



**JIMMA UNIVERSITY**

**COLLEGE OF NATURAL SCIENCES**

**DEPARTMENT OF BIOLOGY**

**ETHNO-BOTANICAL STUDY OF MEDICINAL PLANTS USED TO TREAT  
HUMAN AILMENTS BY LOCAL PEOPLE OF CHORA DISTRICT, BUNO  
BEDELLE ZONE, OROMIA REGIONAL STATE**

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## **List of symbols and acronym**

**WHO**= World Health Organization

**HIV/AIDS** = Human Immunodeficiency viruses, Acquired immunodeficiency syndrome

**UNEP** =United nation Environmental program

**UNESCO**= United Nations Educational, Scientific and Cultural Organization

**NDA**= New Drug application

**SNNPR**= Southern, Nation Nationalities and Peoples 'Region

**NGO**= Non Government Organization



## **Abstract**

*Medicinal plant species are very crucial in Ethiopia for human well-being and provides a significant number of remedies required in healthcare. The objectives of the study was to assess traditional use of medicinal plants used to treat human ailments by local communities of Chora district, Buno Bedelle Zone, Oromia Regional State. This study was conducted from January 2018 to August 2018 and a cross sectional study design was used for the study area. Sixty total informants were selected purposely from five kebeles of Chora district. Selections of informants were based on the presence of traditional healers in the study area. Out of the total informants, 20 were selected as key informants by simple random sampling technique. Data were collected through semi-structured interviews and field observation (guided field walks) with informants. Data were organized and analyzed using excel spread sheet and the results were presented using tables and graphs. Accordingly, a total of 51 medicinal plant species belonging to 48 genera and 28 families were identified and documented. A total of 28 ailments were identified which are treated by medicinal plants, among which, abdominal cramp was frequently reported. Out of 28 families Lamiaceae and Asteraceae were the most reported medicinal plants to treat human ailments in the study area. According to the habit of medicinal plants used in the study area, herbs were the most used growth form which account for about 47% followed by shrubs (37%). From collected plant species leaf and its crashed forms were most preferred in remedy preparation. Oral application was the highest reported administration route (56.86%) of medicine. Traditional medicine and associated indigenous knowledge are the main system to maintain human health in the selected kebeles of Chora district. But minimal conservation methods were recorded in the community. Thus; in-situ and ex-situ conservation practice and sustainable utilization are required in the community.*

**Key words:-**Human ailments, medicinal plants, traditional healers, traditional medicine.

# 1. Introduction

## 1.1 Background of the study

People in different parts of the world depend on plant resources for their basic needs and are aware of many useful species occurring in their ecosystem. They have continuously developed their traditional knowledge of plant uses and plant resource management (Belete Assefa *et al.*, 2010). Medicinal plants are one part of the plant resources that have a potential capacity for treatment of various diseases and used in the commercial production of drugs (Bako *et al.*) . Traditional medicine has not only played a vital role in providing healing but also contributed to the discovery of most pharmaceutically active substances in plants (Sakkir *et al.*, 2012) . Around 80% of the population depend on traditional medicine due to the cultural acceptability of healers and local pharmacopeias, the relatively low cost of traditional medicine and difficult to access the modern health facilities (WHO, 2002; Endashaw Bekele, 2007). Ethiopia is a country characterized by a wide range of climate and ecological condition ,possess enormous diversity of fauna and flora (pankhust,2001 ).The country possess a wide range of potentially useful medicinal plants ,more extensive ended than available in many other parts of the world (Dawit Abebe 1986 ).

Due to anthropogenic activities such as environmental degradation, agricultural Expansion, clearing of forests and wood lands, over-harvesting, fire, cultivation of marginal lands and overgrazing appear to be the major threats to the medicinal plants of Ethiopia. Such a threat poses a significant impact to the future wellbeing of the human and animal populations that have for generations, relied on these resources to combat various ailments (Endashaw Bekele, 2007). Therefore, documentation of indigenous and related knowledge on the utilization to treat human ailments and conservation of medicinal plant is required from the study site to seek solution to the major threats towards medicinal plants. However, Ethno botanical studies on medicinal plants in the country are limited as compared to the multiethnic and cultural diversity of the people, the diverse flora of the country and vital role played by traditional medicinal plants for the primary healthcare (Debela Hunde *et al.*, 2006).

Similarly, in the study area there is no study or documentation with the same issue before. However, the people use traditional medicines from plants continuously to combat human ailments. Therefore, like any other areas of Ethiopia, the study area need documentation of ethno- botanical knowledge to know the status of medicinal plants and to share the knowledge of the local people about the use and conservation measures the people practice.

Thus, this study was initiated to analyze and document the plant species and indigenous knowledge on the use of medicinal plants in treating human ailments and their associated knowledge used by the local people in some selected Kebles of Chora district.

## **1.2 Statement of the Problem**

The People in developing countries such as Ethiopia are highly dependent on traditional medicine for primary health care for both humans and livestock. In Ethiopia, about 80% of the populations use traditional medicine for primary health care (WHO, 2002). However, the indigenous knowledge about traditional medicine is transferred secretly from generation to generation through oral means. There is a gap in the document and records on medicinal plants utilization in the country. The study area is highly suffering from habitat and plant species loss due to continued deforestation. However, so far any research work has not been conducted on the traditional uses of medicinal plants and associated knowledge in the area.

## **1.3 Research question**

1. Which plant species are used for medicinal purposes?
2. Which parts of medicinal plants are used for remedy preparation?
3. What are the main factors that cause threats to medicinal plants in the study site?
4. What are the conservation methods of medicinal plants?

## **1.4 Objectives of the Study**

### **1.4.1 General Objective**

- ❖ To assess traditional use of medicinal plants to treat human ailments in Chora district.

### **1.4.2 Specific Objectives**

- ❖ To collect, identify and document medicinal plants used for treatment of human ailments in the study area.
- ❖ To record methods of preparation, plant parts and dosage used by the local people.
- ❖ To assess the major threats on medicinal plants and related aspects in the area.
- ❖ To record the conservation measures used by the local people in the study area.

## **1.5 Significance of the Study**

This study will help people of the study area to aware about problems associated with medicinal plants and give attention for the threatened medicinal plants. In addition, the documentation of the indigenous knowledge on medicinal plants and identified plant species can be part of the information source for those who want to conduct further research in the same issue and the development of modern drugs.

## **2. Literature Review**

### **2.1. History and Development of ethno-botany**

Different authors used various ways of defining ethno-botany depending on the interest of the workers involved in the study. The term has been given different interpretation and definition (Cotton, 1996). According to Martin (1995), it is broadly defined as the subject dealing with the study of direct interactions between humans and plants. However, Balick and Cox (1996) expanded this field of study by including the use of plants for food, medicine, forage and for any other economic purpose within field of ethno-botany. According to Balick and Cox (1996), research concerned with ethno-botany involves recording the knowledge on the cultural interaction of people with plants, finding out how local people have traditionally used plants for various purposes, and how they incorporate plants into their cultural tradition and religion. However, to get more detailed and reliable information in this concern, ethno botanical investigation needs to involve scholars from different field of studies such as plant taxonomy, plant ecology, anthropology, linguistic, economic botany, pharmacology and the like (Martin, 1995).

There are various techniques of inquiry tools based on the aims and objectives of the ethno-botanical study at hand (Martin, 1995; Alexiades, 1996). These inquiry techniques include participant observation, field interviews, and group discussion, checklist interview and market survey.

### **2.2 Indigenous knowledge and medicinal plants**

In all countries of the world there exists traditional knowledge related to the health of humans and animals. It is usually unwritten and preserved in the culture through oral tradition. It refers to the knowledge system of indigenous people and minority cultures (UNESCO, 1994). In the scientific viewpoint, traditional knowledge is first and foremost a resource which is considered as a body of information and set of skills developed by a group of people over time (Nakashima, 2000). In the past studies, many researchers have expressed their appreciation of the wealth of useful information embedded in traditional knowledge and recognized the utility of integrating scientific and traditional knowledge (Martin, 1995; Cotton, 1996). However, the integration of indigenous knowledge into

science requires the extraction of relevant knowledge through a process of scientific validation and evaluation in order to identify the useful information (Nakashima, 2000).

The body of traditional knowledge is dynamic, and practitioners make efforts to widen their knowledge exchange of information with each other or through reading of traditional pharmacopeia. Therefore, modernization including modern medicine and introduced culture are probably issues involved in changing the focus of people's educational endeavors towards indigenous knowledge. This modernization has been accompanied by the inability of people, particularly the young to recognize value in traditional ways as related to their daily lives (Dawi Abebet, 2001).

## **2.3 Application of Traditional Medicine in Different Part of the Worlds**

### **2.3.1 Use of Medicinal Plants in Developed Nations**

In fact, majority of the developing countries rely on medicinal plants for the primary healthcare. This is not only because of poverty, shortage of allopathic doctors, and less access of hospitals but due to the fact it is more culturally accepted (WHO, 2002; Hamilton *et al.*, 2003). While showing how far these traditional medicines goes in line with our physiological needs, Hippocrates who mainly remembered as a father of medicine said that herbal remedies contain synergistic and side effects neutralizing combinations (Gilani and Rahman, 2005).

