanceolatum	5	5	4	5	3	4	5	5	3	5	44	1st

*__Key:__ Where R represented respondents

4.11. Importance of Medicinal Plants in the Study Area

A paired comparison made to determine the most preferred medicinal plants among the five species that were used to treat abdominal pain in the study area, the responses of ten key informants, showed that *Verbena offinalis* ranked first followed by *Conyza pyrrinopappa* (Table 9). Therefore, this result indicated that *Verbena offinalis* is the most favoured while *Solanum incanum* is the least favoured over the other plant species cited in treating abdominal pain.

Table 9. Paired comparison of five medicinal plant species used to treat abdominal pain

Plant species	**R_1**	**R_2**	**R_3**	**R_4**	**R_5**	**R_6**	**R_7**	**R_8**	**R_9**	**R_{10}**	**TOTAL**	**RANK**
Solanum incanum	2	1	1	1	1	1	1	1	2	2	13	5th
Verbena offinalis	5	4	5	5	4	5	5	5	4	5	47	1st
Conyza pyrrinopappa	4	2	4	4	3	4	4	4	5	4	38	2nd
Rumex nepalesnsis	3	3	2	2	2	2	2	3	3	1	23	4th
Otostegia fruticosa	1	5	3	3	5	3	3	2	1	3	29	3rd

*__Key:__ Where R represented respondents

4.12. Direct Matrix Ranking

Direct matrix ranking was performed to asses the relative importance and to check the major impacts on each of the plant. The result of the direct matrix ranking showed that *Olea europaea* subsp. Cuspidata stood first in being the most multipurpose medicinal plant followed by *Cordia africana* and *Dodonaea angustifolia was* the least (Table 10).

Table 10. Direct matrix ranking for multiple uses of medicinal plants

Use	*Acacia abyssinica*	*Acacia etbaica*	*Cordia africana*	*Dodonaea angustifolia*	*Juniperus procera*	*Carissa spinarum*	*Olea europaea* subsp. cuspidata
Medicinal	4	3	1	6	2	7	5
Charcoal	4	6	2	2	1	1	7
Fire wood	5	6	2	4	3	2	7
Construction	1	1	5	2	7	1	6
Furniture	0	0	7	1	5	0	6
Edible fruit	0	0	6	0	0	7	0
Fence	7	6	1	4	2	5	3
Total	21	22	24	19	20	23	34
Rank	5th	4th	2nd	7th	6th	3rd	1st

4.12.Popular Medicinal Plants Used to Treat Different Ailment

Analysis of informants' consensus was used to investigate the degree of agreement on each medicinal plant reported by informants and the popularity of some medicinal plants to treat different health problems (**Appendix 6**). Accordingly,*Verbena officinalis* is the most popular, cited by 70 informants out of the total 84 informants (83.38%) for its medicinal value to treat fibril illness, tonsillitis and abdominal pain followed by *Zehneria scabra* mentioned by 69 informants (82.14%) to treat fibril illness, *Verbascum sinaiticum* mentioned by 65 informants (77.38%) to treat fire burn, bleeding during delivery, hemorrhoids and evil eye and *Allium sativum* to treat cough, troma, ringworm and fibril illness, *Hagenia abyssinica* mentioned by 57 informantes(67.86%) to treat tapeworm. This shows that the mentioned medicinal plants are well known within the community for their effectiveness regarding specific and different health problems.

Medicinal plants that are considered to be effective in treating a certain disease have higher ICF values. As can be seen from Table 11 some of the categories of ailments that are common in the study area are: evil eye (90.74%), wound (88.89%), tonsillitis (87.88%) and Michi (84. 75%). This may point out high incidence of these types of diseases in the study area, possibly due to the poor socio-economic, sanitary conditions and may be due to the spiritual perception of the people. The type of disease with lower ICF values such as: ***Arthritis*** and ***Abdominal pain***, 74.193% and78.79% are among those occurred rarely.

Table 11. Category of disease for informant consensus factor

Category of diseases	*No of species*	*No. of informants cited*	*ICF*	*%ICF*
Mich	10	60	0.847458	84.74576
Abdominal pain	8	34	0.787879	78.78788
Arthritis	9	32	0.741935	74.19355
Wound	6	46	0.888889	88.88889
Tonsillitis	5	34	0.878788	87.87879
Evil eye	6	55	0.907407	90.74074

4.14. Medicinal Plants Used to treat one Ailment

Of the 113 medicinal plants that were cited by informants, 65(57.53%) were used to treat a specific ailment (Table 12). Accordingly, *Acacia etbaica* was cited by the informants for its medicinal value to treat dislocated bone, *Acokanthera schimperi* was used to treat arthritis/rheumatism, *Argemone mexicana* was used to treat bleeding.

Table12. Number of plant species, number of ailment and total percentage of plant species

Ailment	**Plants**	**%**
One	65	57.53
Two	35	30.97
Three	10	8.85
More than three	3	2.65
Total	113	100

4.15. Marketed medicinal plants

The medicinal plant material found being marketed in the open markets for medicinal purpose was *Hagenia abyssinica.* In addition to this, some medicinal plants are sold in the market for other purposes and most of them are sold as food (Table 13). Medicinal plants in the market are not a common cultural activity in local markets of the study area. But medicinal plant like *Hagenia abyssinica* (dry flower) is sold in the market for its medicinal purpose. Some fresh collection of *Artemisia absinthim* and *Ruta chalepensis* are also marketed in a local community for their aromatic and spice value respectively.

Table 13. Some medicinal plants which are found in market

Medicinal plants	Uses
Allium sativum	Spice
Argemone mexicana	Smoothing (Mitad)
Artemisia absinthim	Aromatic
Capsicum annuum	Food
Catha edulis	Stimulant
Cicer arietinum	Food
Citrus limon	Food
Citrus Medica	Food
Coffea arabica	Stimulant
Cucurbita pepo	Food
Cyperus longus	Aromatic
Hagenia abyssinica	Medicinal
Hordeum vulgare	Food
Lagenaria siceraria	House material
Linum usitatissimum	Food and smoothing
Lycopersicon esculentum	Food
Menthapulegium	Aromatic
Pennisetum thunbergii	House material
Rhamnus prinoides	Beverage
Ricinus communis	Smoothing
Rumex abyssinicus	Beverage
Ruta chalepensis	Spice
Trigonella foenum-graecum	Spice
Vicia faba	Food

4.16. Sources and Transferring of Indigenous knowledge

4.16.1. Ages of Informants

The distribution of informants with respect to age class shows that, the majority of knowledgeable elders are in the age class of 41 to 50 (Table14).

Table 14. Ages of informant in the study area

Informant's age	No. of informants	Percentage (%)
15- 20	3	3.60
21-30	16	19.05
31-40	21	25.00
41-50	23	27.40
51-60	14	16.70
61-70	4	4.80
71-80	2	2.40
81-90	1	1.20
Total	84	100

4.16.2. Educational Status of Informants

According to the data documented from the study area, most of the informants that used medicinal plants as remedies for different health problems. The result shows that 45(53.57%) were illiterate. Therefore, this indicates that modern education limits the acceptance of traditional medicinal plants (Table 15).

Table 15. Educational status of informants

Educational status	Grade	Percent (%)
Illiterate	45	53.57
Writing and reading	17	20.24
8-12	10	11.90
<8	7	8.33
>12	5	5.95
Total	84	100

4.16.3. Sources of traditional knowledge practice

The highest number of traditional medicinal plant knowledge gain from to be 40 (47.66%) father/mother followed by 10 (11.90%) each for wife/husband and the neighborhood (Table 16).

Table 16. Sources of knowledge on the practice of traditional medicine

Source of knowledge for traditional healer	Number	Percent
Father/ Mother	40	47.66
Wife/Husband	10	11.90
Neighborhood	10	11.90
Friends	6	7.14
Sister/Brother	5	5.95
Uncle/Aunt	4	4.75
Other	4	4.75
Total	84	100

4.16.4. Transferring Knowledge of Traditional Medicinal Plants

According to the data from the study area, the highest number for the ways of transferring knowledge on traditional medicinal plants is to eldest son who received 25 (29.6%) votes followed by the all children of the family 20 (23.80%) and 15 (17.86%) for eldest daughter (Table 17).

Table 17. Transferring of knowledge of traditional medicinal plants

To whom transferred	Number	Percent
Eldest son	25	29.76
All children	20	23.80
Eldest daughter	15	17.86
Wife	8	9.52
All members of the family	7	8.33
Husband	4	4.76
Brother/Sister	2	2.38
Not to all	2	2.38
To all freely	1	1.19
Total	84	100

4.16.5. Use of Medicinal Plants Associating with Belief

The indigenous knowledge of people of the study area has shown variation in some aspects to use medicinal plants to treat human and animal heath problems due to the following factors. These are variation on the basis of the geographical location, climatic

conditions, perception to gender difference and, their distance to the nearest town and religious beliefs.

Some members of the local community in using traditional medicinal plants for different remedies are reflected its magical activities rather than reflecting the ethnobotanical knowledge there in. In other members of the local community, utilization and willingness to share ethnobotanical knowledge is affected by the assumption that as if they considered themselves as civilized and rely on modern medicine.

Unlike the other groups of the local people of the community, there is a great involvement of females in using medicinal plants and some for cosmetics purpose, availability of more knowledgeable people and there is also a good relationship between the knowledgeable individuals and other members of the local community. Consequently, a lot of ailments are treated by members of the community using various medicinal plants and spiritual application. For instance, 'shakie or Kalcha' can treat evil eye and evil spirit during "Tufta" ceremony by spiting of *Catha edulis* on the face of victim individual and during this time females contributed a lot to make the treatment more effective by praying and blessing of the victim with speaking out "Erpho mereba - mereba" (which means please our God lissten to us), prior to a treatment given by the 'shakie or Kalcha'. Besides, Local communities under this group use different medicinal plants for one ailment. For example, leech infection is treated with *Capsicum annuum* and *Nicotiana tabacum* differently by the people of the local community in the study area. This is because of *Nicotiana tabacum* is not used by the most Islamic followers due to the presumption of the plant as 'Haram' to mean which is forbidden to use it. Therefore, instead they use *Capsicum annum*.

5. CONCLUSION AND RECOMMENDATIONS

5.1. Conclusion

The study recorded 113 species of medicinal plants of which 82 species (72.5%) were noted to treat human ailments. While, 16 species (14.16%) are used to treat livestock ailments and 15 species (13.27%) are used to treat both livestock and human ailments.

Majority of the reported medicinal plant species were from the wild habitat 65 (57.5%). This shows wild habitats are subjected to the loss of a number of plant species due to different anthropogenic factors such as fire wood, agricultural expansion, drought and others. Most of the knowledge on herbal remedies in this study area concentrated on elders, who were between 41-50 years. This shows that there is a problem in the transfer of knowledge from the elders to the young generation. The problem is may be faced due to the introduction of modern education, religious factors, spiritual and cultural related problems. However, these factors played a significant role in conservation of medicinal plants in the study area. Herbal remedies are prepared as using fresh materials 74 (65.5%) species than dried plant materials 27(23.9%). Therefore, the consequence of this result may expose the area to reduce many plant species. Leaves 45.3% are harvested for medicinal purpose than other plant parts in the study area, which is important to ensure the existence of medicinal plants. Herbs are highly utilized 46% for medicinal purpose than trees and shrubs. This might be help in ensured the survival of trees and shrubs. Most of medicinal plants are administered orally (36.1%). Specially. Drinking takes the largest part (24.5%). With regard to the dosage of traditional medicinal plants, there is no standardized measurement. This will have negative consequence on the health of the society.

5.2. Recommendations

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

- Raising awareness of the local society to protect medicinal plants as well as the indigenous knowledge of the community.
- The local people need to be trained, encouraged and supported on how to conserve and manage the medicinal plant species and whole plant resources found in their area.
- Raising awareness of the 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.
- Attention should be given to standardization of measurement and hygiene of the medicines made from plants by training both the healers and other members of the local community.
- Training must be given to the members of the local community by the Wereda agricultural experts so that they can engage home gardening practices and intensity it.

