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Ethnobotanical study of Medicinal Plants in Banja Woreda

Awi Zone, Amhara Regional State, Ethiopia.

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ABSTRACT

Ethnobotanical study of Medicinal Plants in Banja District, Awi Zone, Amhara Regional State, Ethiopia.

Ayalew Kassahun MSc Thesis

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Ethiopia has a rich history of utilizing traditional medicinal plants to address a broad spectrum of human and livestock ailments. The current research on medicinal plants was carried out to record indigenous and local plant-based medicinal knowledge of local communities, preservation techniques, and the dangers that jeopardize these medicinal plants in Banja-Woreda, Western Ethiopia, Amhara Regional State. A total of 137 respondents (ranging from 20 to 80 years old) were chosen to provide information on medicinal plant usage from 9 sampled kebeles. Out of these, 6 male key informants were purposefully selected based on suggestions obtained from elders members of the communities. Other participants (64 males and 67 females) were randomly chosen. Semi-structured interviews, field observations, and group discussions were utilized to gather data. The data were analyzed using preference ranking, direct matrix ranking, and the informant consensus factor. Additionally, fidelity level calculations were conducted to evaluate the significance of a specific medicinal plant for the intended purpose. A total of 57 distinct medicinal plant species were gathered and identified. 49 species (85.96%) were utilized for treating human ailments, 3 species (5.26%) for treating livestock ailments, and the remaining 5 species (8.77%) for both human and livestock ailments. Among all the medicinal plant species, the majority of them (33.33%) were, herbs and the least of them (7.02%) were climber species. The most commonly used parts of the plants were the leaves (35.53%) followed by roots (27.63%). The primary method of preparation was crushing (55.06%), followed by squeezing (13.48%) of different plant parts. Oral administration 42(57.53%) was the most popular route of administration, followed by dermal administration 29(39.72). Most of the medicinal plants (49.12%) were harvested from the wild, and the efforts of local people to conserve them were limited. To address the rapid loss of medicinal plants and associated indigenous knowledge, we recommend urgent measures to be taken by concerned government institutions. A strategic approach should include systematic awareness creation through schools, local institutions, and community leaders. Awareness creation should be supported by concrete conservation and development activities, such as providing technical support for selecting, domesticating, propagating, and cultivating threatened medicinal plants.

Keywords/Phrases: Ailments, Fidelity level, Indigenous knowledge, Informant consensus factor, Traditional medicinalplants.

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List of Abbreviations and Acronyms

BWAO----- Banja Woreda Agriculture Office

CSA-----Central Statistically Agency

WHO-----World Health Organization

TM-----Traditional medicine

IK----- Idigionous knowledge

1. INTRODUCTION

1.1. Background

Ethiopia is endowed with a wide diversity of fauna and flora. The country is also a centre of origin and diversity for a number of crop and animal genetic resources, reflecting its long history of agriculture (IBC, 2009). It is believed to be the home of about 6,500-7,000 species of higher plants of which 20% are estimated to be used as medicinal value (Tesfaye Awas, 2015). About 1,000 medicinal plants have been identified and documented for the treatments of diseases (Zemede Asfaw and Tigist Wondimu, 2007).

Ethiopia is also a home to many languages, cultures and beliefs which have in turn contributed a high diversity of traditional knowledge and practices of the people including 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 animals from time immemorial (Mirutse Giday and Gobena Ameni, 2003).

Martin (1995) defined ethnobotany as the study of local people's interaction with the natural environment: how they classify, manage and use plants that are available around them and Balick and Cox (1996) defined it as the relationship between plant and people. Ethnobotany studies the complex relationship between plants and cultures on how plants have been or are used, managed and perceived in different societies (Tesfaye Hailemariam *et al.*, 2009). It has been taken in to account that ethnobotanical studies are useful, not only for documenting, analyzing and disseminating indigenous knowledge of local people, belief but also indicating the interaction between biodiversity and human society, how diversity in nature is used and influenced by human activities (Martin, 1995).

Ethiopian traditional life is painted with the hallmark of widespread use of traditional medicinal plants with various levels of sophistication within the indigenous medicinal wisdom (Endashaw Bekele, 2007). According to the report of the World health organization over 80% of the world population still rely on traditional systems of medicines, largely plant based, to meet their primary healthcare needs (WHO, 2011).

Medicinal Plants are the most exclusive source of life saving drugs for majority of the world's population (Okoliet *al.*, 2007). They have important contributions in the healthcare system of

local communities as the main source of medicine for the majority of the rural population (Tesfaye Hailemariam *et al.*, 2009). The wide spread use of traditional medicine among both urban and rural population in Ethiopia could be attributed to cultural acceptability, physical accessibility, economic affordability and efficacy against certain types of diseases as compared to modern medicine (Tilahun Teklehaymanot and Mirutse Giday, 2007). The knowledge and use of plant is an integral part of many ethnic rural cultures in Ethiopia, the extent of which has not yet been studied in depth (Abbink, 1995). However, according to Mirutse Giday and Gobena Ameni (2003), loss of indigenous knowledge has been aggravated by the expansion of modern education, which has made the younger generation underestimate its traditional value. The loss of medicinal plant is coupled with the loss of indigenous knowledge within the community on plant use for medicine.

The human tendency to categorize and organize knowledge and experience is universal. This classification system throughout the world shows certain structural similarities (Cotton, 1996). Similar to elsewhere in Ethiopia, people living in Banja Woreda have the knowledge on the traditional medicinal practices which have passed from one generation to the next so as to treat human and livestock ailments. Traditional medicine practice exists up to date in the area in a reflection of the inadequacy of modern health service coverage and the nature of some ailments, which are more preferred to be treated traditionally by communities. However, the loss of indigenous knowledge is highly prevalent in the study site. Hence, the main objective of this study focused on ethnobotanical study of traditional medicinal plants used by local community of Banja Woreda.

1.2. Statement of the Problem

In spite of having a vast ethnobotanical contribution in the primary healthcare, limited studies have been conducted on medicinal plants in the country so far to document and promote the associated knowledge (Assegid Assefa and Tesfaye Aebebe, 2014; Getnet Chekole, 2017; Girmay Teklay and Zeyede Teshome, 2017; Tilahun Teklehaymanot, 2017). In a similar way, no one has tried to study ethnobotanical traditional medicinal plants in the study area, Banja Woreda. Therefore; to study and documented plants used in the traditional medical practices of the people in Banja Wreda.

Like other places in Ethiopia, local communities of Banja Woreda have traditional medicinal practices; accumulated for a generation to treat human and livestock ailments. However, the traditional wisdom of the local community decreases from time to time in the case of depletions of natural vegetation by anthropogenic means, lack of conservation actions, ways of knowledge transfer and modernization and natural factors and drought. Thus, the main purpose of this ethnobotanical study was to gather, identify, document, and conserve medicinal plants associated with traditional knowledge by drawing the following research questions.

1.3 Research questions

- ❖ What are the traditional medicinal plant species used by indigenous and local people in Banja Woreda for the treatment of human and livestock ailments?
- ❖ Which parts of plants are used for medicinal purpose to treat different ailments?
- ❖ How these traditional remedies do is prepared, administered and in what conditions they are employed?
- ❖ What are the major threats and local conservation methods of medicinal plant species in the study area?

1.4. Objectives

1.4.1. General objective

The general objective of this study is to investigate and document the use of traditional medicinal plants and the associated indigenous and local knowledge in Banj Woreda, Awi Zone, Amhara Reginal State.

1.4.2. Specific Objectives

- ❖ To collect and identify the traditional medicinal plant species used for the treatment of human and livestock ailments
- ❖ To identify the plant parts used for medicinal purpose to treat different ailments
- ❖ To differentiate how these traditional remedies are prepared, administered and in what conditions they are employed and
- ❖ To assess the major threats, and local conservation methods of medicinal plant species used by indigenous people in the study area

2. LITERATURE REVIEW

2.1. Medicinal plants

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 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 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). Develops and changes with time and space.

Hence, such knowledge includes time-tested practice that developed in the processof 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 indare 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 (Zemedu 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 too 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, puts 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 elsewhere 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 Ethnoveterinary 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). Ethnoveterinary medicine provides traditional medicines, which are locally available and usually cheaper than standard treatments. Livestock holders can prepare use homemade 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).

Ethnoveterinary 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 ethnoveterinary 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 worldwide. 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.*; 1996).

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

discovery. 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 bestselling. 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. Medicinal Plants in Africa

The world health organization (WHO, 2002) defined traditional medicine as the total

combination of knowledge and practice that can be formally explained and used in prevention and elimination of physical , mental , or social imbalance and relying exclusively on practical experience and observation handed down from generation to generation whether, verbally or in writing (Endalew Amenu2007). Traditional medicine as a major African socio cultural heritage , obviously is in existence for several hundreds of years , and the first choice of health care treatment for at least 80% of Africans who suffer fever and other common ailment (Elujoba, *et.al.*2005).

2.7. Medicinal plants in Ethiopia

Ethiopia is a country characterized by a wide range of climate and ecological condition, possesses enormous diversity of flora and fauna (Pankhurst, 2006). The country possesses a wide range potentially useful medicine plants, more extensive indeed than available in many other parts of the world (Yirga Gidey and Samuel Zeraburk. 2005). Popular knowledge of plant used by human is based on thousands of years of experience by trial and error people learn how to recognize and use plants, including those with a magic-religious function. In Ethiopia, even though the traditional medicinal practitioners are the best sources of information secret, only to be passed orally to their older son, at their oldest age (Jansen, 1981).Due to its long period of practice and existence, traditional medicine has become an integral part of the culture of Ethiopian people (Endalew Amenu 2007).

In Ethiopia the long history use of medicinal plants is reflected in various medico –religious manuscripts produced on parchments and believed to have originated several centuries ago (Kibebew Fassil 2001).

Medicinal text books written in Geez and Arabic in Ethiopia between the 17 & 18 centuries reported that plants have been used as a source of traditional medicine in Ethiopia health care system .