The interest of medicinal plant is not only for developing countries but also it is true for developed worlds. For example, India, Korea, Japan, China, and Malaysia are frequently cited countries in using traditional medicine (WHO, 2002). According to the same report, countries like Australia, Europe and North America increasingly used complementary and alternative medicine particularly for treating and managing chronic disease.

### **2.3.2. Uses of Traditional Medicinal Plants in Africa**

As elsewhere in other continents, Africans have been supposed to use traditional medicine to safe guard against disease since time immemorial (Lewu and Afolayan, 2009; Izugbara and Duru, 2008). According to WHO (2002), about 80% of the populations in Africa primarily rely on traditional medicine. As a matter of testimonial there has been found documentary evidences like that of medicinal plants of East Africa (Kokwaro, 1976),

Medicinal plants of North Africa (Boulos, 1983). Hutching also emphasized the use of herbal remedies for the physical and physiological health care in South Africa.

WHO (2002) reported the degree of some specific African countries towards the use of traditional plants; accordingly, 70% of the Benin and Rwandans, 60% of Tanzanians and Uganda peoples are reported to rely on medicinal plants. The same organization in 2003 reported the use of traditional medicine in treating and proactive prevention for some chronic disease. For example, in Ghana, Mali, Nigeria and Zambia, the first line treatment for 60% of children with malaria is the use of herbal medicine, and in South Africa, 70% of people living with HIV/AIDS use traditional medicine (WHO, 2003).

### **2.3.3 Overview of Medicinal plants in Ethiopia**

Ethiopia is believed to be home for about 6,500 species of higher plants with approximately 12% endemism, and hence one of the six plant biodiversity rich countries of Africa (Endashaw Bekele, 2007). The genetic diversity contained in the various biotic make up is also high thus making the country a critical diversity hot spot for plants (UNEP, 1995).

Ethiopia has a significant portion of two of the world's 35 biodiversity rich areas hot spot i.e. the eastern Afromontane Biodiversity Hotspot and the Horn of Africa-Biodiversity Hot Spot. These hotspots house a lot of the useful wild biodiversity, particularly that of medicinal plants. The biodiversity richness of Ethiopia was known since 5000 years ago when ancient Egyptians Greeks and Romans used it as a source of unique commodities like Frankincense, Myrrh and other plant products, which are also used for medicine preparation (Thulin, 2004). Most Ethiopian traditional medicinal knowledge is kept in strict secrecy; however, it is dynamic in that the practitioners make every effort to widen their scope by reciprocal exchange of limited information with each other or through reading the traditional pharmacopeias (Dawit Abebe, 1986).

### **2.3.4. Utilization Status of Traditional Medicines in Ethiopia**

As known, Ethiopia is a land of mosaic topographies which is responsible to have diverse floras and faunas, a land of multiple ethnic groups (Dawit Abebe and Ahadu Ayehu, 1993). These traditional practices associated with plant base health care systems are in use since

time immemorial (Dawit Abebe ,1986) and was supposed to be the only system available for health care before the introduction of allopathic medicine to get cured from disease arising from worms, fungi, virus and protozoa (Dawit Abebe,2001). According to this scholar 80% of the populations in Ethiopia use medicinal plants as the primarily health care system. Similar report by WHO (2002) stated that 80% of the Ethiopian populations using traditional plants for their primary health care. This percentage is greater than other developing countries like Benin (70%), Rwanda (70%), Tanzania (60%), and Uganda (60%). This implies that the uses of traditional medicine in Ethiopia for primary health care are becoming accepted and popular as compare to other African countries.

## **2.4 Ethno-Medicine Research in Ethiopia**

The contribution of medicinal plant species to modern health system and the poor society who live mainly in the rural area is very high, lack of detailed descriptions of the medicinal plants has made it difficult for the researchers to decide the identity of these plants universally with the only reference being the local names of the plants and there is very little attention in modern research and development and the effort made to upgrade is not satisfactory. One of the reasons is that the traditional medicinal plant species are not well described (Mesfin Tadese and Sebsibe Demissew, 1992).

According to Sebsibe Demissew and Ermias Dagne (2001), when research is conducted on the medicinal plant species, it must target on the fact that the providers of the indigenous knowledge should get a fair share on the benefits of the development of medicines. According to Tesfaye Awas, (2007), detailed information on medicinal plants of Ethiopia could only be obtained when studies are under taken in various parts of the country where little or no botanical and ethno botanical studies have been conducted. Scientific research on medicinal plants provides additional evidence to the present knowledge of medicinal plants which has been handed down from generation to generation (WHO, 1998). As it has already been stated by Cunningham (1993) and Alexiades (1996), it is better to involve traditionally medical practitioners in pharmaceutical companies. The modern health professionals and some of the consumers ask for scientific based evidence. This encourages for better and more research work. According to Kannon (2004), research on medicinal plants should direct for quality control and the research should examine active herbal constitute for efficacy and toxicity of the herbs.



To preserve indigenous knowledge of traditional medicinal plant in particular, an ethno botanical survey of lesser-studied socio-cultural groups is very crucial. However, in Ethiopia research and documentation on medicinal plants have been started only very recently (Mesfin Tadese and Sebsibe Demissew, 1992). Limited number of these papers dealt with specific socio-cultural groups in specific areas. When compared to the country's varied flora and the socio-cultural diversity, these studies are incomplete as medicinal plant healing systems differed from culture to culture. Due to this, attention should be given to the field of ethno medicine of the country with all necessary endeavors to have a full picture of the country's medicinal plants potentials.

#### **2.4.1 Role of Medicinal Plants in New Drug Developments**

Medicinal plants are important element of indigenous medicinal systems worldwide. Traditional medicine is able to contribute significantly to the common goal of health for all by its capacity to maintain health and treat diseases (WHO, 2000). 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, 1994). 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 (Maundu *et al.*, 2006).

In general, many investigations indicated the relevance of Ethno botanical 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 Ethno botanical 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.

## **2.5. The Role of Ethno-Botanical Study and Medicinal Plant in Ethiopia**

### **2.5.1 Medicinal Plants for Human Healthcare System**

As in any African countries, the use of plants in religious ceremonies as well as for magic and medicinal purposes is common in Ethiopia. This knowledge of traditional medicine has been passed by oral from one generation to the next by healers and knowledgeable elders. However, as time goes on, the traditional knowledge is gradually worn away for reasons mainly attributed to environmental degradation and deforestation, which in turn brought about the loss of some species including medicinal plants (Dessalegn Desissa, 2000).

Plant diversity remains crucial for human well-being and still provides a significant number of remedies required in healthcare. Medicinal plants played a pivotal role in the treatment of various afflictions in Ethiopia (Fikadu Fullas, 2007). For the role-played by plant derived products in human and livestock health, systematic scientific investigations are vital (WHO, 1998). Plants play a major role in providing prototype molecules for possible development into conventional drugs by the pharmaceutical industry (Fikadu Fullas, 2007). However, only small fractions of the world's plants have been investigated scientifically so far, but, human kind has already reaped enormous benefits from it (Farnsworth, 1985).

### **2.5.2 Role of Ethno-botanical studies for Conservation of Biodiversity in Ethiopia**

Ethno medicine, that encompasses indigenous knowledge, besides studying the actual medicinal values of plants, it plays a great role for the conservation of biodiversities. Studies conducted in Ethiopia have found out some cultural believes and traditional

practices which are so vital in contributing to the conservation of medicinal plants in particular and biodiversity as a whole. For example, Etana Tolesa (2007) listed out various local beliefs and cultural traditions used for the conservation of medicinal plants in Gimbi woreda (Western Wellega). The other study by Fisseha Mesfin, (2007) also documented and suggested on cultural and spiritual beliefs used for the conservation of medicinal plants in Wonagoworeda (SNNPR). Other cultural practices for example the Geda culture (Abba Geda) in Oromo also do have an important contribution in biodiversity conservation. Thus, Ethno botany if strengthen and work together with its stakeholders like the local communities, governments, educators, NGOs, and others can address future environmental degradations and accelerating loss of cultural knowledge and language (Hamilton, *et al.*, 2003).

## **2.6. Threats to Medicinal plants**

Many of the threats to medicinal plant species are similar to those causing endangerment to plant diversity generally. The most serious proximate threats generally are habitat loss, habitat degradation and over-harvesting (Hamilton, 1997; Maundu *et al.*, 2006). Medicinal plants can have other uses besides as sources of medicines, and the threats from over-harvesting may be due to effects of collection for purposes other than medicinal. The majority of species of plants in traditional or herbal medical treatments are harvested in the wild rather than cultivated. As a result, many plant species have become extinct and some are endangered. It is therefore necessary that systematic cultivation of medicinal plants be introduced in order to protect threatened species.