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7. APPENDECS

Appendix 1. List of Medicinal Plants Identified

No	Scientific name	Family Name	Local Name	Growth form	Collection no.	SOURCE
1.	*Acacia abyssinica* Hochst. ex Benth.	Fabaceae	Chiea	Tree	NAB-29	W &HG
2.	*Acacia etbaica* Schweinf.	Fabaceae	Sraw	Tree	NAB-30	W
3.	*Achyranthes aspera* L.	Amaranthaceae	Mochalo	Herb	NAB-34	W
4.	*Acokanthera schimperi* (A.DC) Schweinf.	Apocynaceae	Morez	Shrub	NAB-54	W
5.	*Agave americana* L.	Agavaceae	Gorengoria	Herb	NAB-66	W& HG
6.	*Allium sativum* L.	Alliaceae	Tsaeda Shingurtie	Herb	NAB-88	HG
7.	***Aloe megalacantha* Baker**	Aloaceae	Ire	Herb	NAB-85	W
8.	*Argemone mexicana* L.	Papaveraceae	Eshok Buru	Herb	NAB-82	W
9.	*Artemisia absinthium* L.	Asteraceae	Atran	Herb	NAB-78	HG
10.	*Artemisia afra* Jacq. ex Wild.	Asteraceae	Chenabaria	Herb	NAB-76	HG
11.	*Asparagus africanus* Lam.	Asparagaceae	Kastaniesto	Herb	NAB-33	W
12.	*Balanites aegyptiaca* (L.) Del.	Balanitaceae	Bedano	Tree	NAB-89	W&HG
13.	***Becium grandiflorum (*Lam.) Pic.Serm**.	Lamiaceae	Tebeb	Shrub	NAB-71	W
14.	*Berberis holstii* Engl.	Berberidaceae	Muchu euf	Herb	NAB-28	W
15.	***Bidens pilosa* L.**	Asteraceae	Tselim chiguaguit	Herb	NAB-57	W

16.	*Calpurnia aurea* (Ait.) Benth.	Fabaceae	Hatsawitse	Tree	NAB-81	W
17.	*Maytenus senegalensis* (Lam.) Exell	Celastraceae	Andel	Shrub	NAB-65	W
18.	*Capsicum annuum* L.	Solanaceae	Karya	Herb	NAB-90	HG
19.	*Carissa spinarum* L.	Apocynaceae	Agam	Shrub	NAB-32	W
20.	*Catha edulis* (Vahl) Forssk. ex Endl.	Celastraceae	Chat	Tree	NAB-91	HG
21.	*Chenopodium murale* L.	Chenopodiaceae	Hamedmado	Herb	NAB-79	W
22.	*Cicer arietinum* L.	Fabaceae	Shimbra	Herb	NAB-92	HG
23.	*Citrus limon* (L.) Burm.f.	Rutaceae	Lemon	Tree	NAB-93	HG
24.	*Citrus medica* L.	Rutaceae	Tringo	Tree	NAB-94	HG
25.	*Clematis simensis* Fresen.	Ranuculaceae	Hazo	Herb	NAB-04	W
26.	*Clerodendrum myricoides* (Hochst.) Vatke	Lamiaceae	Shewha	Shrub	NAB-86	W
27.	*Clutia abyssinica* Jaub. & Spach	Euphorbiaceae	Hirtimtimo	Herb	NAB-75	W
28.	*Coffea arabica* L.	Rubiaceae	Bunna	Tree	NAB-95	HG
29.	*Cordia africana* Lam.	Boraginaceae	Awhie	Tree	NAB-31	HG
30.	*Croton macrostachyus* Del.	Euphorbiaceae	Tembok	Tree	NAB-14	W
31.	*Momordica foetida* Schumach.	Cucurbitaceae	Yamora missa	Herb	NAB-96	W
32.	*Cucumis ficifolius* A. Rich.	Cucurbitaceae	Ramborambo	Herb	NAB-38	W
33.	*Cucurbita pepo* L.	Cucurbitaceae	Duba	Herb	NAB-97	HG
34.	*Cynoglossum lanceolatum* Forssk.	Boraginaceae	Namich	Herb	NAB-50	W & HG
35.	*Cyperus longus* L.	Cyperaceae	Kuni-azebo	Herb	NAB-98	W
36.	*Datura stramonium* L.	Solanaceae	Mestenagir	Herb	NAB-36	W
37.	*Dodonaea angustifolia* L.f.	Sapindaceae	Tahses	Tree	NAB-61	W & HG
38.	*Silybum marianum (*L.) Gaertn	Asteraceae	Dander	Herb	NAB-69	W

39.	*Eucalyptus globulus* Labill	Myrtaceae	Tsaeda-biharzaf	Tree	NAB-08	HG
40.	*Euclea racemosa* Murr.	Ebenaceae	Keileo	Shrub	NAB-03	W
41.	*Euphorbia abyssinica* Gmel	Euphorbiaceae	Kulkuala	Tree	NAB-84	W & HG
42.	*Euphorbia petitiana* A. Rich.	Euphorbiaceae	Tsabadimu	Herb	NAB-41	W
43.	*Euporbia cactus* Boiss.	Euphorbiaceae	Kalkalda	Shrub	NAB-72	W
44.	*Ficus palmata* Forssk.	Moraceae	Beles	Tree	NAB-13	W
45.	*Foeniculum vulgare* Miller	Apiaceae	Ensilal/Arekie	Herb	NAB-46	HG
46.	*Hagenia abyssinica* (Bruce) J.F. Gmel.	Rosaceae	Habie	Tree	NAB-51	W
47.	*Hordeum vulgare* L.	Poaceae	Eklie(Sigem)	Herb	NAB-99	HG
48.	*Hypericum revolutum* Vahl	Hypericaceae	Abedye	Shrub	NAB-47	W
49.	*Juniperus procera* Hochst. ex Endl.	Cupresaceae	Tsihdie-adie	Tree	NAB-87	W & HG
50.	*Justicia schimperiana* (Hochst.ex Nees) T. Anders.	Acanthaceae	Shemieja	Shrub	NAB-24	HG
51.	*Lagenaria siceraria* (Molina) Standl.	Cucurbitaceae	Hamham	Herb	NAB-45	HG
52.	***Laggera tomentosa* (Sch. Bip. ex A. Rich.)**	Asteraceae	Kansokanso	Shrub	NAB-100	W
53.	*Leucas abyssinica* (Benth.) Briq.	Lamiaceae	Chimida	Shrub	NAB-56	W
54.	*Linum usitatissimum* L.	Linaceae	Entatie	Herb	NAB-26	HG
55.	***Lippia adoensis* Hochst. ex Walp.**	Verbenaceae	Kusha	Shrub	NAB-40	W
56.	*Lycopersicon esculentum* Mill.	Solanaceae	Tematiem	Herb	NAB-101	HG
57.	*Maesa lanceolata* Forssk.	Myrsinaceae	Saweria	Tree	NAB-80	W & HG
58.	*Malva verticillata* L.	Malvaceae	Lit	Herb	NAB-59	W
59.	*Maytenus arbutifolia (A.Rich) Wilezek*	Celastraceae	Hatsihats	Shrub	NAB-68	W
60.	*Melia azedarach* L.	Meliaceae	Niem	Tree	NAB-48	HG

61.	*Mentha pulegium* L.	Lamiaceae	Sentie-Semhal	Herb	NAB-37	W & HG
62.	*Meriandra dianthera* (Roth, ex. Roem. & Schult.) Briq.	Lamiaceae	Mesaguh	Shrub	NAB-44	W
63.	*Myrica salicifolia* A. Rich.	Myricaceae	Shehinet	Shrub	NAB-39	W
64.	*Myrsine □uspidat* L.	Myrsinaceae	Kachamo	Shrub	NAB-16	W
65.	*Nicotiana glauca* R.Grah	Solanaceae	Yeareb Kitel	Herb	NAB-49	W
66.	*Nicotiana tabacum* L.	Solanaceae	Timbaho	Herb	NAB-73	W
67.	*Ocimum lamiifolium* Hochst. Ex Benth.	Lamiaceae	Demakasea	Herb	NAB-102	HG
68.	*Olea □uspida* L. subsp. □uspidate	Oleaceae	Awlie	Tree	NAB-103	W & HG
69.	*Opuntia ficus-indica* (L.) Miller	Cactaceae	Kolkuala-Bahirie	Tree	NAB-104	HG
70.	***Sideroxylon oxyacanthum Ball***.	Sapotaceae	Kakiba	Tree	NAB-21	W & HG
71.	*Otostegia fruticosa* (Forssk.) Schweinf. ex Penzig	Lamiaceae	Chamo/Geram tinjut	Shrub	NAB-52	W & HG
72.	*Otostegia integrifolia* Benth.	Lamiaceae	Tsiendog	Shrub	NAB-12	W
73.	*Pennisetum thunbergii* Kunth	Poaceae	Sindedo	Herb	NAB-18	W
74.	*Phytolacca dodecandra* L'Herit.	Phytolacaceae	Shebtie (endod)	Shrub	NAB-77	W & HG
75.	*Plectranthus orantus* Codd	Lamiaceae	Hindifdif	Herb	NAB-62	W
76.	*Plectranthus punctatus* L'Herit	Lamiaceae	Karewo-awalid	Herb	NAB-63	W
77.	*Polygala abyssinica* Fres.	Polygalaceae	Etse-libona	Herb	NAB-20	W
78.	*Pterolobium stellatum* (Forssk.) Brenan	Fabaceae	Kentefitafe	Shrub	NAB-70	W & HG
79.	*Punica granatum* L.	Lythraceae	Roma	Tree	NAB-105	HG

80.	*Ranunculus oligocarpus* Hochst. ex A. Rich.	Ranunculaceae	Kotseli-madokorem	Herb	NAB-58	W
81.	*Rhamnus prinoides* L'Herit	Rhamnaceae	Gesho	Tree	NAB-83	HG
82.	***Rhus glutinosa* A. Rich.**	Anacardiaceae	Tetaelo	Tree	NAB-53	W
83.	*Ricinus communis* L.	Euphorbiaceae	Gulee	Herb	NAB-35	W & HG
84.	*Rosa abyssinica* Lindley	Rosaceae	Kega	Shrub	NAB-74	W
85.	*Rumex abyssinicus* Jacq.	Polygonaceae	Mokmako	Herb	NAB-19	W
86.	*Rumex nepalensis* Spreng.	Polygonaceae	Diglle	Herb	NAB-05	W
87.	*Rumex nervosus* Vahl	Polygonaceae	Hahot	Shrub	NAB-06	W
88.	*Ruta chalepensis* L.	Rutaceae	Chena-adam	Shrub	NAB-106	HG
89.	*Senecio hadiensis* Forssk.	Asteraceae	Sihum-atalie	Herb	NAB-17	W & HG
90.	*Senecio myriocephalus* Sch. Bip.ex A. Rich.	Asteraceae	Tsada Kotsilei	Shrub	NAB-01	W
91.	*Senna baccarinii* (Chiov.) Lock	Fabaceae	Hambohambo	Tree	NAB-64	W
92.	*Sida schimperiana* Hochst. ex A.Rich.	Malvaceae	Chifrig	Shrub	NAB-15	W
93.	*Solanum adoense* Hochst. ex A. Rich.	Solanaceae	Zerich embuay	Shrub	NAB-43	W
94.	*Solanum benderianum* Schimper ex Dammer	Solanaceae	Berbere Sheitan	Tree	NAB-42	HG
95.	*Solanum incanum* L.	Solanaceae	Niesheton-engule	Shrub	NAB-11	W
96.	***Solanum marginatum* L.f**.	Solanaceae	Abiy-engule	Shrub	NAB-07	W
97.	*Solanum americanum* Miller	Solanaceae	Amalo	Herb	NAB-107	W
98.	***Thymus schimperi* Ronniger**	Lamiaceae	Teshene	Herb	NAB-67	W
99.	*Trigonella foenum-graecum* L.	Fabaceae	Abaeke	Herb	NAB-02	HG

100.	*Urtica simensis* steudel	Urticaceae	Amea	Herb	NAB-108	W
101.	*Verbascum sinaiticum* Benth.	Scrophulariaceae	Trinake	Herb	NAB-09	W
102.	*Verbena officinalis* L.	Verbenaceae	Atuch	Herb	NAB-10	W & HG
103.	*Vernonia schimperi* DC.	Asteraceae	Nakurimba	Herb	NAB-109	W
104.	*Conyza pyrrhopappa* Sch. Bip.ex A. Rich	Asteraceae	Selihim	Shrub	NAB-110	W
105.	*Vernonia amygdalina* Del.	Asteraceae	Grawa	Tree	NAB-111	HG
106.	*Vicia faba* L.	Fabaceae	Ater	Herb	NAB-112	HG
107.	*Withania somnifera* (L.) Dunal	Solanaceae	Giezawa/Geineharis	Shrub	NAB-23	HG
108.	*Xanthium spinosum* L.	Asteraceae	Milhas aniestei	Herb	NAB-22	W
109.	*Xanthium strumarium* L.	Asteraceae	Chobba(Chiguaguit)	Herb	NAB-55	W
110.	*Ximenia americana* L.	Olacaceae	Muleo	Shrub	NAB-60	W
111.	*Zehneria scabra* (Linn.f.) Sond	Cucurbitaceae	Haregressa	Herb	NAB-25	W & HG
112.	*Ziziphus spina-christi* (L.)Desf.	Rhamnaceae	Kunkura	Shrub	NAB-27	W & HG
113.	*Nuxia congesta R. Br. ex Fresen*	Loganiaceae	Tekuware	Tree	NAB+	W