2.8. Threats to medicinal plants

Although, plants play vital role in treating various human and livestock ailments, they are currently under pressure. Indigenous knowledge on usage of medicinal plants as folk remedies is getting lost through various reasons. According to Ensermu Kelbessa *et. al.*, (1992), habitats and species are being lost rapidly because of environmental degradation, agricultural expansion,

deforestation and urban development. According to Zemedede Asfaw (2001), medicinal plants are considered to be at conservation risk due to over use and destructive harvesting. Root and bark collection may kill the plant in harvest (Dawit Abebe and AhaduAyehu, 1993). In a study made by Kebu Ballemie *et al.*, (2004) the order of importance of the threat factors on medicinal plants in Fentalle area were harvest of medicinal plants for firewood, charcoal, drought, agriculture, house use and trade. Decline in the knowledge and utilization of medicinal plants of the people is due to environmental degradation and intense deforestation (Mirutse Giday, 2001). Debela Hunde *et al.*, (2004) also asserted that modern education as having an impact on the medicinal plant knowledge. They pointed out that those students who attended modern schools are showing unwillingness to learn from their parents, which is an evidence for the gradually disappearing traditional knowledge.

The study conducted by Tesfaye Hailemariam *et. al.*, (2009) showed that elders who are 41-50 years old have handled most of the knowledge on herbal remedies. This hints at the fact that ethnomedicinal knowledge is concentrated in the elderly members of the community and the relative difficulty in its transfer from the elders to the young generation. The finding of (Mirutse Giday *et al.*, (2009), revealed as acculturation of the young generation become a major threat to the continuation of traditional medicinal knowledge and practice. Ethnomedicinal knowledge diminishes with the death of elderly knowledgeable members of society since only a few young people are willing to acquire the knowledge.

In addition, invasion of alien weeds like *Parthenium hysterophorus* has adverse impact on medicinal plants and increase in climate change e.g., increase temperature year by year and severe drought lead to difficulty to survive the more water consuming medicinal plants in the future (Muthuswamy and Solomon, 2009).

2.9. Conservation of Medicinal Plants

Although various threats have profound effect on medicinal plants, local people attempt to grow medicinal plants in home garden though the effort is minimal. The result of a study by Haile Yinegeret *al.*, (2008), revealed that the effort of traditional healers in conserving ethnomedicinal plant species in Bale Mountain National Park was so minimal. Various authors gave their suggestion on how to conserve medicinal plants based on the threat they observed in their study. Home gardens are central target for in-situ and ex-situ conservation of traditional medicinal

plants (Zemedede Asfaw, 2001). Some traditional medicinal plants may have to be conserved in-situ in their natural habitats due to the difficulty for domestication and management or failure to produce the desired amount and quality of the active principle under cultivation (Franz, 1993; cited in Zemedede Asfaw, 2001). By ex-situ methods, traditional medicinal plants can be conserved in gene banks, botanic gardens and field gene banks (Zemedede Asfaw, 2001). In addition, tissue culture technique is also important in ex-situ conservation of traditional medicinal plants (Abebe Demissie, 2001). Moreover, conservation measures should be taken by government officers and NGOs to reduce the existing medicinal plants on threat (Seyoum Getaneh, 2009).

Kebu Balemie (2006) suggested that, raising awareness and enhancing conservation alongside urgent collection of germplasm for the severely declining of some species is important. Awareness on the contribution of traditional medical practice towards fulfilling the primary healthcare needs should be created among the youth (Mirutse Giday, *et al.*, 2009). It was pointed out that young generation has no interest to know about medicinal plants and efforts should be made to incorporate traditional medicine in school curricula so that younger people appreciate its usefulness (Mirutse Giday, *et al.*, 2009).

The finding of Zemedede Asfaw (2006), also pointed out that, the dynamic indigenous knowledge practice for the optimization of the uses and management of plant resources particularly in Ethiopian dry land is among the key recommendations for the conservation, use and management of biodiversity.

3. MATERIALS AND METHODS

3.1. The study area description

Banja is one of the 146 Woredas in the Amhara Region of Ethiopia and have 24 kebeles. It was named after a significant mountain located in the woreda. Banja is Part of the Awi Zone; Injibara town is the capital of this district. It was located 120 km south of regional capital Bahir Dar and about 447 km North West of Addis Ababa along the main road from Addis Ababa to Bahir Dar. Banja is bordered on the south by Ankesha, on the west by Guangua, on the north by FaggetaLekoma, and on the east by the GuagusaShikudadworeda. The geographical location of this woreda is lies 10°53'N-11°03'N latitude and 35°57'E-37°54'E longitude. Kosober is the Administrative town of Banja Woreda .

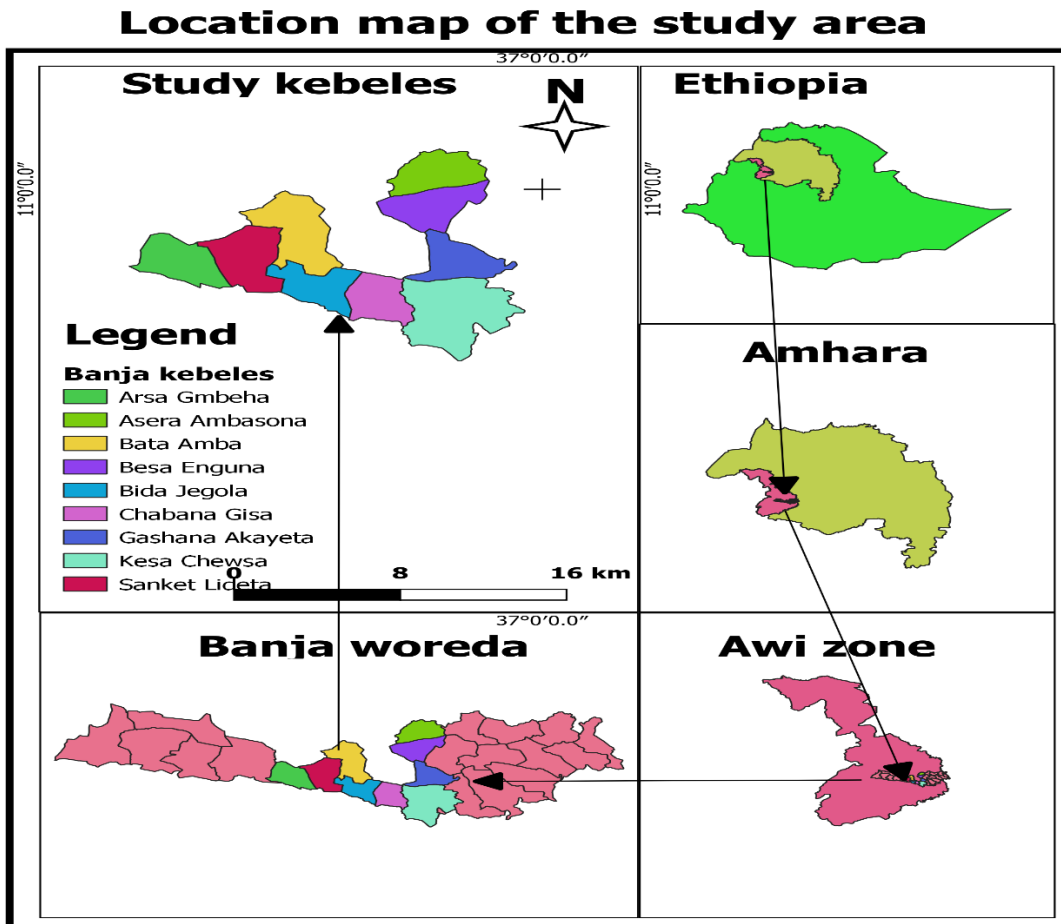


Figure1. Map of Ethiopia, showing Amhara Region and the study district (Source: ArcGIS Arc Map)

3.2. Topography

The topography of the district is described as mountains (25%) undulated sloppy, (60%) and valley (15%). Hence, undulated sloppy area of the District takes lionshare of the total topographic in the study area. The altitude ranges from 2861 m.a.s.l to 2443 m.a.s.l and the lowest peak is 2421 m.a.s Kessa chewusa kebele whereas the highest peak is 2858 m.a.s specially Bata ambi kebele (Taddele Shiferaw, 2019).

3.3. Climate

Climate is a major source, which can affect nearly all human activities and way of life. In Ethiopia the major factor which causes variation in climate is altitude. According to the information obtained from the district Agriculture and Rural Development office (2017). Based on, the traditional climate zone classification, two major vertical temperature zones are found in the study district. The agro ecology of the district comprises of Dega (80%) and Woina Dega (20%). The mean annual temperature of the district is from 100 c° -200 c°. The altitude ranges from 1,850 m to 2870 m a.s.l. and its mean annual rain fall ranges from 1200-2000 mm (Taddele Shiferaw, 2019).

3.4. Soil type

The soil type that is found the study area was red basaltic soil .The soil holds around 25-30 % of the district soil is red; 70-75% of the soil is brown. As far as the fertility of the soil is concerned 60% of the area is moderately fertile while the reaming 35% and 5% of the area is infertile and fertile respectively (BWAO, 2017). ha: many households with small land holdings face severe food deficit the growing human population and the small holding coupled with the growing number of landless people seems to have forced the landless to encroach fragile ecosystems to produce enough yields and this intervention is aggravating natural resource degradation (Taddele Shiferaw,2019).

3.5. Land use land cover

The total area of Banja woreda is estimated at 30,217 ha, of this the total area of 12,190 ha is used for cultivation of annual crop, 3,443.1 ha for grazing, 12,373.4 ha is used for forest and shrub land of which 732 ha is highland bamboo, 1,616 ha occupied by settlement and 594.5 ha

for other land use types (BWADO, 2012). Land holding in the district ranges from 0.25 to 2 ha: many households with small land holdings face severe food deficit the growing human population and the small holding coupled with the growing number of landless people seems to have forced the landless to encroach fragile ecosystems to produce enough yields and this intervention is aggravating natural resource degradation (BWAO 2017).

3.6. Socio-economic Characteristics

3.6.1. Demographics

According to CSA 2007 E.C the total population number of the Woreda was estimated at 121511 out of this 60354 (49.67%) are male and 61157 (50.33%) are female The numbers of farm households are 16239 out of this 9287 are male headed households and 6952 are female headed households. The majority of the inhabitants practiced Ethiopian Orthodox Christianity, with 99.87% reporting that as their religion (TaddeleShiferaw, 2019).