As population grows, demand for traditional medicines will increase, and pressure on medicinal plant resources will become greater than ever (Hamilton, 2003). Like other developing countries, the loss of valuable medicinal plants in Ethiopia due to population pressure, loss of habitat, agricultural expansion and deforestation is widely reported by different workers in Ethiopia, Zemedu Asfaw, (2001). Thus, documentation of medicinal use of plants is becoming increasingly urgent because of the rapid loss of the natural habitat for some of these plants due to anthropogenic activities.

## **2.7 Conservation of medicinal plants**

Laterally the term 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 Zemedede Asfaw, (2001), medicinal plants are considered to be at conservation risk due to over use and destructive harvesting (roots and barks collection).

Dawit Abebe and Ahadu Ayehu (1993) found that many medicinal preparations use roots, stem and bark by effectively killing the plant in harvest. Plant parts used to prepare remedies are different; however, root is the most widely used part. Such wide utilization of root part for human and livestock aliments with no replacement has severe effect on the future availability of the plant. Recent work of (Haile Yinger, 2005) confirms the fact that of the total plant parts to prepare remedies root is widely used with 64 species (35.5%) followed by leaf 47 species (25.97%) which hence affects sustainable utilization. This implies that the major factor for the loss of medicinal plants in Ethiopia.

In a broad sense, conservation is achieved using in-situ and ex-situ means. In-situ conservation is conservation of species in their natural habitat. Some traditional medicinal plants have to be conserved in-situ due to difficulty for domestication and management (Zemedede 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 (Zemedede Asfaw, 2001), this can be possible in places of worship (churches, mosques, so on), road sides, and garden.

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

### 3. Materials and Methods

#### 3.1. Description of the Study Area

The study was conducted in Chora District, Buno Bedele Zone, Oromia Regional State southwest Ethiopia. The district has currently 32 rural and 2 urban kebeles. Based on the information obtained from Chora district agricultural office, the district is generally characterized by a mean annual temperature maximum 31<sup>0</sup>C, minimum 9<sup>0</sup>C and annual rainfall ranges from 1,500-2,200mm. Chora district is bounded by Bedele district in the East, Yayo district in the west, Degga district in the North and Jimma Zone in the South. It is located at 515 Km away from Addis Ababa and 36 km from zonal capital Bedele. According to the data obtained from the District Agricultural Office, the total area of the district is 78, 388.5 hectares and total population of the district is 133,766. Most of the people in Chora district are agrarian and live on agricultural products. The cash crops like Coffee and Khat are used as a source of income whereas some of the food crops like maize, tef, sorghum, wheat, bean and others are used as source of food for domestic use.

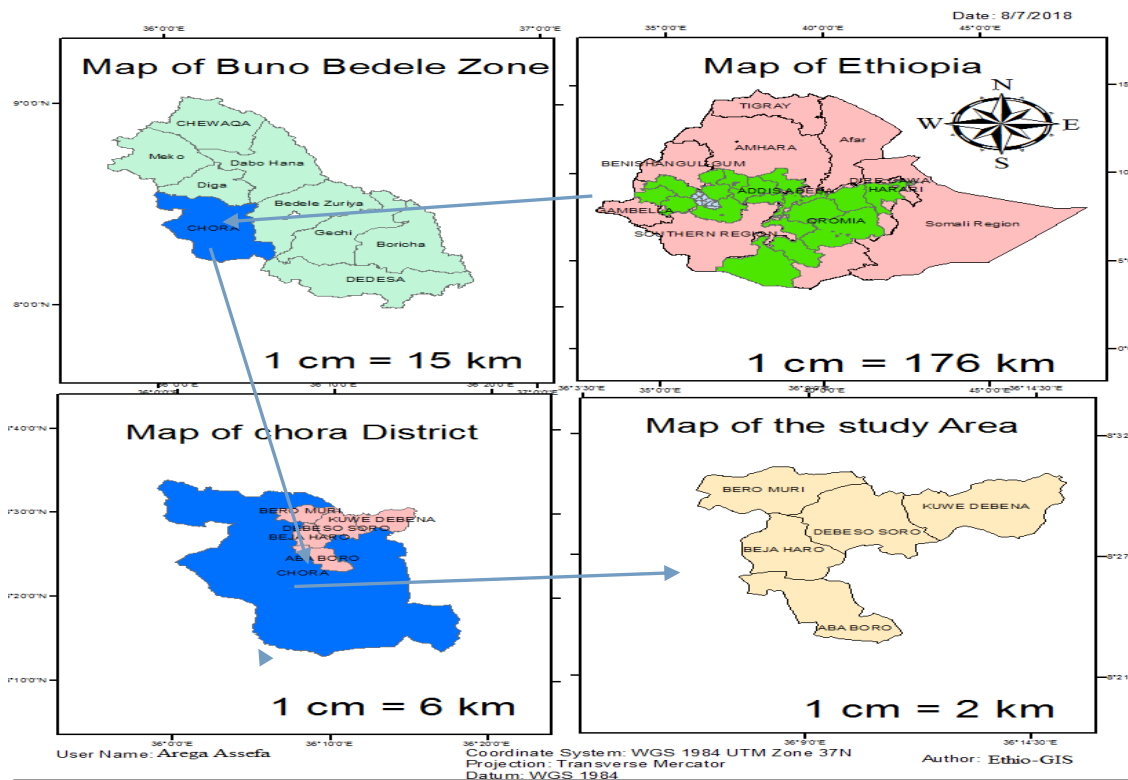


Figure 1: Map of the study area

### **3.2 The Study design**

Cross sectional study design was employed to collect data by using semi-structured interviews and observation (guided field walk) to document the indigenous knowledge of traditional healers in medicinal plant use for the treatments of human ailments. The representative population samples were taken using purposive sampling procedure. A total of five kebeles were selected based on the presence of knowledgeable traditional healers.

### **3.3 Sampling techniques and sample size**

Before doing sampling activities, reconnaissance survey and selection of study site were done in December, 2017. Accordingly, from Chora district of 32 rural and 2 urban kebeles five rural kebeles (Kuwe Dabena, Debeso Soro, Beja Haro, Bero Muri and Ababora) were selected purposely based on the presence of traditional healers and abundance of vegetation resources. Twelve traditional healers were purposely selected from each kebele based on the information obtained from community leaders and making the total informants (sample size) 60. Those traditional healers are well-known in the community due to their long year practice in providing service related to traditional health care to the community. From 60 total informants, 20 were selected as key informants. The selection of key informants was done using simple random sampling method.

### **3.4 Ethno-botanical Data Collection**

All information regarding traditional knowledge of the local community such as use, preparation, dosage, distribution, threats and conservation status of medicinal plants to treat human ailment were gathered and documented. Therefore, to get accurate or reliable data, only primary data collection methods such as field observation (guided field walks with informants) and interviews (semi structured way) were used.

#### **3.4.1 Semi-Structured Interviews**

Semi-structured interviews were prepared in English and translated to the Official language of the region (Afan Oromo) to make communication smooth during data collection. The semi-structured interview questions include local names of medicinal plants found in the area, parts used, preparation method, method of conservation and plant type.

### **3.4.2 Field Observations**

During the study, field observations were performed with the help of key informants who were also interviewed. Full notes on the prevailing facts and information about the history of medicinal plants, plant habitat (cultivated or wild), ecology and plants habit were recorded on site.

### **3.5 Plant specimen collection and Identification**

Based on ethno-botanical information provided by informants medicinal plant specimens were collected from various habitats of the study area such as wild and home gardens. After collection, specimens were coded with number; their habitat and habit were recorded, pressed by wooden press, dried and made ready for identification. For some specimens photographs were taken during field observation. Dried specimens were taken to Jimma University herbarium for identification. The identification was done using published volumes (1-8) of Flora of Ethiopia and Eritrea. Voucher specimens were deposited at Jimma University herbarium.

### **3.6 Data analysis**

Useful information of medicinal plants such as medicinal value, plant parts used, routes of application of remedies, methods of preparation, disease treated, habitat and threats to medicinal plants were organized and analyzed using excel spread sheet and the results were presented using tables and graphs.

#### **3.6.1 Preference ranking**

Preference ranking was conducted following Martin (1995) for seven most important medicinal plants used in treating abdominal cramps (Table 7), as traditional healers treat it usually, 10 local healers were selected to identify the best preferred medicinal plant species for treatment of abdominal cramps. Each informant provided with seven medicinal plants reported to cure this ailment and asked to assign the highest value (4), for plant species most preferred against this ailment and the lower value (1) for the least preferred plant and in accordance of their order for the remaining ones. The value was summarized up and ranks given to each plant species.