Note : Species written as bold are endemic and rare species

Appendix 2.Medicinal plants used to both human ailments and livestock diseases (HB=habit, H=herb, T=tree, Sh=shrub,PUS=partes used,Sb=stem bark,L=leaves, R=root, RB=root bark, CP=condition of preparation, F=fresh, D=dry,F/D=fresh or dried)

Scientific name	Family Name	Local Name	HB	PUS	CP	Application	Method of preparation	Administration Route
Acacia abyssinica	Fabaceae	Chiea	T	S B L	F/D F	Ring worm External wound infection (Livestock)	▪ Placed it on the fire, creamed the infected part by the liquid which is created during burning ▪ Crushed and place on the wound	External External
Acacia etbaica	Fabaceae	Sraw	T	SB	F	Dislocated bone (Livestock)	▪ Tie the dislocated bone by its bark	External
Achyranthes aspera	Amarantha ceae	Mochalo	H	R L L	F F F	▪ Eye infection(livestock) ▪ Tonsillitis ▪ Bleeding during delivery	▪ Chewing and spit the liquid to the infected eye ▪ Crushed and placing on the shaved head of child ▪ Crushed, packed by a piece of cloth and insert to the womb	▪ Local ▪ External ▪ Vaginal
Acokanthera schimperi	Apocynaceae	Morez	Sh	Fruit	D	Arthritis/ rheumatism	Pounded, mix with water and creamed the hands	External
Agave ameri cana	Agavaceae	Gorengoria	H	L	F	Malaria(livestock)	▪ Crushed and add a drop through nose and ear	• Nasal • Oracular
Allium Sativum	Alliaceae	Tsaeda	H	Bulb	F	▪ Cough ▪ Fibril illness	▪ Taking as a food ▪ Mixed with *Ruta*	▪ Oral

		Shingurtie				▪ Troma ▪ Ringworm	*chalapiansi,,*c rashed and cremed the whole body ▪ Crushed and placed on the wound ▪ Splited the bulb in to two and rubbed the infected site	▪ External ▪ External ▪ External
Aloe megalacantha	Aloeaceae	Ire	H	L	F	▪ Scabies(livestock) ▪ Fascioloiasis(livestock) ▪ dislocated bone (livestock)	▪ Crushed, squeezed and creamed the infected skin ▪ Crushed, add 1-liter water and drunk ▪ Tie on the injured part	▪ External ▪ Oral ▪ External
Argemone mexicana	Papaveraceae	Eshok Buru	H	Latex	F	Bleeding	Cutting a leaf and cream the latex to the wound	External
Artemisia absinthim	Asteraceae	Atran	H	Leaf	F	▪ Abdominal pain ▪ Evil eye ▪ Rinder pest	Mixed with *Negelia sativa,* water,boiled and drunk for consgative7-days every morning before meal Showing and sleeping on it	Oral Externald
Artemisia afra	Asteraceae	Chenabaria	H	Leaf	F	▪ Evil eye ▪ Fiberil illness	▪ Mixed with *Ruta chalapiansi* and *Allium sativum, crushed and* sniffed ▪ Mixed with *Ruta chalepiansis*,crushed andcreamed the whole body	▪ Nasal ▪ External
Asparagus africanus	Asparagace	Kastaniesto	H	whole	F/D	▪ Evil eye	▪ Placed the whole plant	▪ External

	ae			pant L R and L	 F F	▪ Troma ▪ Rabbis	beneath the bed ▪ Mixed with *Mentha polegium,* crushe and placed on the wound ▪ crushed, filtering and mix with milk and drunk	▪ External ▪ Oral
Balanites aegyptica	Balanitacea e	Bedano	T	Fruit	F	▪ Amoeba ▪ Abdominal pain	Immersed into water for 1-day and drunk the juice	Oral
Becium grandiflorum	Lamiaceae	Tebeb	Sh	Flower L	F D	▪ Eye infection ▪ Scabies	▪ Rubbed the infected eye by the leaf(livestock) ▪ Squeezed the flower and add drop of it to the infected eye(human) ▪ Mixed with *Dodonea angustifolia* and *Rumex nerevosus*,rosted, pounded and mixed with butter, creamed the infected part	▪ Local ▪ Local ▪ External
Berberis holstii	Berberidace ae	Muchu euf	H	R	F	▪ Inflammation of the eye(livestock) ▪ Arthritis/rheumat ism	▪ Chewing and spit drop of it to the eye ▪ Mixed with *Rumix nurvesus* and fumigating the smoke	▪ Local ▪ External
Bidens pilosa	Asteraceae	Tselim chiguaguit	H	L	F	Wound	Crushed and tie on the wound (the finger)	External
Calpurnia aurea	Fabaceae	Hatsawitse	T	L	F	▪ Scabies	▪ Crushed, homogenized	▪ External

				L fruit	F D	▪ Lice ▪ Insect	in water and washed ▪ Placing on fire and fumigating the smoke	▪ Nasal
Maytenus senegalensis	Celastracea e	Andel	Sh	RB	D	Evil eye (Buda)	▪ Placed on fire and fumigating the smoke ▪ Pounded and take through nasal cavity	▪ External ▪ Nasal
Capsicum annuum	Solanaceae	Karya	H	Fruit	D	Leeches	Pounded, homogenized in water an drunk	Oral
Carissa spinarum	Apocynace ae	Agam	Sh	R RB	D D	▪ 'Ganel' ▪ Evil eye	▪ Placed on fire and fumigating the smoke ▪ Mixed with *Allium sativum*, pounded and take through nose	▪ External ▪ Nasal
Catha edulis	Celastracea e	Chat	T	L	F	▪ Evil eye ▪ 'Ganel'	Chewing and spit on the face and head of patient	External
Chenopodium murale	Chenopodia ceae	Hamedmad o	H	L L L	F F F	▪ Troma ▪ Dandruff ▪ 'Tirff milas'	▪ Crushed and placed on the wound ▪ Crushed and creamed the shaved head ▪ Crushed and mixed with honey, placed on the infected site	▪ External ▪ External ▪ Oral
Cicer arietinum	Fabaceae	Shimbra	H	Seed	D	▪ Malaria ▪ Gastric	▪ Immersed in water, filter after one day, mix with Allium sativum, and take as a meal ▪ Chewing and swallowed it	Oral Oral
Citrus limon	Rutaceae	Lemien	T	Fruit Fruit	F F	▪ Rinder pest ▪ Paralyses	▪ Showing and eating ▪ Squeezed mix with *Calpurina aurea*,	▪ Oral

							Lepidium sativum, *Plumbago zeylarica* then immerse in *Lagenaria siceraria* ,for 7 days then wash early in the morning for 3-7 days by *Rumx nervesus*	▪ External
Citrus medica	Rutaceae	Tringo	T	Fruit	F	▪ Ganel (evil sprit) ▪ Rinder pest	▪ Giving for every body to identify devil and avoid him ▪ Showing and eating	▪ External ▪ Oral
Clematis simensis	Ranuculaceae	Hazo	H	L	F	Cutaneous leshimeniasis	Mixed with *Sida schimpri* , crushed and placed on the infected site	External
Clerodendrum myricoides	Verbenaceae	Shewha	Sh	Fruit	D	▪ Arthritis/ rheumatism ▪ Evil eye	▪ Placed on fire and fumigating the smoke ▪ Pounded and mix with Allium sativum, take through nose	▪ External ▪ Nasal
Clutia abyssinica	Euphorbiaceae	Hirtimtimo	H	Fruit	D	Phobia	Mixed with dry root bark of Withani somnifera ,*Hordeum vulgari,* pounded and mix with " Tela" then drunk	Oral
Coffea arabica	Rubiaceae	Bunna	T	Fruit Fruit	D D	▪ Fire burn ▪ Diarrhea	▪ Roasted, pounded and mix with sugar, placed on the burned part ▪ Roasted, pounded and mix with honey, swallowed	▪ External ▪ Oral
Cordia africana	Boragenaceae	Awhie	T	L	F	▪ Tonsillitis ▪ Tiniascaplis	▪ Crushed, filter and drunk ▪ Crushed the leaf which is infected by fungus	▪ Oral

							then creamed the infected part	▪ External
Croton macrostachyus Del.	Euphorbiaceae	Tembok	T	L	F	Ringworm	Crushed and rubbed the infected part	External
Momordica foetida	Cucurbitaceae	Yamora missa	H	R Fruit	D F	Rectal prolapse	Pounded and mix with " shiro and injera", take it	Oral
Cucumis ficifolius	Cucurbitaceae	Ramboramb o	H	Root Fruit	D F	▪ Rabbis ▪ Hangnil	▪ Pounded,mixed with milk and drunk ▪ Insert the fruit to the finger	Oral External
Cucurbita Pepo	Cucurbitaceae	Duba	H	Seed Fruit	D F	▪ Tape worm ▪ Urine retention	▪ Roasted, chewing and swallowed ▪ Boiled and take it as a food	Oral Oral
Cynoglossum lanceolatum	Boragenaceae	Namich	H	L	F	Febrile illness(Michi)	▪ Squeezed and drunk the juice ▪ Squeezed and add a drop through ear	Oral Oracular
Cyperus longus .	Cyperaceae	Kuni-azebo	H	Bulb	D	Scabies	Roasted ad pounded, mix with butter and creamed the infected part	External
Datura Stramonium	Solanaceae	Mestenagir	H	L	F	▪ Dandruff ▪ Abortion	▪ Crushed and creamed on the shaved head ▪ Crushed, filter it and drunk ½ a cup of tea	▪ External ▪ Oral
Dodonea angustifolia	Sapindaceae	Tahses	T	L L	D D	▪ Scabies ▪ Herpes zoster	Roasted, pounded and mixed with butter,and creamed the infected part	External

Silybum marianum	Asteraceae	Dander	H	R R R R	D D D D	▪ Febrile illness ▪ Evil eye ▪ Epidemic ▪ abdominal pain	▪ Placed on fire and fumigating by its smoke ▪ Placed on fire and fumigated the home ▪ Pounded and mix with coffee and drunk	External External Oral
Eucalyptus globulus	Myrtaceae	Tsaeda-biharzaf	T	L L	F F	▪ Febrile illness ▪ Cough	Boiled with water and fumigated by its vapour	Nasal
Euclea racemosa	Ebenaceae	Keileo	Sh	RB RB L	D D D	▪ Evil eye ▪ Urine retention ▪ Scabies	▪ Mixed with *Carisa spinarum,*pounded and take through nose ▪ Chewing, swallowed the liquid only ▪ Pounded mixed with butter and creamed the infected sight	External Oral External
Euphorbia abyssinica	Euphorbiacea	Kulkuala	T	Latex	F	Swelling(livestock)	Smeared the infected site by the latex	External
Euphorbia petitiana	Eupherbeiaceae	Tsabadimu	H	Latex	F	Ringworm	Smeared the infected part by latex until treated	External
Euporbia cactus	Euphorbiaceae	Kalkalda	Sh	Latex Latex	F D	▪ Swelling(livestock) ▪ Malaria	▪ Smeared the infected site by its milky latex ▪ Dry the milky latex, pounded and mixed with *Eragrostis tef,* bake a bread and take 1/20th of it	▪ External ▪ Oral
Ficus palmata	Moraceae	Beles	T	Latex	F	Hemorrhoids	Smeared the infectehgd site by the milky latex until	External

							treated	
Foeniculum vulgare	Apeaceae	Ensilal/Arekie	H	L Bulb	F F	▪ Asthma ▪ Urine retention	▪ Boiled with water and drunk ▪ Crushed and eat as a food	▪ Oral ▪ Oral
Hagenia abyssinica	Rosaceae	Habie	T	Flower	D	Tape worm	Pounded , mix with "korefe" and drunk	Oral
Hordeum Vulgare	Poaceae	Eklie(Sigem)	H	Seeed	D	Bloat	Pounded the malt of it and dissolved in water and drunk	Oral
Hypericum revolutum	Hypericaceae	Abedye	Sh	L	F	Febrile illness (Michi)	Boiled with water and fumigate by its smoke for 3-consecuative days	External
Juniperus procera	Cuprusaceae	Tsihdie-adie	T	L	F	Abdominal pain	Crushed and mix with water then filter and drunk	Oral
Justicia schimperiana	Acanthaceae	Shemieja	Sh	L	F	Jaundice	Crushed and filter the juice part and drank ¼ of a liter depending on age	Oral
Lagenaria siceraria	Cucurbitaceae	Hamham	H	L	F	Ear problem	Crushed, squeezed and added one drop through ear	Oracular
Laggera tomentosa	Asteraceae	Kansokanso	H	L	F	Febrile illness (Michi)	Boiled with water and fumigate by its smoke	External
Leucas abyssinica	Lamiaceae	Chimida	Sh	L	F	Cough(livestock}	Crushed, mixed with *Allium sativum* , filter and add through nasal cavity	Nasal
Linum usitatissimum	Linaceae	Entatie	H	Seed Seed	D D	▪ Constipation ▪ Difficulty to spoken	Boiled with water and drunk Roasted it over the head of the pationt	Oral External