3.6.2. Economic Characteristics

The district people lead their life based on crop production and livestock rearing. Different food crop types are cultivated in the district such as wheat, Barley, maize, Cereals, and Vegetables. Individual farmer crop production is used for household consumption and local markets. Agricultural production is based on rain fed cultivation and few irrigation activities are found. The major livestock in the area include cattle, equine, poultry and sheep but the productivity of livestock is low principally due to shortage of livestock feed resources and lack of improved breeds. They are also engaged in sale of wood and other off-farm employment opportunities to cope up incidences of food shortage. Land holding in the district ranges from 0.25 to 3ha: many households with small land holdings face severe food deficit the growing human population and the small and holding coupled with the growing number of landless people seems to have forced the landless to encroach fragile 20 ecosystems to produce enough yields and this intervention is aggravating natural resource degradation (BWAO, 2017).

3.2. Method of Data Collection

3.2.1. Reconnaissance survey and site selection

Reconnaissance survey was out from September 10 to 28, 2022 in the study area, before starting the actual study. From the total 24 kebeles, nine (9) was selected purposively for ethnobotanical data collection based on the availability of traditional healers, traditional medicine use history, medicinal plant distributions which are identified with the assistance of the Kebele administration leaders, elders and religious leaders.

3.2.2. Informant selection

From the 9 kebeles a total of 137 informants were selected randomly using sample size determination technique developed by (Kothari, 2004). Among 137 informants 70 were males and 67 were females. 6 key informants (males), were preferentially selected with the help of local administrators, elders and other community members.

Table 1. Total household and selected sampled house hold respondents

Purposively Selected rural kebeles	Total households			Randomly selected sampled Households
	Male Headed	Female Headed	Total	Total
ChabaGisa	940	660	1,600	13
BidaJegole	1,150	687	1,837	15
SankitLideta	1,240	840	2,080	18
Bata Ambi	730	720	1,450	12
Bata Basna	902	700	1,602	14
GashenaAkaita	990	710	1,700	14
KessaChewusa	960	1,140	2,100	18
ArsaGembeha	1,270	931	2,201	19
Asera	1,105	564	1,669	14
Total	9,287	6,952	1,6239	137

Source: CSA, 2007

To determine the sample size of respondents and the researcher used sample size determination technique developed by (Kothari, 2004).

$$n = \frac{z^2 \times p \times q \times N}{e^2(N-1) + z^2 \times p \times q}$$

$$q = (1-P)$$

Where

P=sample proportion

e =Expected error 0.05 significant

Z-Standardize normal variable and valued that Corresponds to 95% degree of confidence level

N=total number of households

$$n = \frac{(1.96)^2 \times (1 - 0.1) \times 0.1 \times 16239}{(0.05)^2 \times (16239 - 1) + (1.96)^2 \times 0.9 \times 0.1}$$

$$\approx \underline{137}$$

Finally, for these study 137 respondents were included from the total nine kebeles households' and then we employed proportional stratified random sampling to keep proportionality in each purposively selected nine kebeles. Regarding to selection individual sampled household we used lottery method selection by receiving the total name of lists from local authorities. Hence, the lottery winners were selected as sample respondents for this study.

$$n_1 = \frac{n}{N} \times N_1$$

N=Total household

n₁=each kebele sample households

N₁=Total kebele households

n=Total households samples

$$n_1 = \frac{n}{N} \times N_1 n_1 = \frac{137}{16239} \times 1600$$

≈ 13, respondents are selected from ChabaGisa

$$n_2 = \frac{137}{1,6239} \times 1837$$

≈ 15, respondents are randomly selected from BidaJegole

$$n_3 = \frac{137}{1,6239} \times 2080$$

≈ 18, respondents are selected from SankitLideta

$$n_4 = \frac{137}{1,6239} \times 1450$$

≈ 12, respondents are selected from Bata Ambi

$$n_5 = \frac{137}{1,6239} \times 1602$$

≈ 14, respondents are selected from Bata Basna

$$n_6 = \frac{137}{1,6239} \times 1700$$

≈ 14, respondents are selected from GashenaAkaita

$$n_7 = \frac{137}{1,6239} \times 2100$$

≈ 18, respondents are selected from KessaChewusa

$$n_8 = \frac{137}{1,6239} \times 2201$$

≈ 19, respondents are selected from ArsaGembeha

$$n_9 = \frac{137}{1,6239} \times 1669$$

≈ 14, respondents are selected from Asera

3.2.3. Source of data

Ethnobotanical data were acquired using both primary and secondary sources. The informants of the study area and field observation were primary data sources whereas the literature review, geographic information like map of the Woreda, the governmental offices - agricultural office, health offices and veterinary clinics of the study area were the secondary data sources.

3.2.4. Ethnobotanical data collection tool

The study was carried out from January to February, 2023. The intended data was collected through semi-structured interviews, focus group discussion and field observation which are briefly discussed below following Martin (1995) and Cotton (1996).

3.2.4.1. Semi-structured interviews

Semi structured interview allowed the investigator to provide supplementary question when needed. The items in the questionnaire would be first prepared in English based on review of related literature. Then they were translated into local language Amharic. Most of the questions were focused on the availability, distribution and threats of traditional medicinal plants in Banja Wored. From Chaba Gisa, Bida Jegola, Sankit Lideta , Bata Ambi , Bata Basna ,Gashena Akaita, Kessa Chewusa, ArsaGembeha and Asera Kebeles 137 respondents were selected for this interview since these could gave significant information for the investigator about the conservation, distribution threats of traditional medicinal plants and information flow from elders to younger.

Key informants were first interviewed individually (Appendix 1) to mention about types of human and livestock ailments in the study area, the local names of the plants they use to treat diseases, diseases treated, part(s) of plants used, methods of gathering, methods of preparation of remedies, route of administration of remedies, application of the remedies, dosage, side effects of the treatment, use of the plants other than medicine, types of threat and conservation problems.

3.2.4.2. Group discussion

According to Martin (1995), intuition and experience are the best guides to informal ways of gathering information.

Group discussion was conducted one times with the most knowledgeable ones who were suggested by respective kebele elders and administrators about the status of the distribution, threats and conservation attempt of traditional medicinal plants. The number of participants in group discussion in Kessa chewusa Kebele 6 male key respondents and 2 female general informants were participate They interacted face to face and actively discussed on the distribution, threats and conservation in order to share information about a topic. During the discussion, the informants were free to state about the traditional medicinal plants without interference (Fig3).



Figure 2. Group discussion with informants at Kessa Chewusa Kebele [Photo courtesy by AlemuTamir 2022)

3.2.4.3. Field observation

Field observation was carried out with the guidance of the local people. Important points such as the plant community and the status of the medicinal plants in each visually identified plant ethno-community type and cultivation practices of medicinal plants by the local people were also be recorded.



Figure 3 .Field observations with the guidance [Photo courtesy by AlemuTamir 2022]

3.2. 5.Ethnobotanical Data Analysis Methods

Ethnobotanical data would be analyzed both qualitatively and quantitatively using analytical tools (preference ranking, direct matrix ranking and paired comparison, informant consensus factor Fidelity level) and Excel spreadsheet. Ethnobotanical data were entered into an Excel spread sheet 2010 and summarized using descriptive statistics

3.2.5.1 .Preference ranking

Preference ranking was computed following Martin (1995), to assess the degree of effectiveness of medicinal plants (*Allium sativum*,*Cordia Africana* Lam.,*Lepidium sativum*, *Vernonia amygdalina*,*Trigonella foenum*, *Hagenia abyssinica* Gmel.and *Coriandrum sativum*.) against evil eye disease which was not treated by modern medicine. The medicinal plant believed to be most effective to treat the illness got the highest value(7) and the one with the least effective got the lowest value(1). The values of each species were summed up and the ranks for each species were determined based on the total score.

3.2.5. 2. Direct matrix ranking

Direct matrix ranking would be made following Cotton (1996) on six multipurpose medicinal plants commonly reported by informants and a matrix was performed to see the relative importance of those multipurpose medicinal plants. Based on the relative benefits to be obtained from each plant, seven key informants were asked to give value to each attribute (5 = best; highest value, 0 = no use, 1 = least use, and the rest with intermediate use values). The list of attributes included medicinal, firewood, charcoal, construction, edible fruits, forage and fence. The scores were added in order to compare use values of medicinal plants and help to identify the main causes of overharvesting of the medicinal plants.

3.2.5.3. Informant consensus factor (IFC)

The Informant Consensus factor was calculated for each category to identify the agreements of the informants on the reported cures for the group of ailments using the formula used by (Heinerich *et al.*, 1998). The factor provides a range of 0 to 1, where a high value acts as a good indicator for a high rate of informant consensus. The ICF was calculated as follows:

$ICF = \frac{Nuc - Ns}{Nuc - 1}$. Where, ICF= Informants Consensus Factor

Nuc= number of use citations in each category

Ns= number of species used

3.2.5.4. Fidelity level (FL)

The fidelity level (FL) was calculated for those frequently reported diseases by informants so as to identify the most important species. It was designed to quantify the importance of the species for a particular given purpose Friedman *et al.* (1986). It would be calculated by using the formula as:

$FL (\%) = \frac{Ni}{N} * 100$ where,

Ni is the number of informants that claim the use of a plant species to treat a particular disease and N is the number of informants that use the plant as a medicine to treat any given disease.

4 .RESULTS

4.1. Medicinal plants in the study area

From the research area 57 species of medicinal plants used to treat varieties of human and animal ailments were gathered. These plants were identified into 54 genera and 39 families. Out of these 49 species (85.96%) were observed to heal solely human ailments while 3 species (5.26 %) were utilized for treating livestock ailments and 5 species (8.77 %) were discovered to cure both human and animal ailments. With regards to the species composition and family *Rutaceae*, *Asteraceae*, *Fabaceae*, *Euphorbaceae* and *Rosaceae* contained three species each.