## 4. Result and Discussion

### 4.1 Result

#### 4.1 .1 Demographic characteristics of respondents in the study area

Table 1: Demographic features of respondents

Item	Alternative	Number	Percentage
Sex	Male	50	83.3
	Female	10	16.7
Age	31-36	10	16.7
	37-49	16	26.6
	50-61	20	33.3
	>62	14	23.3
Religion	Protestant	43	71.7
	Orthodox	16	26.7
	Muslim	1	1.6
Education status	Uneducated	35	58.3
	1-4	11	18.3
	5-12	13	21.7
	Degree holder	1	1.6
Marital status	Single	2	3.3
	Married	58	96.6

The gender distributions of traditional healers were 83% male and 17% female. About 58.3% of informants were uneducated. Most of the traditional healers were married (96.6%) and (33.3%) were between 50-61 years old. As observed during data collection and interviews with the informants, those with the age group 50-61 and above have the highest contribution for the identification and associated knowledge of most medicinal



plants used in the study area (Table 1)

#### 4.1.2 Medicinal plants in the study area

A total of 51 medicinal plant species were collected and identified (Appendix -1) for treating 28 different human ailments in the study area. The most useful information gathered on the medicinal plants include: local name, disease treated, method of preparation, mode of administration, dosage, threatening factors and conservation method. Out of 51 medicinal plants collected from five sites, the highest number was recorded in Kuwe Dabena and Debeso Soro.

Table 2: Number and percentage of medicinal plants in each study site

No	Study site	Number of medicinal plants	Percentage of total species
1	Kuwe Dabena	48	94.1%
2	Debeso Soro	45	88.2%
3	Bero Muri	40	78.4%
4	Aba Bora	38	74.5%
5	Beja Haro	34	66.6%

Table -2 shows that in Kuwe Dabena and Debeso Soro study sites there are highest number of medicinal plants. Though many species were collected from each site, they have many common medicinal species that reduces the overall collected plant species number to 51.

#### 4.1.3 Distribution of medicinal plants among plant taxa: Families and Genera

Medicinal plants collected during this study were distributed among 28 different plant families and 48 genera. The overall analysis of the data revealed that the family Lamiaceae has the highest number 5(9.80%) species followed by Asteraceae and Solonaceae, 4 (7.8%) species each. Euphorbiaceae, Fabaceae, Poaceae and Cucurbitaceae each with 3(5.8 %) species, Caryophyllaceae, Amaranthaceae, Boraginaceae, Alliaceae, Ranunculaceae and

Rutaceae with 2 species (3.92%), and the remaining families have only one species each (1.9%).

Table 3: Lists of plant families identified in the study area with number of genera and species

Families	No of genera	%	No of Species	%
Lamiaceae	5	9.8	5	9.8
Asteraceae	3	5.88	4	7.84
Solanaceae	3	5.88	4	7.84
Euphorbiaceae	3	7.8	3	7.8
Cucurbitaceae	3	5.88	3	5.88
Fabaceae	3	5.88	3	5.88
Poaceae	2	3.9	3	5.88
Amaranthaceae	2	3.9	2	3.9
Boraginaceae	2	3.9	2	3.9
Caryophyllaceae	2	3.9	2	3.9
Ranunculaceae	2	3.9	2	3.9
Rutaceae	2	3.9	2	3.9
Celastraceae	1	1.9	1	1.9
Rhamnaceae	1	1.9	1	1.9
Phytolaccaceae	1	1.9	1	1.9
Brassicaceae	1	1.9	1	1.9
Apiaceae	1	1.9	1	1.9
Rubiaceae	1	1.9	1	1.9
Combretaceae	1	1.9	1	1.9
Verbenaceae	1	1.9	1	1.9
Acanthaceae	1	1.9	1	1.9
Plantaginaceae	1	1.9	1	1.9
Polygonaceae	1	1.9	1	1.9

Simaroubaceae	1	1.9	1	1.9
Alliaceae	1	1.9	1	1.9
Zingiberaceae	1	1.9	1	1.9
Colchicaceae	1	1.9	1	1.9
Aloceae	1	1.9	1	1.9

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#### 4. 1.4 Habitat of medicinal plants in the study area

Out of the 51 medicinal plant species of the study area, 34 (66.66%) species were collected from the wild, while 13 (25.49 %) species were from home garden, and four (7.8) species collected from both home garden and the wild.

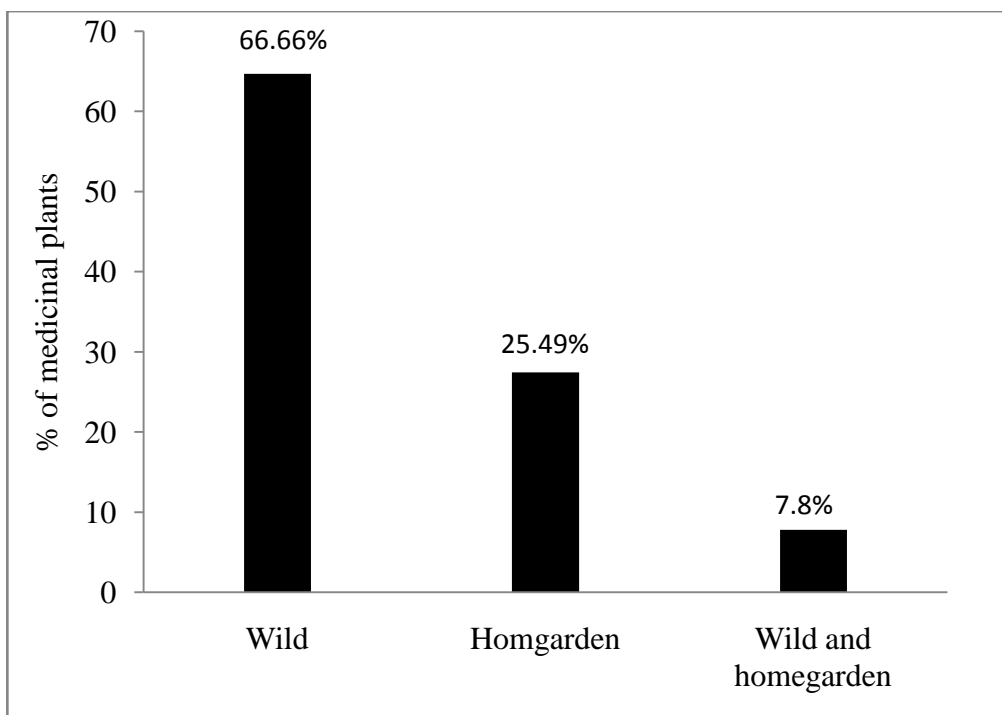


Figure 2: Habitat of medicinal plants

#### 4.1.5 Diseases frequently treated using medicinal plants in the study area

Table 4: Major human ailments and number of plant species used by people of the study area

No	Disease type	Number of plant species	Percentage
1	Abdominal cramp	7	13.7
2	Teeth infection	6	11.7
3	Rabies	4	7.8
4	Wound	4	7.8
5	Spider poisonous	3	5.8
6	Evil eye	3	5.8
7	Cough	3	5.8
8	Snake bite	3	5.8
9	Eye infection	3	5.8
10	Hepetits(Sabbata waaqayyoo)	3	5.8
11	Hemorrhoid	3	5.8
12	Malaria	2	3.9
13	Tonsillitis	2	3.9
14	Fibril illness	2	3.9
15	Tineaversicolor	2	3.9
16	Tape worm disease	2	3.9
17	Diarrhea	1	1.9
18	Fire burn	1	1.9
19	Gonorrhea	1	1.9
20	Common cold	1	1.9
21	Tinea corporis(roojjii)	1	1.9
22	Blood pressure	1	1.9
23	Bat urine(Dhukkuba Simbira halkanii)	1	1.9
24	Hemorrhage (Blooding from nose)	1	1.9
25	Breast pain	1	1.9

26	Body fever	1	1.9
27	Tineacapitis (hair loss)	1	1.9
28	Vomiting	1	1.9

In this study, 28 different types of health problems were found to be treated by using medicinal plants. Among the medicinal plants, 7 (13.7%) species were used for abdominal cramps, 6 (11.7%) species used for teeth infection, 4 (5.8%) species used for wound infection and rabies, 6 (7.8%) species used to treat Evil eye, while spider poisonous, cough, snake bite, eye infection, hepatitis and hemorrhoid were treated equally with 3 (5.8%) species and remaining health problems are treated with two species (3.9%) each and one species (1.9%) respectively. The number of human ailments and number of medicinal plant species documented in the study area were different because of one type of human ailments is treated by many medicinal plant species and also many types of medicinal plant species were treated a single ailments.

#### 4.1.6. Growth form of plants used for preparation of traditional medicine

Most of the medicinal plants used in the study area were herbaceous followed by shrubs (Figure 3). From collected plant specimens, the growth form with least number of medicinal plants were trees and trailers (4%) each.