Lippia adoensis	Verbenaceae	Kusha	H	R	D	Arthritis/rheumatism	Fumigating by its smoke by placing on a fire for 3-days	External
Lycopersicon esculentum	Solanaceae	Tematiem	H	Fruit	F	Fire burn	Rubbing the burned part by its fleshy part	External
Maesa lanceolata	Myrsinaceae	Saweria	T	R Fruit	F D	▪ Arthritis/rheumatism ▪ Tapeworm	▪ Mixed with the root of *Rumex nervesus* and fumigated its smoke by placing on a fire ▪ Pounded, mixed with "korefe" and drunk	External Oralg
Malva verticillata	Malvaceae	Lit	H	R	F	Swelling	Crushed and placed on the infected site	External
Maytenus arbutifolia	Celastraceae	Hatsihats	Sh	L	F	Wound	Crushed and placed on the wound for 7-consecuative days	External
Melia azedarach	Meliaceae	Niem	T	L	F	Tonsillitis	Crushed, Filter and drunk	Oral
Mentha polegium	Lamiaceae	Sentie-Semhal	H	R	F	Tooth ache	Chew and swallowed the fluid	Oral
Meriandra dianthera	Lamiaceae	Mesaguh	H	L	D	Diarrhea	Pounded, mixed with water and salt then drunk	Oral
Myrica salicifolia	Myricaexae	Shehinet	Sh	R	F	Arthritis/rheumatism	Placed on fire and fumigated by its smoke	External
Myrsine africana	Myrsinaceae	Kachamo	Sh	Fruit	D	Tapeworm	Pounded, mixed with water and take with porege	Oral
Nicotiana glauca	Solanaceae	Yeareb Kitel	H	L	F	Impotence	Chewing a very small pieces of leaf and swallewed	Oral
Nicotiana tabacum	Solanaceae	Timbaho	H	L	F	Leech (Livestock)	Crushed and add through	Nasal

							nasal cavity	
Nuxia congesta	Loganiaceae	Tekuare	T	R	F	▪ Acne ▪ Fat accumulatión	Placed on fire and fumigated by its smoke, creamed the head by better is mandatory	External
Ocimum lamiifolium	Lemiaceae	Demakasea	H	L L	F	▪ Headache ▪ Febrile illness	Crushed, squeezed, add to coffee and drunk	Oral
Olea europaea	Oleaceae	Awlie	T	S L L	D D D	▪ Arthritis/rheumatism ▪ Womb infection ▪ Lazyness	▪ Mixed with *Rumex nervosus, Myrica salicifolia* and *Clerodendrum myricoides,* placed on fire and fumigated by its smoke. At this time placing butter on a head is mandatory and it is only for femeal. ▪ Mixed with *Allium sativum* and honey, eat 3-tea spoon for 7/21 days.	▪ External ▪ Oral
Opuntia ficus-indica	Cactaceae	Kolkuala-Bahirie	T	Fleshy part	F	Dandruff	Crushed, mixed with egg and creamed the head	External
Sideroxylon oxyacanthum	Sapotaceae	Kakiba	Sh	L L	F F	▪ Eye infection ▪ Diarrhea (livestock)	▪ Chewing and spit a drop of it on the infected eye ▪ Crushed, mix with water and drunk	▪ Local ▪ Oral
Otostegia fruticosa	Lamiaceae	Chamo/Geramtinjut	Sh	L	F	Abdominal pain	Crushed, squeezed and drunk	Oral
Otostegia integrifolia	Lamiaceae	Tsiendog	Sh	Whole part	D	▪ Fleas ▪ Abdominal pain	▪ Placing on fire and fumigated the smoke in	▪ External

				L	F		the house ▪ Making a plant as component of local alcohol when distilling it, then dunk.	▪ Oral
Pennisetum thunbergii	Poaceae	Sindedo	H	Flower	D	Herpes zoster	Roasted, pounded, mixed with butter and creamed the infected site	External
Phytolacca dodecandra	Phytolacaceae	Shebtie (endod)	Sh	L/Fruit R	F D	▪ Bloat ▪ Rabbis	▪ Crushed, squeezed mixed wit water and drunk ▪ Pounded, mix with milk and drunk	Oral Oral
Plectranthus Orantus	Lamiaceae	Hindifdif	H	Whole part	F	Paralysis	Pounded and rubbed below abdominal part and exposing to sun	External
Plectranthus Punctatus	Lamiaceae	Karewo-awalid	H	Whole part	F	Arthritis/rheumatism	Crushed and rubbed below the abdominal part	External
Polygala abyssinica	Polygalacea e	Etse-libona	H	Whole part Whole part	F F	▪ Snake poison ▪ Snake prevention	Chewing and swallowed	Oral
Pterolobium Stellatum	Fabaceae	Kentefitafe	Sh	L	F	Swelling	Crushed and placed on the infected site	External
Punica granatum	Lythraceae	Roma	T	Seed	D	Not being just active	Pounded and mix with pounded leaf of *Olea europa* and mix with honey, eat for 7-days a bout 3-tea spoon early in the morning	Oral
Ranunculus Oligocarpus	Ranuculace	Kotseli-madokorem	H	L	F	Swelling	Crushed and buried in the infected site	External

	ae							
Rhamnus prinoides	Rhamnacea e	Gesho	T	L	F	Tonsilet	Chewing and spit to the mouse of a chilled	Oral
Rhus glutinosa	Anacardiac eae	Tetaelo	T	L	F	Depression	Crushed with *Justica shimperi* and mixed with honey and eat 3-tea spoon early in the morning for 7-cosecuative days	Oral
Ricinus communis	Euphorbiac ea	Gulee	H	L	F	Horn worm	Crushed squeezed and placed on the broken horn	External
Rosa abyssinica	Rosaceae	Kega	Sh	F	Dr	Tapeworm	Pounded, mixed with "correfe" drunk(local alcoholic drink)	Oral
Rumex abyssinicus	Polygonace ae	Mokmako	H	R	Dr	Abdominal problem	▪ pounded, boil with water and sugar and drunk	Oral
Rumex nepalensis	Polygonace ae	Diglle	H	R	F	Abdominal pain, Tonsilate, Abortion, to facilitate delivery	▪ Crushed, filter and drunk ▪ insert the root in to the womb which is already suitable to insert it	▪ Oral ▪ Internally
Rumex nervosus	Polygonace ae	Hahot	Sh	F	Dr	Vomiting Arthritis/rheumatism	▪ pounded, mix with honey and eat before food ▪ placed on fire and fumigating the smoke	▪ Oral ▪ External
Ruta Chalepensis .	Rutaceae	Chena-adam	Sh	L&Fruit L	F	Abdominal pain cough	▪ Crushed and filter ,add with coffee and drunk ▪ Crushed and mix with *Allum sativum*, paced with piece of cloth and taken via nasal cavity	▪ Oral ▪ Nasal

Senecio myriocephalus	Asteraceae	Tsada Kotsilei	Sh	L	F	Dislocated bone(livestock)	Tie the dislocated bone by its fresh leaf	External
Senecio hadiensis	Asteraceae	Sihum-atalie	H	R	F	Eye infection (livestock)	▪ Chewing the root and spit in to eye	Local
Senna baccarinii	Fabaceae	Hamboham bo	T	L	F	Snake bite	▪ Crushed, rubbing the bitted part	External
Sida schimperiana	Malvaceae	Chifrig	Sh	L	F	Wound	▪ Crus,hed and placed it on the wound	External
Solanum adoense	Solanaceae	Zerich embuay	Sh	R Fruit	Dr	syphilis rabies	▪ Mixed with *Sida schimperiana,* pounded, mix with honey and eat for seven days before food ▪ Pounded mix with milk and drunk	Oral Oral
Solanum benderianum	Solanaceae	Berbere Sheitan	T	L	F	Hypertension	▪ Boiled with water and drunk	Oral
Solanum incanum	Solanaceae	Niesheton-engule	Sh	R R	F Dr	Abdominal pain Rabies	▪ Chewing and swallowed the liquid ▪ Pounded and mix with milk, then drunk	Oral
Solanum marginatum	Solanaceae	Abiy-engule	Sh	Fruit	F	cough (livestock)	▪ Avoiding the seed from the fruit, add the milk on it and give through nasal cavity	Nasal

.	Solanaceae	Amalo	H	L	F	Wound	▪ Crushed and tie on the finger	External
Thymus schimperi	Lamiaceae	Teshene	H	L	Dr/F	Hypertension	▪ Boiled with water and sugar, drunk	Oral
Trigonella foenum-graecum	Fabaceae	Abaeke	H	Seed	Dr	Abdominal pain Dislocated bone	▪ Pounded, mix with water, filter the watery part after one day, mixed the precipitate with juice of citres lemon and drunk ▪ Pounded, immersed in water and tie on the injured part to soften the skin	▪ Oral ▪ External
Urtica simensis	Urticaceae	Amea	H	R	F	Bleeding	▪ Crushed, packed with a piece of cloth and filter though nasal cavity	Nasal
Verbascum sinaiticum	Scrophulariaceae	Trinake	H	Root Root Root bark Leaf	D F F D	Bleeding evil eye Hemorrhoids fire burn	▪ Take a piece of root from seven place and divided them in to a small pieces, insert it on----and tie on their hip like a belt ▪ Mixed with root of *Carisa spinirurum*, *Claro dendrum miercoides,* pounded and take through nasal cavity ▪ Crushed, packed in a piece of cloth and insert through rectum ▪ Roasted, pounded and	External Nasal Anal

							placed on the wound	External
Verbena officinali	Verben aceae	Atuch	H	R R R	F F F	Tonsilate abdominal pain fever illness	▪ Chewing and swallowed the liquid ▪ Crushed, filter add a drop though ear and add in coffee and drunk	Oral
Vernonia schimperi	Astera ceae	Nakurimba	H	L	F	"Kurimba"	▪ Crushed, mix with honey and swallowed	Oral
Conyza pyrrhopappa	Asteraceae	Selihim	Sh	L	F	Abdominal pain	▪ Crushed , squeezed and drunk	Oral
Vernonia amygdalina	Asteraceae	Grawa	T	L	F	Tonsilate	▪ Crushed squeezed and dunk	Oral
Vicia faba	Fabaceae	Ater	H	Seed Seed	Dr	Buginge mumps	▪ Chewing seven or three seeds of it and placed on the wound ▪ Immersed in water for one day, filter and inserted it in fine tendril then wear as necklace	External
Withania somnifera	Solanaceae	Giezawa/Ge ine haris	Sh	L	F	Fibril illness	▪ Crushed, mix with *Allium sativium* and rubbed the whole body ▪ Boil with water, *Jesticia shmprie* and fumigating by its vapor	External
Xanthium Spinosum	Asteraceae	Milhas	H	L	F	Wound (livestock)	▪ Crushed with *Vernonia*	External

		aniestei					*amygdalina* and placed on the infected side	
Xanthium Strumarium	Asteraceae	Chobba(Chiguaguit)	H	L	F	Tinia scapilies	▪ Rubbed the infected site for 3/7 consecutive days	External
Ximenia americana	Olacaceae	Muleo	Sh	R	D	Evil eye	Placed on fire and fumigated bye its smoke	External
Zehneria scabra	Cucurbitaceae	Haregressa	H	L	F	Fiberil illness	Boiled with *Eucalyptus globules*, *Justicia schimperina* and water and fumigated by its smoke	External
Ziziphus spina-christi	Rhaminaceae	Kunkura	Sh	L	D	Acne	Pounded, mix with honey/butter and creamed the face	External