Table 2 Medicinal plants in the study area

Fmily	No. of genera	Percent %	No. of species	Percent %
<i>Rutaceae</i>	3	5.55	3	5.26
<i>Solanaceae</i>	2	3.7	3	5.26
<i>Myrtaceae</i>	2	3.7	2	3.5
<i>Asteraceae</i>	3	5.55	3	5.26
<i>Lamiaceae</i>	2	3.7	2	3.5
<i>Fabaceae</i>	3	5.55	3	5.26
<i>Euporbiaceae</i>	3	5.55	3	5.26
<i>Malvaceae</i>	2	3.7	2	3.5
<i>Rosaceae</i>	3	5.55	3	5.26
<i>Poaceae</i>	2	3.7	2	3.5
<i>Urticaeae</i>	1	1.85	2	3.5
<i>Polygonaceae</i>	1	1.85	2	3.5
The remaining families	1		1	

4.2. Medicinal plants used to treat human and livestock diseases

In Banja-Woreda, there were 57 plant species, out of which 51 species were known to have medicinal properties for treating a range of human and livestock ailments. Among these, 38 families of plants were used for treating human illnesses, while the remaining 2 families were used for treating livestock diseases.

Table 3. Medicinal plants used for treating human ailments

Fmily	No. of genera	Percent %	No. of Species	Percent %
<i>Rutaceae</i>	3	6.52	3	6.12
<i>Solanaceae</i>	2	4.34	3	6.12
<i>Myrtaceae</i>	2	4.34	2	4.08
<i>Asteraceae</i>	3	6.52	2	4.08
<i>Lmiaceae</i>	2	4.34	2	4.08
<i>Fabaceae</i>	2	4.34	2	4.08
<i>Malvaceae</i>	2	4.34	2	4.08
<i>Rosaceae</i>	3	6.52	3	6.12
<i>Poaceae</i>	2	4.34	2	4.08
<i>Urticaceae</i>	1	2.17	2	4.08
<i>Polygonaceae</i>	1	2.17	2	4.08
The remaining families	1		1	

Table 4. Medicinal plant used to treat livestock diseases

Family	No. of species	Percent %
Euphorbiaceae	2	66.66%
Scrophulariaceae	1	33.33%

Table 5 .Medicinal plant used to treat both human and livestock diseases

Family	No. of species	Percent %
Asteraceae	1	20
Aloaceae	1	20
Brassicaceae	1	20
Polygonaceae	1	20
Euphorbiaceae	1	20

4.3. Medicinal plants used to treat human ailments only, livestock only and both human and livestock ailments

Out of the 57 plants with medicinal properties that were gathered, 49 (85.96%) were utilized for healing human ailments, 3 (5.26%) for managing livestock ailments and 5 (8.77%) for treating both human and livestock ailments (Table

Table 6. Number of medicinal plants treat human, livestock and both human and livestock disease

Category	number of medicinal plants	Percentage
Human	49	85.96
Livestock	3	5.26
Both	5	8.77
Total	57	100

4.4. Habitats of medicinal plants

Out of all the medicinal plant species, 28 (49.12%) were gathered in the wild, while the rest were sourced from agricultural fields 18 (31.58%), household gardens 4 (7.02%), and roadside areas 7 (12.28%) (Table 7). The significant proportion of medicinal plants collected from the wild indicates that the natural environment is heavily relied upon for its medicinal resources, highlighting the need for conservation efforts.

Table 7. Medicinal plant distribution in various ecosystems

Habitat type	No. of medicinal plants	Percentage
Agricultural field	18	31.58
Home garden	4	7.02
Road side	7	12.28
Wild	28	49.12
Total	57	100

4.5. Growth form of medicinal plants

Shrubs were the most commonly reported species 19(33.33%), followed by herbs and trees 17 (29.82%) .

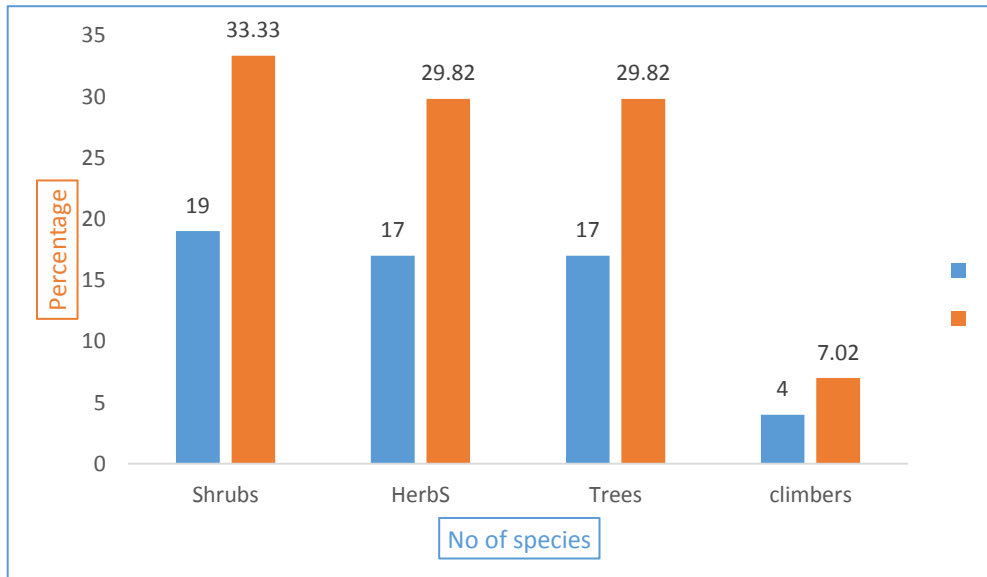


Figure 2 Growth form of medicinal plants

4.6. Plant part(s) used for medicine

During the investigation, participants stated that they employed diverse segments of herbal flora in the production of medicinal remedies. According to the data presented in (Table 8), leaves

were the most frequently utilized plant element, accounting for 31.46% of usage, followed by roots with 24.71%.

Table 8. Plant part(s) used for medicine

Plant parts	Total responses	% of total
Leaves	28	31.46
Roots	22	24.71
Seeds	13	14.6
Fruits	7	7.87
Stems	5	5.61
Bulbs	4	4.5
Saps	2	2.25
Bars	1	1.12
Flowers	1	1.12
Whole	1	1.2
Buds	3	3.38
Root, leaf and fruit	1	1.12
Roots and leaves	1	1.12

4. 7.Preparation methods of remedies

With regards to creating traditional remedies, the indigenous population employs a variety of methods for treating human and livestock ailments. The method of preparation is dependent on the specific illness being addressed. The most prevalent technique for preparing medicinal plants was crushing (55.06%), followed by squeezing (13.48%), chewing (11.24%), boiling (8.99%), soaking (4.49%), roasting (3.37%), and a combination of roasting and crushing (2.24%), as well as chopping and boiling (1.12%) (Table 9).

Table 6. Preparation methods of herbal medicine reported by people of Banja Woreda

Forms of preparation	Total responses	% of total
Crushing	49	55.06
Squeezing	12	13.48
Chewing	10	11.24
Boiling	8	8.99
Soaking	4	4.49
Roasting	3	3.37
Roasting and crushing	2	2.24
Chopping and boiling	1	1.12

4. 8. Conditions of preparation of remedies

The finding showed that fresh plant material was utilized most 45 (47%) followed by dried plant material 20 (21%), and either fresh or dried plant material 30 (32. %) (Fig 5).

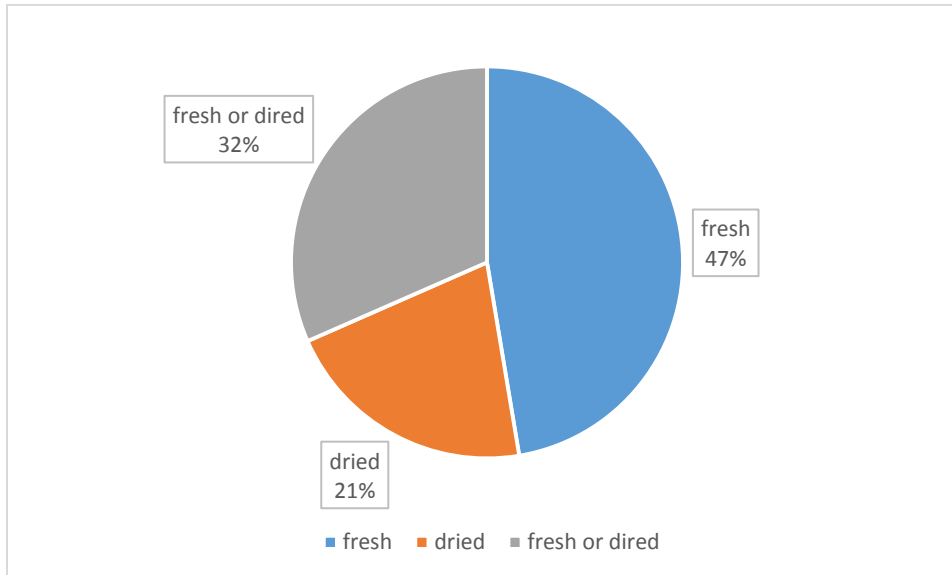


Figure 3. Conditions of plant remedy preparation in Banja district

4.9. Dosage and route of administrations

The route of delivery comprises of oral, optical and nasal. Based on the documented method of delivery, the most common use was through oral means with 42 (57.53%) cases, trailed by dermal with 29 (39.72%) cases (Figure 6).