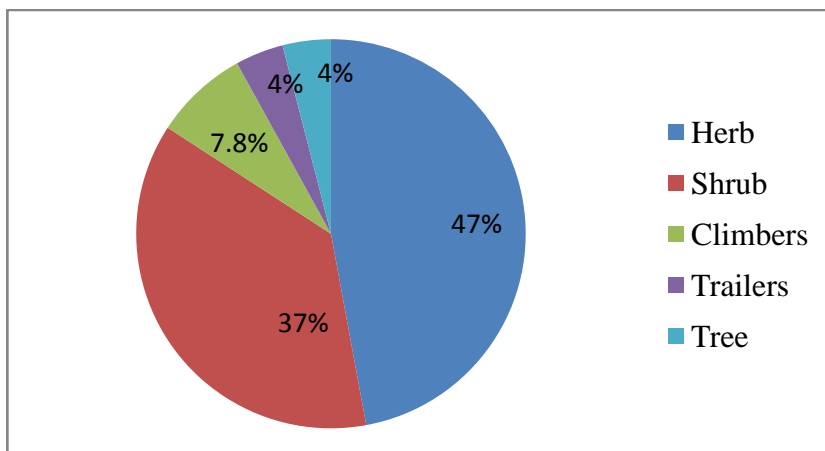


Figure 3: Growth forms of plants used for preparation of traditional medicine

#### 4. 1.7 Parts of medicinal plants used to treat human ailments

The study revealed that almost all plant parts (leaf, roots, stem, fruit and seed) are used for preparing different remedies. However, the most frequently utilized plant parts were leaf with 25 (49%) species followed by roots 21.56% species. Other plant parts such as seed (5.8%), stem (3.9%), flower, bulb, rhizomes, and fruits (1.96%) were also used for preparation of traditional medicine.

Table 4: Parts of medicinal plants used to treat human ailments

Plant parts used	Number of species	Percentage
Leaf	25	49
Root	11	21.56
Whole plant	5	9.8
Seed	3	5.8
Stem	2	3.9
Bulb	1	1.9
Rhizomes	1	1.9
Fruits	1	1.9
Whole plant parts except root	1	1.9
Flower	1	1.9

#### 4.1.8 Route of administration of the traditional medicines

There are different routes of administration of traditional herbal medicines prepared by local community in the study area. The most common route of administration of traditional medicine in the study area was oral (56.86%), while the least was optical (1.9%) (Table 6).

Table 5 :Routes of administration of traditional medicines in percentage

Routes of administration	No of species	Percentage
Oral	29	56.86
External	19	37.25
Nasal	2	3.9
Optical	1	1.9

#### 4.1.9 Mode of application of the traditional medicines in the study area

The application methods of traditional medicines in the study area were drinking (41.17%) followed by dropping (17.67%), while the least mode of application was smoking (1.9%) (Figure 4)

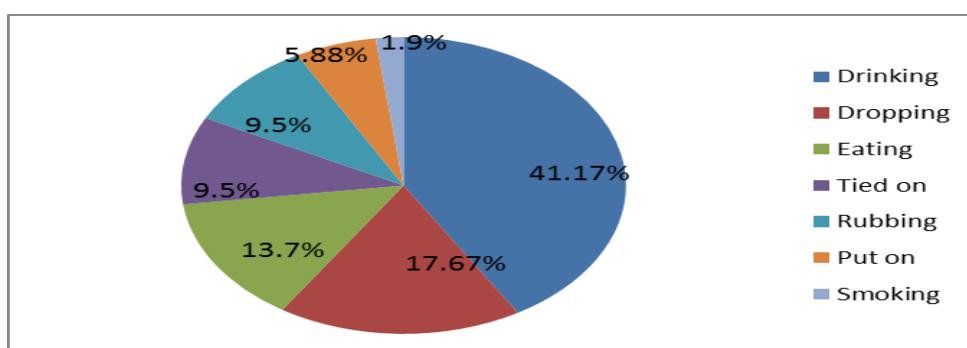


Figure 4: Mode of application of medicinal plants

#### 4.1.10 Preparation forms of medicinal plants in the study area

Most of the local people or healers collect the plant and prepare the remedy mainly from fresh parts of the plants and also from the sun dried parts, in which dried plant materials were used for the preparation of powdered remedies. However, the majority of the

preparation practices used by the local people in the District were in liquid forms, followed by pellet or semi-solid forms. This might be because of the neutral action of water and reducing the toxin effects of medicine in plants. According to interview made with healers, preparations were prescribed to patients differently for different age groups.

#### **4.1.11 Dosage of medicinal plants among age and sex**

The units used to determine the dosage of the plant medicines are varied depending on the experience of individual healer, oral interview made with informants about the sign of the disease and the duration of the illness as well as age, physical and health condition of the patient. Even though, no accurate measurement was reported. The dosage prescription for children was mostly lower than for adults. Based on the information obtained from the informants, dosages were estimated using spoons, cups, glasses, bottles and a number of drops.

#### **4.1.12 Side effects of traditional medicinal plants in the study area**

According to the local healers, majority of the traditional medicines slightly have temporary side effects in some cases namely, nausea, headache, stomachache, diarrhea, vomiting or some other simple and mild side effects.

#### **4.1.13 Mechanisms of knowledge transfer among social groups**

Majority of the respondents reported that most of their knowledge was received from their family members and friends secretly. The secret practices of traditional medicine come from their ancestors. On the other hand, most of the elders kept their knowledge secrecy to generate income and to get sustainable respect from their surrounding community. Moreover, the decline of traditional knowledge in generation is due to interference and shifts to use more synthetic drugs not only in the urban but also in rural areas.

According to the respondents in the study area, the knowledge of traditional medicine is transferred orally, from their parent or grandparents to their children. This type of transfer cannot guarantee continuity under the current circumstances, where plant resource degradation and loss is severe.



#### **4.1.14 Threats to medicinal plant resources in the study area**

Agricultural expansion and lack of modern ways domestication of medicinal plants were indicated as major threats in the study sites and also the disaster is that the knowledge on medicinal plants depth and width become lesser and lesser due to its secrecy, unwillingness of young generation to gain the knowledge, influence of modern education, and awareness factors, which all results in gradual disappearance of indigenous knowledge on medicinal plants.

In the study area, medicinal plants are harvested for local use does not result in threat. Instead, most endangered medicinal plants of the area were threatened due to other uses like: over-harvesting for commercial purposes, destructive harvesting practices, habitat loss resulting from forest degradation and agricultural encroachment. Thus, the need for agricultural land and population pressure severely threatened plant species in general and medicinal plants in particular. Significant numbers of animals graze and browse on vegetation in their wild habitat. They put an actual effect on vegetation during dry season, as the availability of tree/shrub and grass vegetation is limited. These in turn affect the survival of medicinal plants and associated knowledge.

#### **4.1.15 Conservation of medicinal plants in the study area**

People of the study area manage the local vegetation not only to meet their fodder, fruits, construction, fuel wood, commercial values, cultural and spiritual needs but also for their medicinal attributes, as the knowledge is with them. According to the informants from the study area, the knowledge on medicinal plants passes from generation to generation as there is opportunity of knowledge exchange and transfer to the youths.

Plants are also left as remnants of forest in agricultural field due to their uses as timber source, for construction, fuel wood and ritual values. Thus, plants are managed and conserved because of their ritual and material values, which open the way for the possibilities in conservation of vegetation of the locality in general and medicinal plants in particular. Here, the intermixing of multi-purpose medicinal plant species by farmers on their farmland is evidence to management practices in the area. This type of management practice should not be disregarded as it benefits the indigenous people and encourages

them to conserve plants of medicinal value with indigenous practices. In the area, about 25.49% of medicinal plants collected were reported as cultivated in home garden.

In general, traditional healers treat ailments like spider poisons, fibril illness (dhukkuba michii), Hemorrhoid, Evil eye, rabies and Hepetits (dhukkuba simbira halkanii) by traditional medicine than they look for modern treatment. Traditional beliefs have an indirect contribution to the conservation of plants of medicinal importance, since they limit excessive harvesting of these plants in one way or another.

#### 4.1 .16 Preference ranking of medicinal plants in the study area

When there are different species prescribed for the same health problem, people show preference of one over the other. For instance, *Zingiber officinale* was the most effective in treating abdominal cramp, followed by *Allium sativum* and the third effective medicinal plant was *Ruta chalepensis*, *Brucea antidysenterica* ranked 4<sup>th</sup>, *Cymbopogon citratus* and *Calpurnia aurea* ranked 5<sup>th</sup> each, and the least preferred to treat abdominal cramp was *Verbena officinalis* (Table 7)

Preference ranking of seven medicinal plants on their degree of treating abdominal cramp were prescribed by ten local healers (1=Least; 2= Good; 3=Very good; 4=Excellent).