Appendix 3. Medicinal plants used to treat human ailments

Scientific name	Family Name	Local Name	HB	PUS	CP	Application	Method of preparation	Administration Route
Acokanthera schimperi	Apocynaceae	Morez	Sh	Fruit	D	Arthritis/ rheumatism	Pounded, mix with water and creamed the hands	External
Argemone Mexicana	Papaveraceae	Eshok Buru	H	Latex	F	Bleeding	Cutting a leaf and cream the latex to the wound	External
Artemisia absinthim	Asteraceae	Atran	H	Leaf	F	▪ Abdominal pain ▪ Evil eye ▪ Rinder pest	Mixed with *Negelia sativa,* water,boiled and drunk for consgative7-days every morning before meal Showing and sleeping on it	Oral Externald
Artemisia afra	Asteraceae	Chenabaria	H	Leaf	F	▪ Evil eye ▪ Fiberil illness	▪ Mixed with *Ruta chalapiansi* and *Allium sativum, crushed and* sniffed ▪ Mixed with Ruta chalepiansis,crushed andcreamed the whole body	▪ Nasal ▪ External
Balanites aegyptica	Balanitaceae	Bedano	T	Fruit	F	▪ Amoeba ▪ Abdominal pain	Immersed into water for 1-day and drunk the juice	Oral
Bidens pilosa	Asterace	Tselim	H	L	F	Wound	Crushed and tie on the wound (the finger)	External

	ae	chiguagui t						
Maytenus senegalensis	Celastrac eae	Andel	Sh	RB	D	Evil eye (Buda)	▪ Placed on fire and fumigating the smoke ▪ Pounded and take through nasal cavity	▪ External ▪ Nasal
Carissa spinarum	Apocyna ceae	Agam	Sh	R RB	D D	▪ 'Ganel' ▪ Evil eye	▪ Placed on fire and fumigating the smoke ▪ Mixed with *Allium sativum*, pounded and take through nose	▪ Eternal ▪ Nasal
Catha edulis	Celastrac eae	Chat	T	L	F	▪ Evil eye ▪ 'Ganel'	Chewing and spit on the face and head of patient	External
Chenopodium murale	Chenopo diaceae	Hamedm ado	H	L L L	F F F	▪ Troma ▪ Dandruff ▪ 'Tirff milas'	▪ Crushed and placed on the wound ▪ Crushed and creamed the shaved head ▪ Crushed and mixed with honey, placed on the infected site	▪ External ▪ External ▪ Oral
Cicer arietinum	Fabaceae	Shimbra	H	Fruit/s eed	D	▪ Malaria ▪ Gastric	▪ Immersed in water, filter after one day, mix with Allium sativum, and take as a meal ▪ Chewing and swallowed it	Oral Oral

Citrus limon	Rutaceae	Lemien	T	Fruit Fruit	F F	▪ Rinder pest (Enewushen) ▪ Paralyses	▪ Showing and eating ▪ Squeezed mix with *Calpurina aurea*, *Lepidium sativum*, *Plumbago zeylarica* then immerse in *Lagenaria siceraria* ,for 7 days then wash early in the morning for 3-7 days by *Rumx nervesus*	▪ Oral ▪ External
Citrus medica	Rutaceae	Tringo	T	Fruit	F	▪ Ganel (evil sprit) ▪ Rinder pest	▪ Giving for every body to identify devil and avoid him ▪ Showing and eating	▪ External ▪ Oral
Clematis simensis	Ranuculaceae	Hazo	H	L	F	Cutaneous leshimeniasis	Mixed with *Sida schimpri* , crushed and placed on the infected site	External
Clerodendrum myricoides	Verbenaceae	Shewha	Sh	Fruit	D	▪ Arthritis/ rheumatism ▪ Evil eye	▪ Placed on fire and fumigating the smoke ▪ Pounded and mix with Allium sativum, take through nose	▪ External ▪ Nasal
Clutia abyssinica	Euphorbiaceae	Hirtimtimo	H	Fruit	D	Phobia	Mixed with dry root bark of Witinia, *Hordeum vulgari,* pounded and mix with " Tela" then drunk	Oral
Coffea arabica	Rubiacea	Bunna	T	Fruit	D	▪ Fire burn	▪ Roasted, pounded	▪ External

	e			Fruit	D	▪ Diarrhea	and mix with sugar, placed on the burned part ▪ Roasted, pounded and mix with honey, swallowed	▪ Oral
Cordia africana	Boragenaceae	Awhie	T	L	F	▪ Tonsillitis ▪ Tiniascaplis	▪ Crushed, filter and drunk ▪ Crushed the leaf which is infected by fungus then creamed the infected part	▪ Oral ▪ External
Croton macrostachyus	Euphorbiaceae	Tembok	T	L	F	Ringworm	Crushed and rubbed the infected part	External
Momordica foetida	Cucurbitaceae	Yamora missa	H	R Fruit	D F	Rectal prolapse	Pounded and mix with " shiro and injera", take it	Oral
Cucurbita Pepo	Cucurbitaceae	Duba	H	Seed Fruit	D F	▪ Tape worm ▪ Urine retention	▪ Roasted, chewing and swallowed ▪ Boiled and take it as a food	Oral Oral
Cynoglossum lanceolatum	Boragenaceae	Namich	H	L	F	Febrile illness(Michi)	▪ Squeezed and drunk the juice ▪ Squeezed and add a drop through ear	Oral Oracular
Cyperus longus	Cyperaceae	Kuni-azebo	H	Bulb	D	Scabies	Roasted ad pounded, mix with butter and creamed the infected part	External
Datura	Solanace	Mestenag	H	L	F	▪ Dandruff	▪ Crushed and	▪ External

Stramonium	ae	ir				▪ Abortion	creamed on the shaved head ▪ Crushed, filter it and drunk ½ a cup of tea	▪ Oral
Dodonea angustifolia	Sapindaceae	Tahses	T	L L	D D	▪ Scabies ▪ Herpes zoster	Roasted, pounded and mixed with butter,and creamed the infected part	External
Eucalyptus globulus	Myrtacea e	Tsaeda-biharzaf	T	L L	F F	▪ Febrile illness ▪ Cough	Boiled with water and fumigated by its vapour	Nasal
Euclea racemosa	Ebenacea e	Keileo	Sh	RB RB L	D D D	▪ Evil eye ▪ Urine retention ▪ Scabies	▪ Mixed with *Carisa spinarum,*pounded and take through nose ▪ Chewing, swallowed the liquid only ▪ Pounded mixed with butter and creamed the infected sight	External Oral External
Euphorbia petitiana	Eupherbeiaceae	Tsabadimu	H	Latex	F	Ringworm	Smeared the infected part by latex until treated	External
Euporbia cactus	Euphorbiaceae	Kalkalda	Sh	Latex Latex	F D	▪ Swelling(live stock) ▪ Malaria	▪ Smeared the infected site by its milky latex ▪ Dry the milky latex, pounded and mixed	▪ External ▪ Oral

							with *Eragrostis tef,* bake a bread and take 1/20th of it	
Ficus palmata	Moraceae	Beles	T	Latex	F	Hemorrhoids	Smeared the infectehgd site by the milky latex until treated	External
Foeniculum vulgare	Apeaceae	Ensilal/Arekie	H	L Bulb	F F	▪ Asthma ▪ Urine retention	▪ Boiled with water and drunk ▪ Crushed and eat as a food	▪ Oral ▪ Oral
Hagenia abyssinica	Rosaceae	Habie	T	Flower	D	Tape worm	Pounded , mix with "korefe" and drunk	Oral
Hypericum revolutum	Hypericaceae	Abedye	Sh	L	F	Febrile illness (Michi)	Boiled with water and fumigate by its smoke for 3-consecuative days	External
Juniperus Procera Hochst	Cuprusaceae	Tsihdie-adie	T	L	F	Abdominal pain	Crushed and mix with water then filter and drunk	External
Justicia schimperiana	Acanthaceae	Shemieja	Sh	L	F	Jaundice	Crushed and filter the juice part and drank ¼ of a liter depending on age	Oral
Lagenaria siceraria	Cucurbitaceae	Hamham	H	L	F	Ear problem	Crushed, squeezed and added one drop through ear	Oracular
Laggera tomentosa	Asteraceae	Kansokanso	H	L	F	Febrile illness (Michi)	Boiled with water and fumigate by its smoke	External
Lippia adoensis	Verbenac	Kusha	H	R	D	Arthritis/rheumatism	Fumigating by its smoke by placing on a	External

	eae						fire for 3-days	
Lycopersicon esculentum	Solanaceae	Tematiem	H	Fruit	F	Fire burn	Rubbing the burned part by its fleshy part	External
Maesa lanceolata	Myrsinaceae	Saweria	T	R Fruit	F D	▪ Arthritis/rheumatism ▪ Tapeworm	▪ Mixed with the root of *Rumex nervesus* and fumigated its smoke by placing on a fire ▪ Pounded, mixed with "korefe" and drunk	External Oral
Malva verticillata	Malvaceae	Lit	H	R	F	Swelling	Crushed and placed on the infected site	External
Maytenus senegalensis	Celastraceae	Hatsihats	Sh	L	F	Wound	Crushed and placed on the wound for 7-consecuative days	External
Melia azedarach	Meliaceae	Niem	T	L	F	Tonsillitis	Crushed, Filter and drunk	Oral
Mentha polegium	Lamiaceae	Sentie-Semhal	H	R	F	Tooth ache	Chew and swallowed the fluid	Oral
Myrica salicifolia	Myricaeae	Shehinet	Sh	R	F	Arthritis/rheumatism	Placed on fire and fumigated by its smoke	External
Myrsine africana	Myrsinaceae	Kachamo	Sh	Fruit	D	Tapeworm	Pounded, mixed with water and take with porege	Oral
Nicotiana glauca	Solanace	Yeareb	H	L	F	Impotence	Chewing a very small	Oral

	ae	Kitel					pieces of leaf and swallewed	
Nuxia congesta	Loganiaceae	Tekuare	T	R	F	▪ Acne ▪ Fat accumulatión	Placed on fire and fumigated by its smoke	External
Ocimum lamiifolium	Lemiaceae	Demakasea	H	L L	F	▪ Headache ▪ Febrile illness	Crushed, squeezed, add to coffee and drunk	Oral
Olea europaea Sub sp cuspidata	Oleaceae	Awlie	T	L L L	D D D	▪ Arthritis/rheumatism ▪ Womb infection ▪ Lazyness	▪ Mixed with *Rumex nervosus, Myrica salicifolia* and *Clerodendrum myricoides,* placed on fire and fumigated by its smoke. At this time placing butter on a head is mandatory and it is only for femeal. ▪ Mixed with *Allium sativum* and honey, eat 3-tea spoon for 7/21 days.	▪ External ▪ Oral
Opuntia ficus-indica	Cactaceae	Kolkuala-Bahirie	T	Fleshy part	F	Dandruff	Crushed, mixed with egg and creamed the head	External
Otostegia fruticosa	Lamiaceae	Chamo/Geramtinjut	Sh	L	F	Abdominal pain	Crushed, squeezed and drunk	Oral
Pennisetum	Poaceae	Sindedo	H	Flower	D	Herpes zoster	Roasted, pounded, mixed with butter and	External

thunbergii							creamed the infected site	
Plectranthus Orantus	Lamiaceae	Hindifdif	H	Whole part	F	Paralysis	Pounded and rubbed below abdominal part and exposing to sun	External
Plectranthus Punctatus	Lamiaceae	Karewo-awalid	H	Whole part	F	Arthritis/rheumatism	Crushed and rubbed below the abdominal part	External
Polygala abyssinica	Polygalaceae	Etse-libona	H	Whole part Whole part	F F	▪ Snake poison ▪ Snake prevention	Chewing and swallowed	Oral
Punica granatum	Lythraceae	Roma	T	Seed	D	Not being just active	Pounded and mix with pounded leaf of *Olea europa* and mix with honey, eat for 7-days a bout 3-tea spoon early in the morning	Oral
Ranunculus Oligocarpus	Ranuculaceae	Kotseli-madokorem	H	L	F	Swelling	Crushed and buried in the infected site	External
Rhamnus prinoides	Rhamnaceae	Gesho	T	L	F	Tonsilet	Chewing and spit to the mouse a chilled	Oral
Rhus glutinosa	Anacardiaceae	Tetaelo	T	L	F	Depression	Crushed with Justica shimperi and mixed with honey and eat 3-tea spoon early in the morning for 7-cosecuative days	Oral
Rosa abyssinica	Rosaceae	Kega	Sh	F	Dr	Tapeworm	Pounded, mixed with "correfie" drunk	Oral