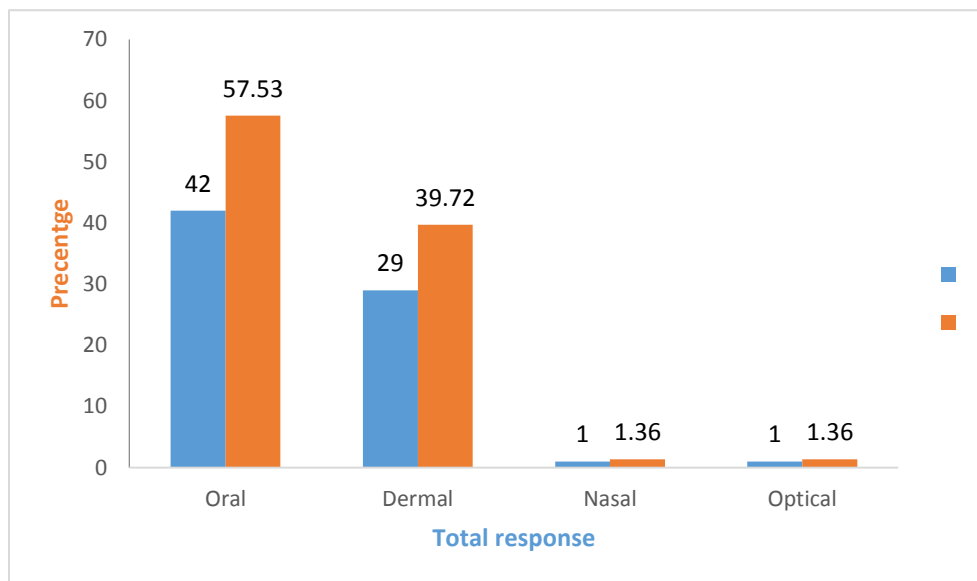


Figure 4. Path of plant remedy administration for human and livestock use

4.10. Ways of applications of plant remedies

Traditional medicines were reported to be prepared in different ways; it includes drinking (33.34 %), smearing (17.78%), eating (10.00 %), put on and tide (17.78 %), chewing (7.78 %), smoking (2.22 %), washing (2.22%) swallowing (7.78 %) washing and swallowing (1.11%) (Table 10).

Table 7. Ways of application of plant remedies in human and livestock ailment treatment

Ways of Applications	Total Responses	Percentage (%)
Drinking	30	33.34
Smearing	16	17.78
Eating	9	10
Put on and tie	16	17.78
Chewing	7	7.78
Smoking	2	2.22
Washing	2	2.22
Swallowing	7	7.78
Washing and drinking	1	1.11

4.10.1 Informant consensus factor (ICF)

The illnesses within the surveyed region have been categorized into various groups according to the disease's location, condition, and treatment similarity. The research revealed that diseases prevalent in the study area had a greater informant consensus factor. Furthermore, the study indicated that medicinal plants, which are recognized and used by community members to treat specific ailments, have higher ICF values (Table 11).

Table 8. Informant Consensus Factor (ICF)

Disease categories	Ns	Nuc	ICF
Abdominal pain, intestinal pain, diarrhea , intestinal parasite	4	62	0.95
Animal diseases, leeches, colic, fever	7	30	0.79
Diabetes ,blood pressure	4	12	0.72
Evil eye	5	8	0.42
Joint pain	4	17	0.81
Malaria, rabies viruses	4	29	0.89
Organ diseases; eye, ear , kidney	5	56	0.93
Respiratory system problems, common cold, cough, asthma.	6	44	0.88
Skin problems, wound ,venereal ,fungal	6	60	0.92
STDs , gonorrhea	5	32	0.87
Swelling	5	20	0.79
Tonsillitis ,goiter	6	15	0.64

ICF= Informants Consensus Factor $ICF = \frac{Nuc - Ns}{Nuc - 1}$

Nuc= number of use citations in each category

Ns= number of species used

4.10. 2.Fidelity level index (FLI)

The fidelity level (FLI) values were computed for a selection of frequently used plants with regards to their efficacy in treating commonly reported conditions. *Allium sativum* was found to be effective against kidney pain and common cold, *Croton macrostachyus* against malaria and

skin fungal infections, *Lupinus albus* against hypertension, *Phytolacca dodecandra* against rabies and vomiting, *Ruta chalepensis* against common cold, *Embelia schimperi* against hepatitis and tapeworm, and *Vernonia amygdalina* against abdominal pain (as Table 12).

Table 9. Fidelity index of some medicinal plants

Name of Medicinal plant	Examples of ailment treated	N p	N	FL	FL%
<i>Allium sativum</i>	Common cold and kidney pain	32	34	0.94	94
<i>Croton macrostachyus</i>	Malaria and skin fungal disease	28	30	0.93	93
<i>Embelia schimperi</i>	Hepatitis and Tape worm	11	15	0.73	73
<i>Lupinus albus</i>	Hipertetion	21	24	88	88
<i>Phytolacca dodecandra</i>	Vomiting	15	18	0.83	83
<i>Ruta chalepensis</i>	Common cold	13	17	0.76	76
<i>Vernonia amygdalina</i>	Abdominal pain	11	15	0.73	73

4.10.3. Preference ranking

After handpicking six key informants, a ranking of preference was carried out for seven herbal remedies known to cure stomach pain. The sources were requested to rate the remedies based on their efficacy, with the highest number (7) denoting the most effective cure for stomach pain and the lowest number (1) representing the least effective cure. *Allium sativum* obtained a score of 36 and was ranked first, indicating that it is the most potent cure for stomach pain, followed by *Cordia africana Lam* .

Table 10. Medicinal plants used to treat abdominal pain are ranked in order of preference

List of medicinal plants	R1	R2	R3	R4	R5	R6	Total	Rank
<i>Allium sativum</i>	7	5	6	6	8	4	36	1 st
<i>Coriandrum sativum</i>	3	3	2	1	3	2	14	7th
<i>Lepidium sativum</i>	5	5	3	5	4	4	26	3rd
<i>Hagenia abyssinica</i> .	4	2	3	2	2	3	16	6th
<i>Vernonia amygdalina</i>	5	4	5	5	3	2	24	4th
<i>Cordia Africana</i>	7	6	5	7	4	3	32	2 nd
<i>Trigonella foenum</i>	4	4	4	2	5	3	20	5 th

4.10.4 .Direct matrix ranking

In accordance with Cotton's (1996) methodology, a direct matrix ranking was executed for 6 multipurpose medicinal plants that were frequently cited by informants. To determine the relative benefits of each plant, 6 key informants were selectively chosen and requested to assign value to each attribute. The set of attributes comprised medicinal, fw- firewood, for-forage, co-construction, fu-furniture, fo-food, ch-charcoal, fe-fence, and me-medicine. The total scores were computed to compare the usage values of medicinal plants and to detect the primary causes of over harvesting of these plants. The mean score for a direct matrix ranking of six medicinal plant species based on their overall usage values (5 = optimal, 4 = highly beneficial, 3 = beneficial, 2 = moderately used, 1 = least used, and 0 = not used) was evaluated as demonstrated in Table 14.

Table 11. Ranking of multipurpose medicinal plants in Banja_District.

Species	use categories								total	Rank
	Fw	For	Co	Fu	Fo	Ch	Fe	Me		
<i>Yushnia alpina</i>	4	3	5	5	0	0	4	4	25	2 nd
<i>Carissa spinarum</i>	3	0	1	1	4	3	4	4	20	5 th
<i>Embelia schimperi</i>	2	2	0	2	3	2	5	5	21	4 th
<i>Eucalyptus globulus</i>	4	0	5	3	0	5	5	5	27	1 st
<i>Lupinus albus L.</i>	5	2	0	0	3	3	5	5	23	3 rd
<i>Justica schimperiana</i>	2	0	2	0	0	4	4	5	17	6 th
Total	20	7	13	11	10	17	27	28	133	
Rank	3rd	8th	5th	6th	7th	4th	2nd	1st		

4.11. Factors threatening medicinal plants

After conducting interviews with informants, it was determined that the main hazardous threats to medicinal plants in Banja-Woreda were charcoal production, agricultural expansion, usage of plants for building homes, gathering firewood and fodder, as well as drought. These factors have been cited as the causes for the depletion of natural vegetation as a whole and medicinal plants specifically (refer to Table 15).

Table 12. Ranking of threats to medicinal plants in Banja District

Threat	R1	R2	R3	R4	R5	R6	Total	Rank
Agricultural expansion	5	5	4	4	5	5	28	2
Charcoal	5	6	6	6	7	6	36	1
Construction	3	4	4	4	4	4	23	3
Drought	3	4	3	3	3	2	19	6
Fire wood	3	2	4	4	5	4	22	4
Fodder	3	3	2	4	5	3	20	5

4.12. Threatened medicinal plants

A total of six key informants were consulted to assess and prioritize the threat levels of five different herbs with medicinal properties. The findings revealed that *Phoenix reclinata* was the most endangered plant, while *Urtica simensis* Steudel was ranked second in terms of threat level. On the other hand, *Embelia schimperi* and *Kalanchoe petitiiana* were considered to be the least threatened. The ranking process was carried out by six key informants, and the results are presented in Table 16.

Table 13. Ranking of threatened plants using six key informants in Banja District

Threatened plants	Informants						Total	Rank
	R1	R2	R3	R4	R5	R6		
<i>Rumex abyssinicus</i>	5	5	5	4	4	3	26	3rd
<i>Embelia schimperi</i>	3	2	3	3	3	4	18	5th
<i>Kalanchoe petitiiana</i>	2	3	4	4	4	3	20	4th
<i>Phoenix reclinata</i>	4	3	5	7	5	5	29	1 st
<i>Urtica simensis</i>	4	4	5	5	5	5	28	2 nd

4.13. Administration and protection of medicinal plants

Informants reported that the traditional healers possess knowledge regarding the appropriate timing and methods for collecting and preserving medicinal plants. The seeds, leaves, fruits, and roots were harvested and subsequently dried and conserved in the corners of homes or in outdoor areas. The dried components were then reported to be ground into powder and kept in various vessels such as pots, bottles, or cloth bags for later use. The local inhabitants had a firm and authentic conviction in the potency of plants for healing purposes, and they were well-versed in identifying their natural habitats, distribution, harvesting procedures, and the current status of these plants in the region.

5. DISCUSSION, CONCLUSION AND RECOMMENDATION

5.1. Discussion

5.1.1. Medicinal plants in the study area

A total of 57 medicinal plants were collected and documented to treat various human and animal diseases. The presence of 57 plants utilized by local populations to treat 49 different types of human and livestock illnesses shows the deep established culture of medicinal plant use in the studied area. Out of these, larger number of medicinal plants (47) was used for the treatment of human disease. This result shows that the local communities have better knowledge on and give more emphasis to the uses of medicinal plants to treat human disease than livestock diseases. This result is similar with other results which were documented in other regions of Ethiopia (Tesfaye and Sebsebe Demissew, 2009); (Mirutse *et al.*, 2009); (Moa, 2010) and (Getaneh, 2011).