Table 6: Preference ranking of medicinal plants used for treatment of abdominal cramps

Scientific name	Respondents (1-10)										Total	Rank
	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	R <sub>4</sub>	R <sub>5</sub>	R <sub>6</sub>	R <sub>7</sub>	R <sub>8</sub>	R <sub>9</sub>	R <sub>10</sub>		
<i>Zingiber officinale</i>	4	4	3	4	2	3	4	4	3	4	35	1 <sup>st</sup>
<i>Allium sativum</i>	4	4	3	3	2	4	4	3	3	3	33	2 <sup>nd</sup>
<i>Ruta chalepensis</i>	3	3	1	2	3	4	2	2	3	2	25	3 <sup>rd</sup>
<i>Brucea antidysenterica</i>	3	2	1	1	2	3	4	1	1	2	20	4 <sup>th</sup>
<i>Calpurnia aurea</i>	2	3	2	4	1	1	1	1	1	3	19	5 <sup>th</sup>
<i>Cymbopogon citrates</i>	2	1	2	1	3	3	2	1	1	3	19	5 <sup>th</sup>
<i>Verbena offinalis</i>	2	2	3	2	1	1	1	1	1	3	17	7 <sup>th</sup>

## 4.2. Discussion

The use of traditional medicine is still wide spread in Ethiopia and acceptability, availability and popularity is no doubt as about 80% of the populations use it for health care needs (WHO, 2002). According to Kanon (2004), easy accessibility, efficacy on treatment and affordable cost in getting health services are the main reasons for preferring traditional medicine than modern ones. There is high demand for traditional medicine by the local community compared to modern medicine to address the problem of health care systems of their population. Traditional healers were found to play an important role in the primary health care system of the rural people as they treat resource people who had little access and could not afford the cost of modern medication.

The study revealed that male informants in the study area had knowledge of medicinal plants more than female participants. This may be male performed their tasks out of their home, consequently, they could have chance to learn the useful values of medicinal plant species from their daily interaction with plant species. In addition to this, healers preferred male to transfer their indigenous medicinal knowledge due to their expectation that male alone could take the medicinal plant species from far site and forests. Similarly, the dominance of male in the medicinal plants was also reported by other researchers (Berhane Kidane *et al.*, 2014). The highest numbers of species were mentioned by participants from the male informants. The current study results are in agreement with the study results reported for the sheko ethnic communities in south-western Ethiopia by Mirutse Gidey *et al.* (2010) in which male informants were reported to have more knowledge on traditional medicine than their female counter part.

In the study site abundant numbers of medicinal plant species are found. The reason for this and associated knowledge in chora district could be related to the topography of the land and favorable climatic conditions that support varieties of plant species.

In the study area, families Lamiaceae, Solanaceae and Asteraceae were represented by higher number of medicinal plant species contributing for the remedies preparation. This could be an indication that the study area consists of considerable diversity of medicinal plant species within these families. According to Bekalo *et al* (2009), Endalew Amenu

(2007); Ermias Lulekal *et al.* (2008) and Haile Yinger *et al.* (2008), Fabaceae, Lamiaceae and Asteraceae have the highest contribution in preparation of remedies and represented by large number of medicinal plants. This finding is a good indicator for the presence of a considerable diversity of medicinal plant species in the area. Furthermore, the existence and utilization of such a large number of medicinal plants by people in the study area indicate that majority of the people continue to employ indigenous medicinal practices even after the advent of modern medicines.

The present study indicates that the healers mostly collected medicinal plants from wild sources or the natural environment than home gardens (Figure 2). The activity of cultivating medicinal plants was less than that of wild around the study area even though some authors emphasized that home gardens are useful for sustainable utilization of medicinal plants and can be shelter for wild species that are threatened in the wild by deforestation and environmental changes. According to Zemedede Asfaw (2001), most of the remedies were found in the wild environment is a big threat to their existence with the current rate of habitat destruction and conversion and resulted in rarity of some medicinal plants.

This study also shows that some species of medicinal plants and their utilization are more popular than the others in treating human's health problems. Most of the medicinal plants which are popular in the study area have local name and well known by the local people or healers. According to the informants in the study area, the reason behind the recognition of these medicinal plants can be attributed to the wide range of health problems that they treat or to the abundance of the plant in the area for easy access. Whereas the less recognized and less popular plants do not have local name, even some medicinal plants that have local names were not commonly utilized by many people of the study area. Generally, based on the information obtained from the respondents in the study area, some species were independently cited more than six times by different informants for their medicinal uses to treat human ailments. As indicated in (Table 4) major uses of medicinal plants for treatment of different diseases ranges from simple diseases such as painkiller (*Gloriosa superba*) to fatal diseases such as malaria and hemorrhoid.

The result of the study also showed the highest proportions of medicinal plants were used in treating abdominal cramp and teeth infection respectively. For instance, *Verbena*

*officinalis*, *Zingiber officinale*, *Ruta chalepensis*, *Brucea antidysenterica*, *Allium sativum* and *Calpurnia aurea* were used in treating abdominal cramps while *Verbena officinalis*, *Vernonia auriculifera*, *Premna schimperi*, *Cynoglossum amplifolium*, *Citrus lemon* and *Drymaria cordata* were used in treating teeth infection.

In the study area some plants were used in treating a series of different health problems for example, *Drymaria cordata* is used in treating spider poisons, teeth infection and snake bite, and *Justicia schimperiana* is used in treating wound, teeth infection, and breast pain. However, in most plants the preparations are used to treat only one particular problem. The action of plant extracts on different health problems may explain the broad-spectrum nature of the plants while their action on only a particular problem explains the narrow spectrum in nature.

Herbs are the most plant growth forms as a source of traditional medicine of plants in the study area. This could be due to relative abundance and accessibilities of herbs as compared to the other growth forms as noticed during field observation (Bekalo *et al.*, 2009) and could also be due to the fact that herbs are relatively rich in bioactive constituents (Coley *et al.*, 1988). According to Stepp (2004), herbaceous plants are more toxic than others, the property of which has made herbs as most wanted form of medicine and this is related to the selection strategy of the medicinal flora of indigenous people for their healthcare. Studies conducted by Fisseha Mesfin (2007), Mirutse Gidey *et al.*, (2009), Tesfaye Awas and Sebsibe Demissew (2009), also showed the dominance of herbaceous species as medicinal plants in communities elsewhere.

Leaves were the most frequently used for medicinal purposes in the study area (Table 5) threat to the destruction of medicinal plants was found to be minimal, as high threat to the mother plant comes with root, bark and stem harvest. According to Dawit Abebe and Ahadu Ayehu (1993) medicinal plant harvest that involves roots, rhizomes, bulbs, barks and stems have serious effect on the survival of mother plants.

In the current study, from all methods of application, drinking was the most frequently and widely used method of traditional drug application in the study area. This is in agreement with Endashaw Bekele (2007) and Birhane Kidane *et al.*, (2014).

Oral application was the highest and most commonly used route of application (Table 6). Dawit Abebe and Ahedu Ayehu (1993) indicated that oral administration is the main route of application used in the northern Ethiopia, both oral and external route permit rapid physiological reaction of the prepared medicine with the pathogens and increase its curative power (Fisseha Mesfin 2007). Traditional remedy was also externally fumigated in the form of smoke in the study area. Whereas those taken through nasal were powdered, smoked or boiled in water and the patient inhale the smoke or the steam being covered with pieces of cloth. Examples of medicinal plants used as such remedy in the study area were *Plectranthus edulis* and *Nicotiana tabacum* (Tamboo).

People of the study area use various local units of measurement and the duration of administration to determine the dosage and to estimate the amount of medicine. Recovery from the disease, disappearance of the symptoms of the diseases, fading out of the disease sign and judgment of the healer to stop the treatment were some of the criteria used in determining duration in the administration of the dosage. According to Mirutse Gidey *et al.* (2009), liquid remedies administered to humans were usually measured by tea or coffee cups or plastic cups, or number of drops which agree with this study. The amounts of remedy and prescription rates were generally dependent on the degree and duration of the ailment. This kind of prescription was also reported by Haile Yinger *et al.*, (2008). The lacks of standardized measuring units for traditional medicine were described by other research results (Ermias Lulekal *et al.*, 2008).

This study revealed that majority of the respondents reported that most of their knowledge was received from their family member through oral means. Various reported studies indicated that the absence of formal education in transferring traditional knowledge in developing nations is another factor for the decline of indigenous knowledge (Wondwosen Teshome, 2005 and Abebe Demise 2001). Moreover, most of the African modern health professionals greatly undermine the contribution of traditional medicine in health care system while the scientists of developed nations intensively search for medicinal plants to seek a solution for the old and newly rising diseases. All these factors may result to a loss of this rich and useful knowledge which has been accumulated over many generations.

The most causes to threat medicinal plants in the study area shows that agricultural expansion, lack of well-organized cultivation of traditional medicinal plants and the decline

of knowledge on medicinal plants were the main factors. This trends also observed in other parts of Ethiopia. Ethno medicinal knowledge diminishes with the death of elderly knowledgeable members of the society, since less and less young people are willing to acquire the knowledge. Thus, erosion of knowledge on medicinal plant is more significant in species collected from forests for use in treating rare and unusual ailments (Caniago and Siebert, 1998).