Rumex abyssinicus	Polygonaceae	Mokmako	H	R	Dr	Abdominal problem	▪ pounded, boil with water and sugar and drunk	Oral
Rumex nervosus	Polygonaceae	Hahot	Sh	F	Dr	Vomiting Arthritis/rheumatism	▪ pounded, mix with honey and eat before food ▪ placed on fire and fumigating the smoke	▪ Oral ▪ External
Ruta Chalepensis	Rutaceae	Chena-adam	Sh	L&Fruit L	F	Abdominal pain cough	▪ Crushed and filter ,add with coffee and drunk ▪ Crushed and mix with *Allum sativum*, paced with piece of cloth and taken via nasal cavity	▪ Oral ▪ Nasal
Senna baccarinii	Fabaceae	Hambohambo	T	L	F	Snake bite	▪ Crushed, rubbing the bitted part	External
Sida schimperiana	Malvaceae	Chifrig	Sh	L	F	Wound	▪ Crus,hed and placed it on the wound	External
Solanum benderianum	Solanaceae	Berbere Sheitan	T	L	F	Hypertension	▪ Boiled with water and drunk	Oral
Solanum americanum	Solanaceae	Amalo	H	L	F	Wound	▪ Crushed and tie on the finger	External
Thymus schimperi	Lamiacea	Teshene	H	L	Dr/	Hypertension	▪ Boiled with water	Oral

	e				F		and sugar, drunk	
Trigonella foenum-graecum	Fabaceae	Abaeke	H	Seed	Dr	Abdominal pain Dislocated bone	▪ Pounded, mix with water, filter the watery part after one day, mixed the precipitate with juice of citres lemon and drunk ▪ Pounded, immersed in water and tie on the injured part to soften the skin	▪ Oral ▪ External
Urtica simensis	Urticacea e	Amea	H	R	F	Bleeding	▪ Crushed, packed with a piece of cloth and filter though nasal cavity	Nasal
Verbascum sinaiticum	Scrophul ariaceae	Trinake	H	Root Root Root bark Leaf	D F F D	Bleeding evil eye Hemorrhoids fire burn	▪ Take a piece of root from seven place and divided them in to a small pieces, insert it on----and tie on their hip like a belt ▪ Mixed with root of *Carisa spinirurum*, *Claro dendrum miercoides,*pounded and take through nasal cavity ▪ Crushed, packed in a piece of cloth	External Nasal Anal

							and insert through rectum ▪ Roasted, pounded and placed on the wound	External
Verbena officinalis	Verbenaceae	Atuch	H	R R R	F F F	Tonsilate abdominal pain fever illness	▪ Chewing and swallowed the liquid ▪ Crushed, filter add a drop though ear and add in coffee and drunk	Oral
Vernoni schimpri	Asteraceae	Nakurimba	H	L	F	"Kurimba"	▪ Crushed, mix with honey and swallowed	Oral
Conyza pyrrhopapa	Asteraceae	Selihim	Sh	L	F	Abdominal pain	▪ Crushed , squeezed and drunk	Oral
Vernonia amygdalina	Asteraceae	Grawa	T	L	F	Tonsilate	▪ Crushed squeezed and dunk	Oral
Vicia faba.	Fabaceae	Ater	H	Seed Seed	Dr	Buginge mumps	▪ Chewing seven or three seeds of it and placed on the wound ▪ Immersed in water for one day, filter and inserted it in fine tendril then wear as necklace	External
Withania somnifera	Solanaceae	Giezawa/ Geine	Sh	L	F	Fibril illness	▪ Crushed, mix with *Allium sativium* and rubbed the whole	External

		haris					body ▪ Boil with water, *Jesticia shmprie* and fumigating by its vapor	
Xanthium Strumarium	Asteraceae	Chobba(Chiguagu it)	H	L	F	Tinia scapilies	▪ Rubbed the infected site for 3/7 consecutive days	External
Ximenia americana	Olacaceae	Muleo	Sh	R	D	Evil eye	Placed on fire and fumigated bye its smoke	External
Zehneria scabra	Cucurbitaceae	Haregressa	H	L	F	Fiberil illness	Boiled with *Eucalyptus globules*, *Justicia schimperina* and water and fumigated by its smoke	External
Ziziphus spina-christi	Rhaminaceae	Kunkura	Sh	L	D	Acne	Pounded, mix with honey/butter and creamed the face	External

Appendix 4. Medicinal plants used to treat livestock diseases

Scientific name	Family Name	Local Name	HB	PUS	CP	Application	Method of preparation	Administration Route
Acacia etbaica	Fabaceae	Sraw	T	SB	F	Dislocated bone (Livestock)	▪ Tie the dislocated bone by its bark	External
Agave americana	Agavaceae	Gorengoria	H	L	F	Malaria(livestock)	▪ Crushed and add a drop through nose and ear	• Nasal • Oracular
Aloe megalacantha	Aloeaceae	Ire	H	L	F	▪ Scabies(livestock) ▪ Fascioloiasis(livestock) ▪ dislocated bone (livestock)	▪ Crushed, squeezed and creamed the infected skin ▪ Crushed, add 1-liter water and drunk ▪ Tie on the injured part	▪ External ▪ Oral ▪ External
Capsicum annuum	Solanaceae	Karya	H	Fruit	D	Leeches	Pounded, homogenized in water an drunk	Oral
Euphorbia ampliphylla	Euphorbiacea	Kulkuala	T	Latex	F	Swelling(livestock)	Smeared the infected site by the latex	External
Leucas abyssinica	Lamiaceae	Chimida	Sh	L	F	Cough	Crushed, mixed with *Allium sativum* , filter and add through nasal cavity	Nasal
Meriandra dianthera	Lamiaceae	Mesaguh	H	L	D	Diarrhea	Pounded, mixed with water and salt then drunk	Oral
Nicotiana	Solanaceae	Timbaho	H	L	F	Leech (Livestock)	Crushed and add through nasal cavity	Nasal

tabacum								
Sidroxylon oxyacanthum	Sapotaceae	Kakiba	Sh	L L	F F	▪ Eye infection ▪ Diarrhea (livestock)	▪ Chewing and spit a drop of it on the infected eye ▪ Crushed, mix with water and drunk	▪ Local ▪ Oral
Phytolacca dodecandra	Phytolacaceae	Shebtie (endod)	Sh	L/Fruit R	F D	▪ Bloat ▪ Rabbis	▪ Crushed, squeezed mixed wit water and drunk ▪ Pounded, mix with milk and drunk	Oral Oral
Pterolobium Stellatum	Fabaceae	Kentefitafe	Sh	L	F	Swelling	Crushed and placed on the infected site	External
Ricinus communis	Euphorbiacea	Gulee	H	L	F	Horn worm	Crushed squeezed and placed on the broken horn	External
Senecio myriocephalus	Asteraceae	Tsada Kotsilei	Sh	L	F	Dislocated bone(livestock)	Tie the dislocated bone by its fresh leaf	External
Senecio hadiensis	Asteraceae	Sihum-atalie	H	R	F	Eye infection (livestock)	▪ Chewing the root and spit in to eye	Local
Solanum marginatum	Solanaceae	Abiy-engule	Sh	Fruit	F	cough (livestock)	▪ Avoiding the seed from the fruit, add the milk on it and give through nasal cavity	Nasal
Xanthium Spinosum	Asteraceae	Milhas aniestei	H	L	F	Wound (livestock)	▪ Crushed with *Vernonia amygdalina* and placed on the infected side	External

Appendix 5. List of Medicinal Plants, where they are found and their status

No	Scientific name	Family Name	Local Name	Growth form	Habitat	Status
1	*Acacia abyssinica*	Fabaceae	Chiea	Tree	Home garden	Common
2	*Acacia etbaica*	Fabaceae	Sraw	Tree	Around home	Common
3	*Achyranthes aspera*	Amaranthaceae	Mochalo	Herb	Around home	Common
4	*Acokanthera schimperi*	Apocynaceae	Morez	Shrub	Forest	Rare
5	*Agave americana*	Agavaceae	Gorengoria	Herb	Near farm land	Common
6	*Allium sativum*	Alliaceae	Tsaeda Shingurtie	Herb	Home garden	Common
7	*Aloe megalacantha*	Aloaceae	Ire	Herb	Near farm land	Common
8	*Argemone Mexicana*	Papaveraceae	Eshok Buru	Herb	Fallow land	Common
9	*Artemisia absinthim*	Asteraceae	Atran	Herb	Home garden	Rare
10	*Artemisia afra*	Asteraceae	Chenabaria	Herb	Home garden	Common
11	*Asparagus africanus*	Asparagaceae	Kastaniesto	Herb	Forest	Moderate
12	*Balanites aegyptiaca*	Balanitaceae	Bedano	Tree	Road side	Rare
13	*Becium grandiflorum*	Lamiaceae	Tebeb	Shrub	Near farm land	Common
14	*Berberis holstii*	Berberidaceae	Muchu euf	Herb	Around home	Rare
15	*Bidens pilosa*	Asteraceae	Tselim chiguaguit	Herb	Near farmland	Common
16	*Calpurnia aurea*	Fabaceae	Hatsawitse	Tree	Forest	Rare

17	*Maytenus senegalensis*	Celastraceae	Andel+	Shrub	Forest	Rare
18	*Capsicum annuum*	Solanaceae	Karya	Herb	Home garden	Common
19	*Carissa spinarum*	Apocynaceae	Agam	Shrub	Near farm land	Moderate
20	*Catha edulis*	Celastraceae	Chat	Tree	Home garden	Moderate
21	*Chenopodium murale*	Chenopodiacea e	Hamedmado	Herb	Around home	Common
22	*Cicer arietinum*	Fabaceae	Shimbra	Herb	Home garden	Moderate
23	*Citrus limon*	Rutaceae	Lemien+	Tree	Home garden	Rare
24	*Citrus Medica*	Rutaceae	Tringo	Tree	Home garden	Rare
25	*Clematis simensis*	Ranuculaceae	Hazo	Herb	Near farm land	Rare
26	*Clerodendrum myricoides*	Lamiaceae	Shewha	Shrub	forest	Rare
27	*Clutia abyssinica*	Euphorbiaceae	Hirtimtimo	Herb	Near farm land	Common
28	*Coffea arabica*	Rubiaceae	Bunna	Tree	Home garden	Rare
29	*Cordia africana*	Boraginaceae	Awhie	Tree	Road side	Rare
30	*Croton macrostachyus*	Euphorbiaceae	Tembok	Tree	Near farm land	moderate
31	*Momordica foetida*	Cucurbitaceae	Yamora missa	Herb	Around house	Rare
32	*Cucumis ficifolius*	Cucurbitaceae	Ramborambo	Herb	Near farm land	Rare
33	*Cucurbita pepo*	Cucurbitaceae	Duba	Herb	Home garden	Common
34	*Cynoglossum*	Boraginaceae	Namich	Herb	Home garden	Common

	lanceolatum					
35	*Cyperus longus*	Cyperaceae	Kuni-azebo	Herb	Grass land	Common
36	*Datura stramonium*	Solanaceae	Mestenagir	Herb	Fallow land	Common
37	*Dodonaea angustifolia*	Sapindaceae	Tahses	Tree	Forest	Common
38	*Silybum marianum*	Asteraceae	Kebericho+	Herb	Grass land	moderate
39	*Eucalyptus globulus*	Myrtaceae	Tsaeda-biharzaf	Tree	Home garden	common
40	*Euclea racemosa*	Ebenaceae	Keileo	Shrub	Forest	Moderate
41	*Euphorbia abbysinica*	Euphorbiaceae	Kulkuala	Tree	Near farm land	Common
42	*Euphorbia petitiana*	Euphorbiaceae	Tsabadimu	Herb	Fallow land	common
43	*Euporbia cactus*	Euphorbiaceae	Kalkalda	Shrub	Near farm land	Rare
44	*Ficus palmata*	Moraceae	Beles	Tree	Near farm land	Moderate
45	*Foeniculum vulgare*	Apiaceae	Ensilal/Arekie	Herb	Home garden	Moderate
46	*Hagenia abyssinica*	Rosaceae	Habie	Tree	Forest	Rare
47	*Hordeum vulgare*	Poaceae	Eklie(Sigem)	Herb	Farm land	Common
48	*Hypericum revolutum*	Hypericaceae	Abedye	Shrub	Near farm land	Rare
49	*Juniperus procera*	Cupresaceae	Tsihdie-adie	Tree	Forest	Common
50	*Justicia schimperiana*	Acanthaceae	Shemieja	Shrub	Around house	Common
51	*Lagenaria siceraria*	Cucurbitaceae	Hamham	Herb	Around house	Moderate
52	*Laggera tomentosa*	Asteraceae	Kansokanso	Shrub	Near farm land	Common

53	*Leucas abyssinica*	Lamiaceae	Chimida	Shrub	Forest	Rare
54	*Linum usitatissimum*	Linaceae	Entatie	Herb	Fallow land	Moderate
55	*Lippia adoensis*	Verbenaceae	Kusha	Shrub	Near farm land	Moderate
56	*Lycopersicon esculentum*	Solanaceae	Tematiem	Herb	Home garden	Common
57	*Maesa lanceolata*	Myrsinaceae	Saweria	Tree	Home garden	Moderate
58	*Malva verticillata*	Malvaceae	Lit	Herb	Around home	Common
59	*Maytenus arbutifolia*	Celastraceae	Hatsihats	Shrub	Near farm land	Moderate
60	*Melia azedarach*	Meliaceae	Niem	Tree	Road side	Rare
61	*Mentha polegium*	Lamiaceae	Sentie-Semhal	Herb	Close to river	Common
62	*Meriandra dianthera*	Lamiaceae	Mesaguh	Shrub	Near farm land	Common
63	*Myrica salicifolia*	Myricaceae	Shehinet	Shrub	Forest	Rare
64	*Myrsine africana*	Myrsinaceae	Kachamo	Shrub	Forest	Moderate
65	*Nicotiana glauca*	Solanaceae	Yeareb Kitel	Herb	Rode side	Rare
66	*Nicotiana tabacum*	Solanaceae	Timbaho	Herb	Rode side	Rare
67	*Ocimum lamiifolium*	Lamiaceae	Demakasea	Herb	Home garden	Moderate
68	*Olea europaea* subsp. cuspidata	Oleaceae	Awlie	Tree	Forest	Rare
69	*Opuntia ficus-indica*	Cactaceae	Kolkuala-Bahirie	Tree	Near farm land	Common
70	*Sideroxylon oxyacanthum*	Sapotaceae	Kakiba	Tree	Around home	Rare