The presence of traditional knowledge and practice on large number of medicinal plants by communities of Banja Woreda shows that the indigenous and local people of the area still depends on traditional medicine of plant origin. Traditional remedies were used by 75-90 percent of the world's rural population (excluding western countries) as their only source of health care due to its accessibility and affordability, cultural acceptability and efficacy. In terms of species composition, families, *Asteraceae*, *Rosacea*, *Fabaceae*, *Rutaceae* and *Euphorbiaceae* contained 3 species each followed by *Solanaceae*, *Myrtaceae*, *Lamiaceae*, *Malvaceae* and *Poaceae* each with 2 species may related to its abundance and distribution in the study area. Similarly the dominance of family *Asteraceae* for the treatment of human diseases was reported in the work of EndalewAmenu (2007) and, SeyoumGetaneh (2009).

5.1.2. Medicinal plant habits and origins

Most medicinal plants were collected from the wild 28 (49.12%) in this study. The remaining species were collected from home gardens 4 (7.02 %), roadside 7 (12.28%) and agricultural fields 18 (31.58%). The findings are similar to those reported by Haile Yineger and Delenasaw Yewhalaw, 2007; Ermias Lulekal *et al.*, (2008); Tesfaye Hailemariam *et al.*, (2009); Getu Alemayehu, (2010); Nigussie Amsalu, (2010); Emiru Birhane *et al.*, (2011); where wild areas are the most important sources of medicinal plants. This shows that in order to acquire medicinal

plants in the study area, practitioners primarily use wild sources or the natural environment rather than home garden. 19 (33.33%) were herbaceous species followed by, 17(29.82) shrub species, 17(29.82 %) tree species and 4 (7.02) climbers. This shows that herbs, followed by shrubs, are the most commonly used medicinal plants in the study area. In comparison with trees and climber species, this may be due to a high degree of abundance and distribution of herbs in the study area. Debela Hunde (2004).

5.1.3. Plant parts used, conditions and mode of preparation

Results of plant parts used for medicinal purposes indicated that, the local communities mostly used leaves (35.33%) followed by roots (27.63%). Other plant parts were also used to prepare traditional medicine, i.e. seeds (13.16%), fruits (6.58%), stem (2.63%), bulbs (5.26 %), sap (2.63%), barks (1.32%), and flowers (1.32%). Previous reports in Ethiopia have also shown that leaves were the most commonly use; followed by roots to treat various health problems Mirutse Giday, (2001); Haile Yineger and Delenasaw Yewhalaw,(2007); Mirutse, (2009); Tesfaye, (2009). Given the maximum frequency of leaves utilized for medicinal reasons in the study area, the threat to medicinal plant destruction was found to be small, as root, bark, and stem harvest pose a significant harm to the mother plant. Medicinal plant harvesting that includes roots, rhizomes, bulbs, barks, and stems has a major impact on the survival of mother plants, according to Dawit Abebe and Ahadu Ayehu (1993).Traditional medicinal plant remedy formulations can be done in a variety of ways. Crushing (55.06%) was the most common and popular method of preparation, followed by squeezing (13.48%), chewing (11.24%), and boiling (8.99%).In a similar study, Haile Yinger and Delensaw Yewhalaw (2007) found that crushing was the most popular method of preparation in Oromia Reginal State, Southwestern Ethiopia .In this study, the community also use some other products as additives in their preparations. For example, water, oil, butter, salt, milk, honeys are some of the additives that the community people reported to be used to improve the flavor and reduce adverse effects such as vomiting and diarrhea so that the efficacy of the traditional medicine would be maintained or increased. Such additives were also reported by some previous researchers (DawitAbebe, 1986; MirutseGiday, 1999).

The finding showed that herbal remedies are made with fresh ingredients 45(47.37%), 20(21.05%) were used as dried plant material and 30 (31.58%) either fresh or dried similarly, a

study conducted by previous researchers Endalew Amenu (2007); Haile Yineger and Delenasaw Yewhalaw (2007); Moad Megersa (2010) and Nigussie Amsalu (2010), showed that using fresh materials for various health problems is very common than dry materials because the ingredients are not lost before use compared to the dried forms.

5.1.4. The route of administration of medicinal plants

The route of administration includes oral, dermal, optical ear and nasal. Overall, oral administration was reported as a dominant route of administration 42(57.53%) followed by dermal route 29(39.72). Both the oral and dermal routes allow the prepared medicines to quickly physiologically react with the pathogens and increase their curative capacity. This result coincides with some prior findings Dawit Abebe, (1986). The amounts of medicine to be delivered were stated to be determined by a rough estimate of the patient's age and physical condition. As a result, the medicine dosage was not precise. Dawit Abebe and Ahadu Ayehu (1993) reported that lack of precision in the dosage of traditional remedy as major drawbacks of practicing traditional medicine.

The prepared traditional medicines are applied in a number of ways. Among which drinking 30 species (33.34%), followed by smearing 16 (17.78%). Eating, 9 (10%) put on tie, 16 (17.78%) chewing, 7(7.78%) swallowing, 7 (7.78%) were the dominant routes. This observation is consistent with others, Alemayehu Kefyalew, (2010); Eskedar Abebe, (2011).

5.1.5. Top ranking medicinal plants

Six respondents were asked to compare *Alliums ativum*, *Vernonia amygdalina*, *Lepidium sativum*, *Trigonella foenum-graecum*, *Hagenia abyssinica*, *Cordia africana* and *Coriandrum sativum* based on their efficacy to identify the most effective medicinal plant used for treating abdominal pain. According to Mohammed Adafa (2009), in Tuhuledere, *Allium sativum* is the most recommended species in the treatment of numerous ailments, followed by *Nigella sativa*.

FL values for medicinal herbs that are widely used by communities to treat one or a few ailments will be higher than for medicinal herbs that are less commonly used (Tilahun Teklehaymanot and Mirutse Giday, 2007). For instance, multiple informants claimed that *Allium sativum* was useful to treat malaria; hence it received a 94 percent FL. In a similar study, Endalew Amenu (2007) found that *Allium sativum* was the previous plant species used to cure malaria in the Ejajiarea. The

results revealed that some medicinal herbs were utilized more frequently than others. The medicinal plants supposed to be effective in treating certain disease had higher ICF values, which indicated that these diseases were more common than those with low ICF. Additionally, medicinal plants that are effective in treating specific diseases and are well-known among community members have higher ICF values. With the ICF values ranging from 0.95 to 0.64 per illness category. Due to the high prevalence of the disease in the area, abdominal pain problems had the highest ICF value (0.95), while tonsillitis and goiter had the lowest (0.64) may be due to the unusual occurrence of these diseases and the fact that most are successfully treated by local healers. According to Tilahun Teklehymanot and Mirutse Giday, (2007) medicinal plants that are presumed to be effective in treating a certain disease have higher ICF values. A high ICF value close to 1 indicates that the respondents rely most on the same taxa to manage specific disease condition, While low values of ICF close to 0 indicate that the informants disagree on the taxa to be used in the treatment of a given ailments. In this study, a number of medicinal plants were identified as multipurpose species that can be used for a range of purposes. Medicinal, fodder, food, firewood, constructions, forage, fencing, charcoal, and furniture making are some of the most popular uses. Six commonly reported multipurpose species and eight use categories were included in a direct matrix ranking exercise to assess their relative relevance to local people and the amount of existing threats related to their use values. *Eucalyptus globulus* and *Yushnia alpine* were ranked 1st and 2nd and hence are the most preferred medicinal plants by local people for various uses and are the most abundant species as the informants reported, which was not evidently shown by their distribution scarcity and time required for collection of these species. Similarly, the values for use reports were summed up and ranked across the selected species. The results show that the local people harvest eight multipurpose species primarily for medicine, fencing, firewood, charcoal, food, furniture, construction, and forage, with the first, second, third, fourth, fifth, sixth, seventh, and eighth places, respectively.

5.1.6. Threats to and conservation of medicinal plants

Informants reported that they must travel a long distance to obtain medicinal plants. The ethnobotanical knowledge on uses of medicinal plants is secrete and transferred from one generation to the next orally. The result of the present study showed that charcoal, agricultural expansion, construction, firewood charcoal, fodder and drought were ranked as the most severe

threats not only to medicinal plants but often plants of the Banja District as a whole. According to information provided from key informants, charcoal is the most serious threat to medicinal plants, followed by agricultural expansion. Similarly, this observation is consistent with others (Mirutse Giday, 2001).

Indigenous people of the area have strong and genuine belief on healing power of plants and they know their habitat, distribution, harvesting technique, time of harvest and the status of a plant in the study area. In the study area, for example, 4(7.02%) medicinal plants were found in the majority of home gardens and farm borders, indicating that these plants are used in daily life as medicine or for other purposes. According to Zemedede Asfaw (2001), cultivation for medicinal value accounted for 6% of the plants maintained in home gardens in Ethiopia. Medicinal plants were also kept or protected in close proximity because of their scent, as a live fence to keep enemies at bay, as spices, and as food. Because of their uses for construction, fuel wood, and other value, plants are also left as forest remnants in agricultural fields. Agricultural growth and firewood are the main threatening elements, according to Behailu Etana (2010).

5. 2.CONCLUSION AND RECOMMENDATIONS

5.2. 1.Conclusions

Within the research District, a total of 57 medicinal plants were discovered. Among these, 49 species were employed to remedy human ailments, 3 species were utilized to treat livestock ailments, and 5 species were applied to heal both animal and human ailments. The bulk of these medicinal plants were harvested from the wild (49.12%), followed by agricultural fields (31.58%), home gardens (7.02%), and roadside areas (12.28%). The creation of herbal remedies was accomplished through the utilization of fresh materials (47%), dried plant materials (21%), or fresh and dried materials (32%). Herbs (33.33%) were more frequently employed for medicinal purposes than shrubs, trees, and climbers. The utilization of plant leaves (31.46%) for medicinal purposes is more widespread than other plant parts for the preparation of remedies for both humans and livestock. These remedies were taken with a variety of additives and solvents, with water being the most commonly used. Oral administration 42(57.53%) was the most common method of delivering medicinal herbs, followed by dermal application 29(39.72%). The primary threats to medicinal plants and associated knowledge in this field of study are charcoal production, agricultural expansion, construction, firewood collection, plant fodder usage, and drought, in that order. Major threats to indigenous knowledge include the keeping of secrets, the transfer of knowledge through oral means, young people's unwillingness to learn, species extinction, the effects of contemporary education, and awareness issues. In order to avert the depletion of autochthonous knowledge and guarantee its enduring usage, it is imperative to conduct timely educational initiatives aimed at enhancing the comprehension of the local populace regarding the significance and administration of therapeutic flora, as well as to sensitize traditional medicine practitioners.