Nowadays, the world is losing plants every minute due to deforestation, for agriculture, fire wood, timber, construction materials, over browsing and overgrazing (Seyani and Chikuni, 1997). These common anthropogenic factors besides some natural factors resulted in loss of plant genetic diversity and threatening the very survival of human kind with erosion of some life saving medicinal plants of wild genes (Odera,1997).The loss of medicinal plants associates with the missing advantages gained from medicinal plants and indigenous knowledge associated with plants (Sofowara, 1982). This is observed in Chora district as collection and search for some medicinal plants like *Cordia africana*, and *Croton macrostachyus* used for construction. The effect of deforestation on medicinal plants was reported by Mirutse Gidey (1999) a sustainable harvest which put medicinal plants under threat, even though it is not severe as the other factors.

Most medicinal plants were more available in the wild areas (Figure 2) and have not been cultivated by households in the home gardens. Future efforts need to give due attention to conserve them around human habituations,Teferi Flatie *et al.*,(2009) reported some of the medicinal plants were cultivated in the home gardens for benefits of other than medicine preparation. Hence the medicinal plants are more exposed to extinction. Unless conserved, medicinal plants may be highly eroded in the study area. Hence, the sustainable utilization of medicinal plant species should practiced through awareness raising and conscious protection in situ and ex situ conservation. Endalew Amenu (2007) stated that giving educational training for the people can help the management of traditional medicine easily.

## **5. Conclusion and Recommendation**

### **5.1 Conclusion**

This study showed that traditional medicine, mainly involving the use of medicinal plants, is playing a significant role in meeting the primary healthcare needs of the people in the study area. Due to the acceptance of traditional medicinal plants around the study area and limited access to modern healthcare facilities, using medicinal plants are considered as the main continued practice among the society.

Generally, 51 species of medicinal plants have been documented from the study area and are used in the treatment of different types of human health problems and categorized under 48 genera and 28 families.

Health problems such as, abdominal cramp, teeth infection, rabies, wound, Evil eye, cough, eye infection and snake bite were the major recognized ailments in the study area.

Most of the medicinal plant species collected from each study site was from their natural habitat and home gardens. Regarding the growth forms of medicinal plants herbs are widely used followed by shrubs, climbers, trailers and tree respectively. Peoples of the study area mostly prepare the remedies from leaves and this utilization of more leaves than other plant parts do not put medicinal plants under pressure compared with using of root or stem.

Agricultural expansion and lack of modern ways of cultivation of medicinal plants are the major threats to plant species in general and to the medicinal plants in particular in the study area. As suggested by most informants, in the area, the human induced threats including agricultural expansion, over grazing and use for construction are cited to be major threats for reduction of medicinal plants

Concerning conservation practice, some local people have cultivated some medicinal plants for different uses. Majority of cultivation of medicinal plant is mostly due to other uses such as for food and spice. There are little efforts towards the conservation practice of certain medicinal plants. The District Agricultural and Rural Development offices and State Forest Office have also conserve the forest or vegetation of the area which is the main



source for medicinal plants, and thus in turn, the source for associated indigenous knowledge.

## **5.2 Recommendation**

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

- Medicinal plants are central to the indigenous cultures and material needs. Therefore, formal and non-formal education systems should be designed to create positive attitude among the youth.
- 
- Encouraging people to grow medicinal plants in the home gardens, mixing with crops in farm lands.
- Identifying effective medicinal plants and promoting their production and cultivation accomplished through genuine collaboration between local administrators and healers.
- Promoting the establishment of local Botanical Garden starting at least at the district level.
- Creating awareness to the local society through public teaching about multi-purpose tree species giving especial emphasis to medicinal plants cultivation.
- Largely in-situ and ex-situ conservation activities should be practiced in the district through training model farmers to ensure the continuity of threatened medicinal plants.
- Farmers should be encouraged to participate in training program which will facilitate them in implementing modern technique of cultivation, collecting, processing, storage and sustainable uses of medicinal plants.

## 6. Reference

- Abebe Demissie (2001).Biodiversity conservation of medicinal plants: problems and prospects.
- Alexiades M (1996).Collecting ethno botanical data. **In:** Alexiades, M.N and Sheldon, J.W. (eds), *Selected Guideline for Ethno botanical Research: A field manual*. The New York Botanical garden, Bronx, New York, USA. Pp. 40-102.
- Bako, S. P., Bakfur, M. J., John, I. and Bala, E. I. (2005).Ethno-medicinal and phytochemical profile of some savanna plant species in Nigeria.*Int. J. Bot.*, **1**(2): 147-150
- Balick M.J. and Cox, P.A.R. (1996).Plants People and Culture.The science of ethnobotany. Scientific American Library, New York, USA, P. 219
- Bekalo T. H, Sebsibe Demissew, and Zemedede Asfaw(2009). An ethnobotanical study of medicinal plants used by local people in the lowlands of Konta Special Woreda,southern nations, nationalities and peoples regional state, Ethiopia, *Journal of Ethno biology and Ethno medicine* ,**5**:26.[http:// www .ncbi.nlm .nih. gov /pmc / articles /PMC2764637/pdf/1746-4269-5-26.pdf](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2764637/pdf/1746-4269-5-26.pdf)
- Belete Assefa, Glatzel, G. and Buchmann, C. (2010).Ethno medicinal uses of *Hagenia abyssinica* (Bruce) J. F.Gmel. Among rural communities of Ethiopia. *Journal of Ethno biology and Ethno medicine*, **6:20**
- Berhane Kidane Tinde van Andel, Laurentius Josephus Gerardus van der Maesen (2014). *Use and management of traditional medicinal plants by Maale and Ari ethnic communities in southern Ethiopia*
- Boulos L (1983).Medicinal Plants of North Africa, Reference Publications, Inc., Algonac, Michiagan.
- Caniago and Siebert,S.F (1998). Medicinal plant ecology, knowledge and conservation in Kalimantan, Indonesia: *Economic Botany*52(3):229-253.
- Coley, P. D., Bryant, J. P. and Chapin, F. S. (1988). Resource availability and plant anti-herbivore defense. *Science*, **230**:895-699.

- Cotton C.M (1996). *Ethno botany: Principles and Applications*. John Wiley and Sons Ltd., Chichester, England, pp: 347-374.
- Cunningham A.B. (1993). *African Medicinal Plants: Setting priorities at the interface healthcare between conservation and primary health care: People and plants* working paper, UNESCO, pp. 1-50.
- Dawit Abebe (1986) Traditional medicine in Ethiopia. The attempt being made to promote it for effective and better utilization. *SINET: Ethno. J. Sci.* **9**: 61–69.
- Dawit Abebe (2001). The role of medicine plants in Healthcare coverage of sustainable use of medicinal plants in Ethiopia. Proceedings of National Workshop on Biodiversity conservation and sustainable use of medicinal plants in Ethiopia. pp. 6-21.
- Dawit Abebe and Ahadu Ayehu (1993). Medicinal plants and enigmatic health practice of north Ethiopia. BerhaninaSelam Printing Enterprise, Addis Ababa. 341p.
- Debela Hunde, Zemedede Asfaw and Ensarmu Kelbessa, (2006). Use of Traditional Medicinal Plants by People of ‘Boosat’ Sub District, Central Eastern Ethiopia. *Ethiop. J health sci.*, **16**(2): 141-155
- Dessalegn Desissa (2000). *Uses and conservation status of medicinal plants used by the Shinasha people*. EWNHS, Addis Ababa.
- Endalew Amenu (2007). Use and management of medicinal plants by indigenous people of Ejaji Area (Chelya Woreda) West Shoa, Ethiopia: An ethnobotanical approach. MSc. Thesis. Addis Ababa University, Addis Ababa, Ethiopia.
- Endashaw Bekele (2007). Study on actual situation of medicinal plants in Ethiopia. Prepared for JAICAF (Japan Association for International Collaboration of Agriculture and Forestry). Pp. 1-73
- Ermias Lulekal, Ensarmu Kalbessa and Haile Yinger. An ethno botanical studies of medicinal plants in Mana Angitu District southern Ethiopia. *J Etnobiol Ethinomed*, 2008; 4:10