71	*Otostegia fruticosa*	Lamiaceae	Chamo/Geramtinjut	Shrub	Around home	Rare
72	*Otostegia integrifolia*	Lamiaceae	Tsiendog	Shrub	Road side	Moderate
73	*Pennisetum thunbergii*	Poaceae	Sindedo	Herb	Grass land	Common
74	*Phytolacca dodecandra*	Phytolacaceae	Shebtie (endod)	Shrub	Around home	Common
75	*Plectranthus orantus*	Lamiaceae	Hindifdif	Herb	Road side	moderate
76	*Plectranthus punctatus*	Lamiaceae	Karewo-awalid	Herb	Road side	Rare
77	*Polygala abyssinica*	Polygalaceae	Etse-libona	Herb	Forest	Rare
78	*Pterolobium stellatum*	Fabaceae	Kentefitafe	Shrub	Around home	Common
79	*Punica granatum*	Lythraceae	Roma	Tree	Home garden	Rare
80	*Ranunculus oligocarpus*	Ranunculaceae	Kotseli-madokorem	Herb	Home garden	Moderate
81	*Rhamnus prinoides*	Rhamnaceae	Gesho	Tree	Home garden	Common
82	*Rhus glutinosa*	Anacardiaceae	Tetaelo	Tree	Forest	Moderate
83	*Ricinus communis*	Euphorbiaceae	Gulee	Herb	Road side	Common
84	*Rosa abyssinica*	Rosaceae	Kega	Shrub	Near farm land	Moderate
85	*Rumex abyssinicus* J	Polygonaceae	Mokmako	Herb	Around home	Rare
86	*Rumex nepalensis*	Polygonaceae	Diglle	Herb	Around home	Common
87	*Rumex nervosus*	Polygonaceae	Hahot	Shrub	Road side	Common
88	*Ruta chalepensis*	Rutaceae	Chena-adam	Shrub	Home garden	Common

89	*Senecio hadiensis*	Asteraceae	Sihum-atalie	Herb	Around home	Rare
90	*Senecio myriocephalus*	Asteraceae	Tsada Kotsilei	Shrub	Close to river stream	Rare
91	*Senna baccarinii*	Fabaceae	Hambohambo	Tree	forest	Moderate
92	*Sida schimperiana*	Malvaceae	Chifrig	Shrub	Near farm land	Moderate
93	*Solanum adoense*	Solanaceae	Zerich embuay	Shrub	Road side	Rare
94	*Solanum benderianum*	Solanaceae	Berbere Sheitan	Tree	Road side	Rare
95	*Solanum incanum*	Solanaceae	Niesheton-engule	Shrub	Near farm land	Moderate
96	*Solanum marginatum*	Solanaceae	Abiy-engule	Shrub	Road side	Common
97	*Solanum americanum*	Solanaceae	Amalo	Herb	Near farm land	Rare
98	*Thymus schimperi*	Lamiaceae	Teshene	Herb	Near farm land	Moderate
99	*Trigonella foenum-graecum*	Fabaceae	Abaeke	Herb	Farmland	Moderate
100	*Urtica simensis*	Urticaceae	Amea	Herb	Road side	Common
101	*Verbascum sinaiticum*	Scrophulariaceae	Trinake	Herb	Near farm land	Common
102	*Verbena officinalis*	Verbenaceae	Atuch	Herb	home garden	Moderate
103	Vernonia schimperi	Asteraceae	Nakurimba	Herb	Forest	Rare
104	Conyza pyrrhopappa	Asteraceae	Selihim	Shrub	Road side	Rare

105	*Vernonia amygdalina*	Asteraceae	Grawa	Tree	Home garden	Common
106	*Vicia faba*	Fabaceae	Ater	Herb	Farmland	Common
107	*Withania somnifera*	Solanaceae	Giezawa/Geine haris	Shrub	Home garden	Moderate
108	*Xanthium spinosum*	Asteraceae	Milhas aniestei	Herb	Near farm land	Common
109	*Xanthium strumarium*	Asteraceae	Chobba(Chiguag uit)	Herb	Road side	Moderate
110	*Ximenia americana*	Olacaceae	Muleo	Shrub	Forest	Rare
111	*Zehneria scabra*	Cucurbitaceae	Haregressa	Herb	Around home	Common
112	*Ziziphus spina-christi*	Rhamnaceae	Kunkura	Shrub	Around home	Rare
113	*Nuxia congesta*	Logani aceae	Tekuware	Tree	Forest	Rare

APPENDIX 6. Informant Consensus of Medicinal Plants

No	Medicinal plant	Number of informants	% of total informants
1.	*Acacia abyssinica*	10	11.90%
2.	*Acacia etbaica*	8	9.52%
3.	*Achyranthes aspera*	45	53.57%
4.	*Acokanthera schimperi*	1	1.19%
5.	*Agave americana*	3	3.57%
6.	*Allium sativum*	61	72.62%
7.	*Aloe megalacantha*	6	7.14%
8.	*Argemone Mexicana*	13	15.48%
9.	*Artemisia absinthim.*	25	29.76%
10.	*Artemisia afra*	43	51.19%
11.	*Asparagus africanus*	10	11.90%
12.	*Balanites aegyptiaca*	6	7.14%
13.	*Becium grandiflorum*	20	23.81%
14.	*Berberis holstii*	10	11.90%
15.	*Bidens biternata*	1	1.19%
16.	*Calpurnia aurea*	19	22.62%
17.	*Maytenus senegalensis*	6	7.14%
18.	*Capsicum annuum*	28	33.33%
19.	*Carissa spinarum*	29	34.52%
20.	*Catha edulis*	21	25.00%
21.	*Chenopodium murale*	25	29.76%
22.	*Cicer arietinum*	5	5.95%
23.	*Citrus limon*	18	21.43%
24.	*Citrus Medica*	12	14.29%
25.	*Clematis simensis*	1	1.19%
26.	*Clerodendrum myricoides*	20	23.81%

27.	*Clutia abyssinica*	2	2.38%
28.	*Coffea arabica*	6	7.14%
29.	*Cordia africana*	4	4.76%
30.	*Croton macrostachyus*	2	2.38%
31.	*Momordica foetida* Schumach	1	1.19%
32.	*Cucumis ficifolius*	25	29.76%
33.	*Cucurbita pepo*	5	5.95%
34.	*Cynoglossum lanceolatum*	49	58.33%
35.	*Cyperus longus*	8	9.52%
36.	*Datura stramonium.*	12	14.29%
37.	*Dodonaea angustifolia*	8	9.52%
38.	*Silybum marianum*	29	34.52%
39.	*Eucalyptus globulus*	50	59.52%
40.	*Euclea racemosa*	18	21.43%
41.	*Euphorbia abbysinica*	21	25.00%
42.	*Euphorbia petitiana*	1	1.19%
43.	*Euporbia cactus*	10	11.90%
44.	*Ficus palmata*	15	17.86%
45.	*Foeniculum vulgare*	12	14.29%
46.	*Hagenia abyssinica*	57	67.86%
47.	*Hordeum vulgare*	50	59.52%
48.	*Hypericum revolutum*	2	2.38%
49.	*Juniperus procera*	5	5.95%
50.	*Justicia schimperiana*	1	1.19%
51.	*Lagenaria siceraria*	5	5.95%
52.	*Laggera tomentosa*	1	1.19%
53.	*Leucas abyssinica*	1	1.19%
54.	*Linum usitatissimum*	11	13.10%
55.	*Lippia adoensis*	18	21.43%

56.	*Lycopersicon esculentum*	1	1.19%
57.	*Maesa lanceolata*	7	8.33%
58.	*Malva verticillata*	3	3.57%
59.	*Maytenus arbutifolia*	7	8.33%
60.	*Melia azedarach*	1	1.19%
61.	*Mentha polegium*	4	4.76%
62.	*Meriandra dianthera*	26	30.95%
63.	*Myrica salicifolia*	20	23.81%
64.	*Myrsine africana*	5	5.95%
65.	*Nicotiana glauca*	1	1.19%
66.	*Nicotiana tabacum*	54	64.29%
67.	*Ocimum lamiifolium*	23	27.38%
68.	*Olea europaea* subsp. cuspidata	43	51.19%
69.	*Opuntia ficus-indica*	1	1.19%
70.	*Sideroxylon oxyacanthum*	2	2.38%
71.	*Otostegia fruticosa*	20	23.81%
72.	*Otostegia integrifolia*	15	17.86%
73.	*Pennisetum thunbergii*	8	9.52%
74.	*Phytolacca dodecandra*	45	53.57%
75.	*Plectranthus orantus*	1	1.19%
76.	*Plectranthus punctatus*	3	3.57%
77.	*Polygala abyssinica*	1	1.19%
78.	*Pterolobium stellatum*	8	9.52%
79.	*Punica granatum*	1	100.00%
80.	*Ranunculus oligocarpus*	1	1.19%
81.	*Rhamnus prinoides*	13	15.48%
82.	*Rhus glutinosa*	2	2.38%
83.	*Ricinus communis*	12	14.29%
84.	*Rosa abyssinica* Lindley	5	5.95%

85.	*Rumex abyssinicus*	10	11.90%
86.	*Rumex nepalensis*	7	8.33%
87.	*Rumex nervosus*	43	51.19%
88.	*Ruta chalepensis*	53	63.10%
89.	*Senecio hadiensis*	13	15.48%
90.	*Senecio myriocephalus*	46	54.76%
91.	*Senna baccarinii*	1	1.19%
92.	*Sida schimperiana*	2	2.38%
93.	*Solanum adoense*	2	2.38%
94.	*Solanum benderianum*	1	1.19%
95.	*Solanum incanum*	51	60.71%
96.	*Solanum marginatum*	5	5.95%
97.	*Solanum americanum*	5	5.95%
98.	*Thymus schimperi*	7	8.33%
99.	*Trigonella foenum-graecum*	9	10.71%
100.	*Urtica simensis*	1	1.19%
101.	*Verbascum sinaiticum*	65	77.38%
102.	*Verbena officinalis*	70	83.33%
103.	Vernonia schimperi	1	1.19%
104.	Conyza pyrrhopappa	17	20.24%
105.	*Vernonia amygdalina*	12	14.29%
106.	*Vicia faba*	20	23.81%
107.	*Withania somnifera*	20	23.81%
108.	*Xanthium spinosum*	12	14.29%
109.	*Xanthium strumarium*	1	1.19%
110.	*Ximenia americana*	1	1.19%
111.	*Zehneria scabra*	69	82.14%
112.	*Ziziphus spina-christi*	5	5.95%
113.	*Nuxia congesta*	12	14.29%

Appendix 7. List of Family, Genera and Speciesof Medicinal Plants

Family Name	No. of Genera	No. of Species	% of No. of Species
Acanthaceae	1	1	0.88
Agavaceae	1	1	0.88
Alliaceae	1	1	0.88
Aloeaceae	1	1	0.88
Amaranthaceae	1	1	0.88
Anacardiaceae	1	1	0.88
Apeaceae	1	1	0.88
Apocynaceae	2	2	1.77
Asparagaceae	1	1	0.88
Asteraceae	9	12	10.62
Balanitaceae	1	1	0.88
Berberidaceae	1	1	0.88
Boragenaceae	2	2	1.77
Cactaceae	1	1	0.88
Celastraceae	2	3	1.77
Chenopodiaceae	1	1	0.88
Cucurbitaceae	4	5	4.24
Cuprusaceae	1	1	0.88
Cyperaceae	1	1	0.88
Ebenaceae	1	1	0.88
Euphorbiaceae	4	6	5.30
Fabaceae	8	7	7.08
Hypericaceae	1	1	0.88
Lamiaceae	9	11	8.85
Linaceae	1	1	0.88
Loganiaceae	1	1	0.88
Lythraceae	1	1	0.88
Malvaceae	2	2	1.77
Meliaceae	1	1	0.88
Moraceae	1	1	0.88
Myricaceae	1	1	0.88
Myrsinaceae	2	2	1.77
Myrtaceae	1	1	0.88
Olacaceae	1	1	0.88
Oleaceae	1	1	0.88
Papaveraceae	1	1	0.88
Phytolacaceae	1	1	0.88
Poaceae	2	2	1.77
Polygalaceae	1	1	0.88
Polygonaceae	1	3	2.65

Ranuculaceae	2	2	1.77
Rhaminaceae	2	2	1.77
Rosaceae	2	2	1.77
Rubiaceae	1	1	0.88
Rutaceae	2	3	2.65
Sapotaceae	1	1	0,88
Sapindaceae	1	1	0.88
Scrophulariaceae	1	1	0.88
Solanaceae	6	11	9.73
Urticaceae	1	1	0.88
Verbenaceae	2	2	2.65