5.2.2. Recommendations

The following recommendations are made based on the study's findings

- ✓ The Agricultural Office of the Woreda should provide education, motivation, and assistance to the community to safeguard and oversee the preservation of medicinal and entire plant reserves within their vicinity.

- ✓ The Woreda health department focuses on ensuring uniformity in the measurement and cleanliness of herbal medicines by providing education to traditional healers and community members.
- ✓ The Woreda Agricultural Bureau and community leaders should receive training on cultivating medicinal plants in household gardens alongside their agricultural produce.
- ✓ The inhabitants of the area gather flora from the woodland for diverse reasons without comprehending the danger. As a result, employees in the agricultural sector of the Woreda need to educate the populace on the importance of sustainable harvesting to ensure its continuity.
- ✓ The authorities ought to promote and authorize the native expertise and proficiency of conventional healers in the field of alternative medicine.
- ✓ The Woreda Agricultural Bureau is creating awareness among the youth to prevent adverse effects on medicinal plants and the related knowledge in the area of study.
- ✓ The Woreda Government and Woreda Health Bureau should encourage local herbalists to improve the use of traditional medicine by providing licenses and other benefits.
- ✓ *Phoenix dactylifera* should be prioritized as it was found to be the top-ranked species based on my research.
- ✓ Additional scientific exploration is necessary to extract active components and conduct pharmaceutical research on *Croton macrostachyus* and *Lepidium sativum*, in order to bolster the findings of this study.

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7. APPENDICES

Ethnobotanical study of Medicinal Plants in Banja District, Awi Zone, Amhara Regional State, Ethiopia.

APPENDIX I: Semi structure interview

Date _____ Kebele _____

Name of informant _____ Sex;

Male _____ Female _____ Age _____

Occupation _____ Religion _____ Level of education _____

1. What are the most serious or common human health issues in your area?
2. What are the most serious or prevalent livestock health issues in your area?
3. What are some plants that are used to treat human and cattle diseases?
4. Which parts of the plant do you utilize to cure a specific disease?
5. What further applications do you have for the medicinal plants you listed in question 3?
6. Which part of the medicinal plants you mentioned above are effective in treating diseases?
7. How are the medicinal plant parts gathered?
8. How is the collected plant parts processed?
9. Are the processed plant parts used immediately or are these stored for a latter use?
10. Does the dose differ between sexes and among age groups?
11. Are there any restrictions in taking remedies (e.g., pregnancy, age)?
12. Are medicinal plants easily accessible?
13. Do you have a place where you keep the medicine? If so, in what way and for how long?
14. Where do plants grow? In the wild _____ or in home gardens?

15. How are the prepared remedies taken by the patients(s)? Dermal _____,
Oral _____, Nasal _____, optical _____ or Through the Ear

16. Preparation forms of the plant in your locality (crushed, pounded. powder,
latex/extract with cold water/boiled/juice

17. What are the major threats to medicinal plants?

18. How do you conserve the medicinal plants?

Thank you!!

APPENDIX II: List of medicinal plant species used for Human; Livestock ailments and Both in Banja District: Scientific name; Family name; Local name; Habit; Disease treated Plant parts used; mode of Preparation and route administration in study area.

Scientific name	Family name	Local name		Habit	Disease treated	Plant parts used, mode of preparation and application	Route of administration	Human, Livestock or both	Collection code
		Amharic	Awgni						
<i>Acanthus emines</i>	Asteraceae	Kosheshilie	dandury	Herb	Stabbing pain	Stems: The stems will be tied on pain surface Root: Fresh root boiled with water is applied on the horse skin	Der.	Both	AK 01
<i>Carica papaya</i>	Caricaceae	Papaya	Papaya	tree	Amoeba gastritis	A coffee cup of fresh seeds are chewed & swallowed it before meal	Ora.	Human	AK 02
<i>Citrus aurantifolia</i>	Rutaceae	Lomy	Lminy	Tree	Athletes foot Asthma	Fruit: The fruit of Citrus lemon is squeezed and creamed on affected part for continuous days Leaves: Boil the leaves with stem of sugar cane and drink hot decoction	Ora	Human	AK 03
<i>Coffea arabica</i>	Rubiaceae	Buna	Bun	Shurb	Fire burn	Dried seeds roasted, pounded & pasted on the burning part	Der.	Human	AK 04
<i>Cordia africana</i>	Boraginace	Wanza	Bgitsy	Tree	Amoeba, intestinal worms	Fruits: a beaker of fresh fruits are soaked in water for one day & a glass of juice given to drink for three consecutive days before food	Ora	Human	AK 05

<i>Solanum anguiva</i>	Solanaceae	Zerchembuay	Kulempampa	Herb	Eczema Snake bit	Roots: Yemidiremboay together with Yegibmrkuz (Steganotaeniaaraliaceae) root crushed and put on wound surface Fruits: Yemidiremboay together with Allium sativum and Chili (Capsicum annum) Mix up Honey or Butter and smear on wound Roots: Chewing the root and swallowing the juice	Der	Human	AK 06
<i>Cucurbita pepol</i>	Cucurbitaceae	Duba	Dbi /Ptu/	Climber	Impotency Malaria	Seed: fresh/dried seeds are chewed & swallowed The fresh fruit is chopped, boiled & then, eaten as food	Ora	Human	AK 07
<i>Eucalyptus globules</i>	Myrtaceae	Nechbahirzaf	Fuchybarzaf	Tree	Febrile illness Catarrh/common cold/	Leave: fresh leaves are boiled in water then, inhaled the vapor & smear the body at bed time. Insert the fresh leaf into nose for a hour and inhale.	Ora Nas	Human	AK 08
<i>Aloe monticola</i>	Aloaceae	Erret	Embrkaky	Shrub	Wound Continuous weight loss Insecticide W eevil	Sap: Cut the leaves and take a jelly juice and paint on infected site Leaves: Fresh or dried leaf is given orally for continuously loss cattle Leaves: put the leaves where the cereal stored.	Der Ora	Both	AK 09
<i>Justicia schimperiana</i>	Acanthaceae	Simiza (sensel)	Lili	Shurb	Jaundice	A handful fresh leaves are squeezed & a tea cup of juice	Ora	Human	AK 10

					Rabies Newcastle	is drunk for seven days in the morning before breakfast. Leaves: fresh leaves are squeezed, mixed with milk of a cow which has the same color with its calf & drunk. Leaves: the fresh leaves are squeezed with water & mixed with injera, then eaten.			
<i>Kalanchoe petitiiana</i>	Crassulaceae	Andahula	Anduki	Shurb	Ear pain Evil eye Common cold Tonsillitis Tooth ache	Roots: The roots of <i>Kalanchoe petitiiana</i> are squeezed and added few drops through ear Roots: Fresh root is inhaled nasally Roots: Fresh root is fumigated nasally Roots: Fresh root crushed with water is given Roots: Chewing fresh root	Ora	Human	AK 11
<i>Lepidium sativum</i>	Brassicaceae	Fto	Fitsu	Herb	Tumor Gonorrhea Internal parasite	Stem: Put a hot stem on wound surface Seeds: Crush the seeds and mix with boiled milk and drink Seeds: Crushed seed mixed with water is given orally for cattle	Der Ora	Both	AK 12
<i>Melia azedarach</i>	Meliaceae	Neem	Mym	Tree	Diarrhea, tonsillitis Toothache	Leaves: the fresh Leaves are squeezed & the juice is taken orally Leaves: the fresh young leaves is chewed & held on	Ora Ora	Human	AK 13

						the teeth			
<i>Ocimum lamyfolium</i>	Lamiaceae	Damakese	Tasy-ijo	Herb	Febrile illness headache, cough, malaise	Fresh leaves are squeezed ,added into a cup of coffee then drunk & smeared the body		Human	AK 14
<i>Olea europaea L. subsp. Cuspidai</i>	Oleaceae	Woirra	Wiri	Tree	Insect repellent Mumps	Fresh/dried whole plant parts are burned & fumigated the smoke inside the homestead, as soon as insect leave from human body Leaves: the fresh leaves are crushed, squeezed with water &then filtered solution is dropped into the ear	Der Ora	Human	AK 15
<i>Phytolacca dodecandra</i>	Phytolaccaceae	Endod	Sibty	Shrub	Vomiting Or 'kuruba' Abortion	Stem: Crush the stem and mix with whey and drink Leaves: Squeeze the leaves and drink with honey Roots: Crushed root mixed with water is given orally	Ora	Human	AK 16
<i>Rhamnus prinoide</i>	Rhamnaceae	Gesho	Geshu	Shrub	Tonsillitis/ uvulitis	Leaves: seven fresh leaves are collected from seven places, chewed together with seven barley malt & taken the filtered solution, & the remaining part(sludge) put on the head three times	Ora Der	Human	AK 17
<i>Millettiaferruginea</i>	Fabaceae	Birbira	Chihuy	Chihuy	Skin infection Goiter	Dry fruit powder is mixed with butter and salt and then applied to the infected skin. Chewing the fruit for goiter	Der Ora	Human	AK 18