Appendix 8. List of human ailments, number of informants cited and percentage

Ailments	**Local name of the ailment**	**No.**	**Percentage (%)**
Ringworm	Tifsase	10	2.88
Wound	kuseli	46	9.6
Dislocated bone	Kutsaie	2	0.57
Eye disease	Himame eye	2	0.57
Tonsillitis	Hanat (Khimo)	34	7.09
Bleeding during delivery	Dem-heresi	10	2.88
Arthritis	kurtemaete	32	6.7
Malaria	Assowe	4	1.15
Cough	Se-al	8	2.30
Troma	Mintae	20	5.76
Feberileillnes	Mich	60	12.52
Scabies	Sheore	35	7.3
Bleeding	nesir	2	0.57
Abdominal pain	kurtsete	34	7.09
Evil eye	ede-sebe	55	11.5
Evil sprit	Ganale or seitane	8	2.30
Rabbis	Himame-ebude kelbe	10	2.88
amoeba	Amoeba	2	0.57
Drosophila	Teinina	2	0.57
Dandruff	Forefore	3	0.86

Toung infection	Tirf-milhas	1	0.28
Gastric	Cheguara/kihar	1	0.28
Rinder pest	Enewushen	5	1.44
Paralyzed	Gusay	1	0.28
Cutaneous leshimaniasis	Gizuwa	1	0.28
Phobia	Tsilecha	1	0.28
Fire burn	Ktsal-hawi	3	0.86
Diarrhea	Tsihtsah/tekimate	3	0.86
Tinea-capitis	Barelle	3	0.86
Rectal prolapse	Yiefinteta megelbete	1	0.28
Hangnil	Tsifre-metmet	2	0.57
Tapeworm	Habi	57	12.1
Urine retention	Tsegem Shinte	1	0.28
Abortion	Mechingafe	2	0.57
Herpes zoster	Hawi-semaie	9	1.9
Swelling	Hibet	2	0.57
Hemorrhoids	Kintarot	3	0.86
Asthma	asmi	1	0.28
Jaundice	Ef-shiwa	1	0.28
Ear-infection	Himam ezenie	1	0.28
Constipation	Dirket	1	0.28
Dificulty to speak	Duda	1	0.28
Toothache	Himame senie	1	0.28
Impotence	Snfete wosibe	1	0.28
Acne	Shifta	1	0.28
Fat accumulation	Mrguade	1	0.28
Headache	Himame resie	4	1.15
Laziness	Senfena	1	0.28
Fleas	Kunchi	5	1.44
Snake bite	Teben menidafe	1	0.28
Snake prevention	Mekhilakal teben	1	0.28
Depression	Debrtie	1	0.28
Vomiting	Temilase	1	0.28
Sphilis	Ketgne	1	0.28
Hypertension	Dembezhat	1	0.28
Mumps	Jero degefe	3	0.86
Total		**479**	**100**

Appendix 9. List of livestock, number of informants cited and percentage

Ailments	Local name of the ailment	No.	Percentage (%)
Cough	Sial	1	1.85
Scabies	Shehor	4	7.40
Fasiolasis	Hule-huelta	8	14.81
Lice	Kumale	4	7.4
Leech	Alehkite	10	18.51
Diarrhea	Tsetshe	3	5.55
Epidemic	Worereshigne	2	3.70
Swelling	Hibet	2	3.70
Bloating	Menfah	2	3.70
Constipation	Dirket	1	1.85
Horn worm	Hashea kerni	5	9.25
Back leg	Aba gurba	3	5.55
Dislocated bone	Ginay	3	5.55
Eye infection	Himam eyene	6	11.11
Total		**54**	**100**

Appendix 10 : Lists of Informants Participated (R = reading :W= Writing , M= Married S= single)

No	Full Name	Sex	Age	Marital Status	Educational Status	Locality
1	Gebrehiwot Moges	M	27	M	Diploma	Fala
2	Hailu Alemu	M	47	M	9	Fala
3	Abebe Worku	M	45	M	4	Fala
4	Abrehet Alemu	F	37	M	No	Fala
5	Azeb Tefera	F	25	M	Diploma	Fala
6	Zewuditu Berhe	F	30	M	10+3	Fala
7	Aregash Tasew	F	41	M	No	Fala
8	Birhanu Kemal	M	65	M	9	Zata
9	Adanu Kelkay	F	60	M	No	Zata
10	Tsehayu Kasaye	M	46	M	7	Zata
11	Mamiet Ahmed	F	35	M	R&W	Zata
12	Abrha Tebeje	M	30	S	R&W	Zata
13	Bidgilign Ayenew	M	29	S	R&W	Zata
14	Mussa Aburrhiman	M	81	M	No	Zata

15	Museluu Hadishe	F	53	M	No	Darabekeda
16	Hadish Ayenew	M	61	M	No	Darabekeda
17	KEfalew Asefa	M	30	S	R&W	Darabekeda
18	Alemash Hagoes	M	29	S	7	Darabekeda
19	Hagos Kahsay	M	41	M	No	Darabekeda
20	Alemeayehu Berhe	M	59	M	No	Darabekeda
21	Kalayu Mesele	M	27	S	10	Darabekeda
22	Sembetu Tsegay	F	33	M	No	Dinkashena
23	Tafetu Alemu	F	40	M	No	Dinkashena
24	Agezew Tsegay	M	50	M	R&W	Dinkashena
25	Desalen Tafete	M	25	M	9	Dinkashena
26	Beyene Gedilu	M	52	M	No	Dinkashena
27	Syum Gebremariam	M	33	M	No	Dinkashena
28	Maleefye Tafere	F	40	M	No	Dinkashena
29	Amare Hailu	M	77	M	No	Sesela
30	Gebeyaw Abadie	M	38	M	R&W	Sesela
31	Meytu Beilu	F	35	M	No	Sesela
32	Yeshareg Kassu	F	20	S	9	Sesela
33	Tasew Tiwmay	M	40	M	No	Sesela
34	Berihun Hagos	M	34	S	7	Sesela
35	Yeshareg Kahsay	F	47	M	No	Hayalo
36	Lemlem Werese	F	45	M	No	Hayalo
37	Tsehaynesh Reda	F	33	M	No	Hayalo
38	Wudnesh Beyene	F	42	M	No	Hayalo
39	Adugna Molla	M	32	S	9	Hayalo
40	Arekie Molla	M	65	M	R&W	Hayalo
41	Kalayu Teumay	M	45	M	R&W	Hayalo
42	Kiros Terefe	M	29	S	R&W	Hayalo
43	Mihretu Beyene	M	50	M	R&W	Wonberet
44	Abrha Getahun	M	52	M	No	Wonberet
45	Lielt Gebrehiwot	F	33	S	No	Wonberet
46	Diay Birhanu	F	40	M	No	Wonberet
47	Hiray Shumey	F	35	M	No	Wonberet
48	Sindayo Desta	F	50	S	R&W	Wonberet
49	Mekonnen Alemayehu	M	25	M	9	Wonberet
50	Fantaye Terefe	M	50	M	R&W	Adigolo
51	Shumey Mengesha	M	60	M	No	Adigolo
52	Zewdey Haftu	F	15	S	5	Adigolo
53	Hadas Reda	F	40	M	No	Adigolo

54	Zeyneba Hagoes	F	55	M	R&W	Adigolo
55	Hadish Dubale	M	50	M	No	Adigolo
56	Fantaye Tedla	M	52	M	No	Adigolo
57	Zenebu Hieda	F	65	M	No	Gumbirda
58	Abdelkrim Nure	M	35	S	R&R	Gumbirda
59	Hayelom Esmail	M	38	M	5	Gumbirda
60	Asesu Gussa	F	40	M	No	Gumbirda
61	Kalayu Tsegay	M	30	S	No	Gumbirda
62	Mushira Ibrahim	F	50	M	No	Gumbirda
63	Kedija Yimer	F	60	M	No	Gumbirda
64	Abadit Kurifay	F	45	M	No	Hashengie
65	Shikuru Bashay	M	52	M	No	Hashengie
66	Zinabu Mengistu	M	43	M	R&W	Hashengie
67	Barentu Nigus	M	56	M	No	Hashengie
68	Ekuar Tesfaye	M	50	M	No	Hashengie
69	Aregash Birhanu	F	47	M	No	Hashengie
70	Embeytu Birhanu	F	28	M	Diploma	Hashengie
71	Ekuar Ayenew	F	58	F	No	Hashengie
72	Kassech Tuemay	F	42	F	No	Adishinbereket
73	Tesfaye Kahisay	M	78	M	No	Adishinbereket
74	Kassech Tuemay Alemea	F	45	M	No	Adishinbereket
75	Etsay Abadie	M	20	S	10	Adishinbereket
76	Deribew Tsegay	M	30	S	7	Adishinbereket
77	Hadera Berhe	M	55	M	No	Adishinbereket
78	Abrha Beyene	M	60	M	No	Selambikalsie
79	Majete Kasaye	F	33	M	No	Selambikalsie
80	Taeze Shekole	M	50	M	R&W	Selambikalsie
81	Nigus Getahun	M	27	M	Diploma	Selambikalsie
82	Tsehaytu Kahsay	F	34	M	8	Selambikalsie
83	Sindayo Girmay	F	28	M	10+2	Selambikalsie
84	Mengistu Gebremariam	M	47	M	R&W	Selambikalsie

Appendix-11 . Checklist of semi-structured interviews for collecting ethno botanical data.

I. General Information

1. Date ---------- Residence Area ---------- Kebelle code ----------
2. Name of Respondent ----------

Sex ---------- Age ---------- Serial No ----------

Marital Status ---------- Occupation (main Jo) ----------

Religion ----------

For how long have you lived in the area? (Mark an x)

Since birth _____ for the last 20 years _____

For the last 10 years _____ for less than 10 years _____

Educational background (what is the grade you attended)? _____

List the traditional way of classifying forest (Vegetation) and landscapes in your area.

What are the most common diseases of humans in your area?

What are veterinary important diseases the area?

List the signs and symptoms of a given disease in your area?

How do people prevent and control a give disease in the area?

II. Ethonbotanical Data

3. Mention plant types used to treat a give disease in the area (give local names)

3.1. Plant used to treat human diseases

a._____

b._____

c._____

3.2 Plants used to treat animal disease

a. _____

b._____

c._____

3.3 plants used to treat both human and animal diseases

a. _____

b. _____

c._____

4. Where do plants grow? (from where they can be obtained?) (Mark an "X" on one of the give alternatives)

In the wild _____

In home gardens _____

Both in the wild and home gardens _____

5. What are the most common habitats of a given medicinal plant?

6. Which part of the medicinal plant is used? (Marx an "X" on the given alternatives)

Flower (Fr) _____	Latex (Lt) _____
Fruit (Ft) _____	Whole plant (Wp)_____
Seed (sd) _____	Leaf (L)_____
Sap(Sp) _____	Root (R)_____
Bark(B)_____	Stem (St)_____

7. What is the method of preparation of the medicinal plant? (Mark"X" from the alternatives).

Fresh(F) _____ Dried(D)_____ Crushed(C)_____

Powdered (P) _____ Used alone (Ua) _____ Exudation(Ex)_____

Concoction (Cn) _____ Mixed with others or water(Mw) _____

8. Dosage: Does it vary among age groups , sex? If yes state for effect?

9. Is there any side effect of the medicine? If yes, is there remedy for side effect?

10. What are side modes of application of the medicinal plants for the victim human or animal (Dermally or non-dermally)

11. Is there any condition that forbids taking the medicine such as pregnancy or others?

12. How is/are the medicinal plant(s) Preserved(if any) ?

13. Which members of the community use the medicinal plants frequently and why?

14. Is the medicinal plant marketable?

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

16. What do the trend of their accessibility look as compared to the past ten years? Why ?

17. How is the knowledge of medicinal plant used transferred from elders to young

generation?

18. Is there any interference between modernization and traditional medicinal plant use in the area?
19. Are there community members who frequently depend more on traditional medicinal plants as compared to modern medicine? why ?
20. Are the any taboos associated with medicinal plant use utilization of medicinal plants? (Time of collection, method of collection, sex , age, storage etc.) What do the taboos imply? (If any)
21. What are the major problems associated with medicinal plants in the area?
22. Is there traditional conservation methods used to conserve medicinal plants in the area? If yes list out them and explain how are the medicinal plants conserved in the area?
23. How is the effort made by the government and other organizations other than the local people to conserve the medicinal plants in the area are explained?
24. Is there any information on the edibility and any other use of medicinal plant under? question practiced in the area?
25. How abundant is the medicinal plant, its trends when compared to the past years (is it increasing?) ; how far are you travel to get the medicinal plants in the past and know?
26. Are there economic groups who mostly or occasionally use these medicinal plants? Why?