<i>Ricinus communis</i>	Euphorbia	Chaqima (gulo)	Chakmy	Shrub	Horn worm	Fresh leaves are pounded & pasted on the injured part of the horn	Der	Livestock	AK 19
<i>Rumex nervosus</i>	Polygonaceae	Embacho	Embochu	Shrub	Hemorrhoid External parasite Wart	Leaves: fresh leaves are crushed & rubbed on the affected part until it recovers Leaves: a bunch of fresh leaves are pounded, mixed with little water & then wash the body of cattle once a day until it remove Leaf: add fresh juice until the wart recover	Der	Both	AK 20
<i>Ruta chalepensis</i>	Rutaceae	Tenadam	Naruky	Herb	Common cold Malaria	Leaves: Boil the leaves with tea or milk and then drink Stem: Dried or fresh shoot boiled with ginger and drink	Ora	Human	AK 21
<i>Sida schimperiana</i>	Malvaceae	Chifrig	Chifrngy	Shrub	Syphilis	Roots: Crush the roots and mix with honey and swallow	Ora	Human	AK 22
<i>Solanum incanum</i>	Solanaceae	Embuay	Empampy	Shrub	stomachache	The 'atik' size of fresh root is chewed & sucked before food	Ora	Human	AK 23
<i>Trigonella foenum-graecum</i>	Fabaceae	Abish	Kochy	Herb	Swelling Abdominal pain	Seeds: Crush both Abish and Bean, then mix with water and tie on the swell part Seeds: Crushed seeds mixed with water and honey and then drink	Der Ora	Human	AK 24
<i>Vernonia amygdalina</i>	Asteraceae	Grawa	Kukitsy	Tree	Stomachache	Root: the 'atik' size of fresh root is crushed, squeezed in	Ora	Human	AK 25

					e/abdominal pain Wound	water & one coffee cup is drunk Root: fresh/dried root bark is crushed , mixed with few water & pasted on the wound	Der		
<i>Allium sativum</i>	Alliaceae	Nech Shinkurt	Shingurchy	Herb	Intestinal pain Kidney pain Common cold Malaria Kidney filtration	Bulbs: Crush the bulb and swallow it before food Bulbs: Boil with water and drink Bulbs: Eating with food Bulbs: Eating one-two parts before food Ora		Human	AK 26
<i>Amaranthus spinosus</i>	Amaranthaceae	Aluma	Zagristy	Herb	Tapeworm, ascariasis	Seeds: one cup of dried seeds are grounded, mixed in water, salt & a glass of solution is drunk in the morning before breakfast for three consecutive days	Ora	Human	AK 27
<i>Coriandrum sativum</i>	Apiaceae	Dinbilal	Endadby	Herb	Diarrhea (Ascariasis)	Seeds: Boil the seeds with water and drink it	Ora	Human	AK 28
<i>Malva verticillata</i>	Malvaceae	Lut	Lity	Herb	Head ache Skinny calf	Roots: Crush the root and mix with water and wash the head Root: grind the root; wash by water and for skinny calves to drink.	Der Ora	Human	AK 29
<i>Combretum cllinum</i>	Combretaceae	Abalo	Abaly	Shrub	Eye pain Leprosy	Buds: Squeeze one-seven buds and paint on the eye Fruit: Crush the fruit and mix with honey and paint on wound	Der	Human	AK 30

<i>Croton macrostachyus</i>	Euphorbiaceae	Bisana	Asisy	Tree	Fungal skin disease Malaria	Buds: The buds are squeezed and the content is dropped on the infected site Buds: Eat fresh shoot tip with shirowot	Der Ora	Both	AK 31
<i>Datura stramonium</i>	Solanaceae	Astenagir	Liflif	Herb	Ear insect Dandruff Toothache	Leaves: Crush the leaves and squeezed the liquid part and drop into ear Leaves: Crush the leaves and paint on infected area or head Seeds: Dried seeds with <i>Capparistomentosa</i> fresh or dried root is fumigated orally	Der Ora	Human	AK 32
<i>Embelias chimperi</i>	Myrsinaceae	Enkoko	Enkoku	Shrub	Tape worm Hepatitis	Seeds: Crush the seeds and eat with porridge or drink with water Leaves: Crushed leaves with Niger and after drink	Ora	Human	AK 33
<i>Hagenia abyssinica</i>	Rosaceae	Kosso	Shenchy	Tree	Tape worm	Fruits: Crush the fruit and mix with water and drink	Ora	Human	AK 34
<i>Verbena officinalis</i>	Verbenaceae	Atuch		Herb	Stabbing pai	Roots, Leaves and Fruits: are crushed with cardamom and mix with Honey and swallow	Ora	Human	AK 35
<i>Acmella caulirhiza</i>	Asteraceae	YemdirBerberie	Bit-bierbiera	Herb	Tonsillitis	Flower: Chewing the flower and swallow	Ora	Human	AK 36
<i>Phoenix reclinata</i>	Arecaceae	Selen	Ankuty	Tree	Goiter	Leaves: The leaves will be squeeze and paint on goiter	Der	Human	AK 37
<i>Verbascum</i>	Scrophulariaceae	Ketetina		Shrub	Skinny	Roots and Leaves: Crush	Ora	Livesto	AK

<i>sinaiticum</i>	ae				(weak body)	together with salt and eat		ck	38
<i>Stephania abyssinica</i>	Menispermaceae	Yeathareg	Yintsi-ahera	Climber	Wound	Root: Crush the roots and paint on wound surface	Der	Human	AK 39
<i>Clematis simensis</i>	Rununculaceae	Yeazohareg	Azu-aher	Climber	Swelling	Leaves: Fresh leaf juice with water is applied topically	Der	Human	AK 40
<i>Euphorbia abyssinica</i>	Euphorbiaceae	Kulqual	Kulkuly	Herb	Rabies Wound, tumor	Latex: fresh latex is collected & drunk Latex: fresh latex is smeared on the surface & around infected part	Ora Der	Livestock	AK 41
<i>Rosa abyssinica</i>	Rosaceae	Kega	Gimsy	Shrub	Tape worm	Fruits: Fresh fruit is given for eating	Ora	Human	AK 42
<i>Maytenus arbutifolia</i>	Celastraceae	Koba	Koky	Tree	Venereal diseases	Bark: Dried, roasted stem bark powder with butter is applied on infected place	Der	Human	AK 43
<i>Prunus persica</i>	Rosaceae	Kok	Kok	Tree	Swelling	Leaves: Dried leaf powder mixed with food is given orally	Ora	Human	AK 44
<i>Yushnia alpina</i>	Poaceae	Kerikha	Aniny	Tree	Shotelay	Roots: the root of <i>Yushinaalpina</i> is tie on neck part of the body	Der	Human	AK 45
<i>Psidium guajava</i>	Myrtaceae	Zeytun	Zaitun	Tree	Amoeba	Seeds: The seeds are eaten together with its fruits	Ora	Human	AK 46
<i>Cymbopogon commutatus</i>	Poaceae	Serdo	Kimbahy	Climber	Breast swelling	Stem: Crush the stem and mix with honey and drink it	Ora	Human	AK 47
<i>Mentha spicata</i>	Lamiaceae	Nana		Herb	Syphilis	Leaves; the leaf is pounded, With butter and creamed on the affected part.	Der	Human	AK 48

<i>Opuntia ficusmedica</i>	Moraceae	Beles	Kotlebeles	Shrub	Ear pain	Sap: Pour the liquid part of the leaves into ear	Der	Human	AK 49
<i>Rumex abyssiniensis</i>	Polygonaceae	Mkmeke	Mihuy	Herb	Hypertension	Root: grind dried root full well, mix with tea and drink.	Ora	Human	AK 50
<i>Lupinus albus</i>	Fabaceae	Gibto	Gibtsu	Herb	Hypertension	Seed: take seven seeds, soak in water with grind garlic for seven days, and drink five spoon every day.	Ora	Human	AK 51
<i>Plantago lanceolata</i>	Plantaginaceae	Gorteb	Kurtiby	Herb	Wound	Leaf: squeeze the leaf and smear the juice on wound or cut part.	Der	Human	AK 52
<i>Urtica simensis</i>	Urticaceae	Samma	Siry	Herb	Gastritis	Leaf: harvest fresh leaf and cook it. Cool it very well and eat with injera.	Ora	Human	AK 53
<i>Urtica dioica</i>	Urticaceae	Kusha	Ababry	Herb	Fire burn	Root: chop or crush fresh root and tie the wound with gauze.	Der	Human	AK 54
<i>Clausena anisata</i> <i>Carissa spinarum</i>	Rutaceae	Limich	Luntsy	Tree	Evil eye	Roots: The fresh roots are crushed and mixed with water and drunk	Ora	Human	AK 55
<i>Schinus molle</i>	Anacardiaceae	Kundobebererie	Tree		Tonsillitis Common cold Toothache	Seed: the seeds of <i>Schinus molle</i> are powdered and mixed with water then taken. Leaves: the leaves are boiled with water and drunk. The fresh leaves are chewed & caught on the feeling parts of teeth for a few times	Ora	Human	AK 57

APPENDIX II. Number of medicinal plants in each family**Table 1.** Number of medicinal plants in each family

No.	Family	Number of plant species	Percentage of plant species (%)
1	Acanthaceae	1	1.75
2	Alliaceae	1	1.75
3	Anacardiaceae	1	1.75
4	Apiaceae	1	1.75
5	Amaranthaceae	1	1.75
6	Arecaceae	1	1.75
7	Apocynaceae	1	1.75
8	Asteraceae	3	5.26
9	Brassicaceae	1	1.75
10	Caricaceae	1	1.75
11	Celastraceae	1	1.75
12	Combretaceae	1	1.75
13	Crassulaceae	1	1.75
14	Cucurbitaceae	1	1.75
15	Euphorbiaceae	3	5.26
16	Fabaceae	3	5.26
17	Lamiaceae	2	3.5
18	Linaceae	1	1.75
19	Moraceae	1	1.75
20	Myrsinaceae	1	1.75
21	Myrtaceae	2	3.5
22	Oleaceae	1	1.75
23	Phytolaccaceae	1	1.75
24	Polygonaceae	2	3.5
25	Ranunculaceae	1	1.75
26	Rhamnaceae	1	1.75
27	Rosaceae	3	5.26
28	Menispermaceae	1	1.75
29	Rutaceae	3	5.26

30	Solanaceae	3	5.26
31	Malvaceae	2	3.5
32	Poaceae	2	3.5
33	Utricaceae	2	3.5
34	Boraginaceae	1	1.75
35	Aloaceae	1	1.75
36	Meliaceae	1	1.75
37	Verbenaceae	1	1.75
38	Scrophulariaceae	1	1.75
39	Plantagonaceae	1	1.75
Total	39	57	100

APPEND IX : field work and Specimen identification in AAU National herbarium