- Etana Tolasa (2007). *Use and Conservation of Traditional Medicinal Plants by Indigenous People in Gimbi Woreda, Western Wellega, Ethiopia*. M.Sc Thesis. Addis Ababa University, Addis Ababa.
- Farnsworth, N.R (1985). Medicinal plant in therapy. *Bulletin of WHO* **63 (6):** 965-98
- Fikadu Fullas (2007). The role of indigenous medicinal plants in Ethiopia health care. *African Renaissance*. London, UK.
- Fisseha Mesfin (2007). An Ethnobotanical Study of Medicinal Plants in Wonago Woreda, SNNPR, Ethiopia. MSc Thesis, Addis Abeba University, Addis Abeba, Ethiopia.
- Gilani A. H. and Rahman, A. U. (2005). Trends in ethno pharmacology. *Journal of Ethno pharmacology*, **100:43-49**.
- Haile Yineger (2005). A Study on the Ethnobotanical Medicinal Plants and Floristic Composition of the Dry Afromontane Forest at Bale Mountains Natural parks. Ethiopia. M.Sc. Thesis, Addis Ababa University.
- Haile Yineger, Ensarmu Kelbessa, Endashaw Bekele And Ermias Lulekal, (2008). Plants used in traditional management of human ailments at Bale Mountains National Park, southeastern Ethiopia. *Journal of Medicinal Plants Research*; **2:132-153**.
- Hamilton A. C , Shengji, P., Kessy, J., Khan, A., Logas-Witte, S. and Shinwari, Z. K. (2003). The Purposes and Teaching of Applied Ethnobotany. People and Plants working paper 11. WWF, Godalming, UK.
- Hamilton A. C. (1997). Threats to plants: an analysis of centres of plant diversity. **In: Conservation into the 21st Century**, Touchell, D. H. and Dixon, K. W. (eds). Proc. 4<sup>th</sup> International Botanic Gardens Conservation Congress. Kings Park and Botanic Garden, Perth, Australia, 309-322.
- Hutchings A. and Terblanche, S. E (1989). Observation on the use of some known and suspected toxic liliiflorae in Zulu and Xhosa medicine. *SAML* **75: 62-69**. **In:** (Medhin Zewdu and Abebe Demissie eds.). *Conservation and sustainable use of medicinal plants in Ethiopia*. Proceeding of the National Workshop on Biodiversity

Conservation and Sustainable use of medicinal plants in Ethiopia, 28 April-01 May  
*Indigenous knowledge and Development monitor*. **3(2)**:3-5.

Izugbara C. O and Duru, E. C. J. (2008). Transethnic Sojourns for ethnomedical knowledge among Igbo traditional healers in Nigeria: preliminary observations. *Journal of World Anthropology: Occasional paper*. 2:2-5

Kannon B (2004). Integration of traditional medicine with modern medicine. **In:** Urga., K., Assefa, A. and Guta, M. (eds). *Traditional Medicine in Ethiopia*, pp. 32-35, Proceedings of a national workshop held in Addis Ababa, Ethiopia on June 30-2 July, 2003. Ethiopian Health and Nutrition Research Institute, Addis Ababa.

Kokwaro J. O (1976). *Medicinal Plants of East Africa*, East African Literature Bureau, Nairobi, Kenya.

Lewu F. B. and Afolayan, A. J. (2009). Ethno medicine in south Africa: the role of weedy species. *African Journal of Biotechnology*, **8(6)**: 929-934.

Martin G.J. (1995). *Ethnobotany: A Method Manual*. Chapman and Hall, London, p. 267

Maundu, P., Kariuki, P. and Matig, O.E. (2006). Threats to medicinal plant species – an African perspective. **In:** Miththapala, S. (ed). *Conserving Medicinal Species Securing a Healthy Future*, IUCN: Ecosystems and Livelihoods Group, Asia, 48-50.

Mesfin Tadesse and Sebsebe Demissew (1992). Medicinal Ethiopian plants. Inventory, Identification and Classification. **In:** Edwards, S. and Zemedu Asfaw (eds.). *Plants used on African traditional medicine as practiced in Ethiopia and Uganda, East Africa. Botany 2000: NAPRECA, Monograph Series. No. 5*: 1-19. Addis Ababa University, Ethiopia

Mirutse Giday (1999). An Ethnobotanical study of Medicinal Plants Used by the People in Ethiopia. M.Sc. Thesis, Uppsala, Sweden.

Mirutse Giday, Zemedu Asfaw, Zerihun Woldu, and Tilahun Teklehaymanot, (2009). Medicinal plant knowledge of the Bench ethnic group of Ethiopia: an

ethnobotanical investigation. *Journal of Ethno biology and Ethno medicine*; **5**:34.  
<http://www.ncbi.nlm.nih.gov/pmc/article/content/pdf/1746-4269-5-14.pdf>

Mirutse Gidey, Zemde Asfaw, and Zerihun Woldu (2010) . Ethno medicinal studies of plants used by sheko ethnic group of Ethiopia .journal of Ethinopharmacology 132:75-85

Nakashim D. (2000).*Traditional Knowledge: Resisting and Adapting to Globalization*. UNCTAD Expert Meeting on Systems and National Experiences for Protecting Traditional Knowledge, Innovations and Practices, Geneva.

Nemarundwe,N.and Richards.(2002).Participatory methods for exploring livelihood

Odera,J.A.(1997).Traditional beliefs, Sacred groves and Home GardenTechnologies:Adapting old practices for conservation of medicinal plants.**In:***Conservation and Utilization of Indigenous medicinal plants and wild relatives of food crops*.Pp.19-28. UNESCO,Nairobi,Kenya

R. Pankhurst (2001) .The status and availability of oral and written knowledge on traditional health care

Sakkir S., Kabshawi, M. and Mehairbi, M. (2012).Medicinal plants diversity and their conservation status in the United Arab Emirates (UAE).*Journal of Medicinal Plants Research*, **6**(7): 1304-1322

Sebsibe Demissew and Ermias Dagne (2001).Basic and Applied Research on Medicinal Plants of Ethiopia. In: Medhin Zewdu and Abebe Demise (eds). *Conservation and Sustainable use of Medicinal Plantsin Ethiopia*, pp. 29-33.Proceedings of the National workshop on Biodiversity Conservation and Sustainable use of Medicinal plants in Ethiopia. IBCR, Addis Ababa.

Seyani,J.H and Chikuni,A.C(1997) .Botanic gardens of Malawi and their role in the conservation and sustainable utilization of indigenous medicinal and agricultural plants.**In:***Conservation and Utilization of indigenous medicinal plants and wild relative soffoodcrops*.Pp.36-40.UNESCO,Nairobi,Kenya.

SofoworaA(1982).*MedicinalPlantsandTraditionalMedicineinAfrica*.256pp  
JohnWileyandSons,Ltd.NewYork

- Stepp, J. R. (2004). The Role of Weeds as Sources of Pharmaceuticals. *Journal of Ethno pharmacology*; **92**:163-166.
- Teferi Flatie, Teferi Gedif ,Kaleab Asres and Tsige Gebre-Mariam . Ethinomedicinal survey of Berta ethnic group Assosa zone Benishangulgumuz region state ,mid west Ethiopia *Ethinobiol Ethinomed*.2009;5:14
- Tesfaye Awas (2007). Plant Diversity in Western Ethiopia: Ecology, Ethno botany and Conservation. PhD Dissertation, Faculty of Mathematics and Natural Sciences, University of Oslo, Norway.
- Tesfaye Awas and Sebsibe Demisew(2009) .Ethno botanical study of medicinal plants in kafficho people, South western Ethiopia. In proceedings of the 16<sup>th</sup> International conference of Ethiopian studies .
- Thulin M (2004).Horn of Africa.**In**: Russell, A., Mittermier, G., Patrico R, Michael, H, Pilgrim, J., Brooks, T., CristnaGoettsch, M., Lamoreux, J and Gustavo A. (eds.). Hotspots Revisited Earth's biologically richest and most endangered terrestrial Eco regions.
- UNEP (1995).Global biodiversity assessment. United Nations Environment Programme.
- UNESCO (1994).Traditional Knowledge into the Twenty First Century, Nature & Resources, UNESCO, Paris, **30**  
(2).Values derived from forests: potential and limitations.**In**:B.M.Campbell and M.K.Luckert(eds.),*Uncovering the Hidden Forest: Valuation Methods for Woodland and Forest Resource*.Earth scan Publications Ltd,London.Pp.168-198.
- WHO (1998).Regulatory situation of herbal medicines: A World wide Review, Pp. 1-9 Geneva.
- WHO (2000). World Health Organization :General guidelines for methodologies on research and evaluation of traditional medicine in Geneva.
- WHO (2002). World Health Organization: Traditional Medicinal Strategy 2002-2005, Geneva.

WHO (2003). World Health Organization: Traditional Medicine, Report by the Secretariat, 56th World Health Assembly, Provisional Agenda item 14.10, A56/18, 31 March 2003

Wonduwosen Teshome (2005). Impacts of Urbanization on the Traditional Medicine of Ethiopia. *Anthropologist*, 8:43–52.

Zemedet Asfaw (2001). The role of home gardens in the production and conservation of medicinal plants. **In:** Medhin Zewedu and Abebe Demissie (eds.). *Conservation and Sustainable Use of Medicinal Plants in Ethiopia*. Proceedings of the National Workshop on Biodiversity Conservation and Sustainable Use of Medicinal Plants in Ethiopia, IBCR, Addis Ababa.



## 7. Appendices

Appendix1: List of medicinal plants used to treat human ailments in Chora District, Buno Bedele Zone, Oromia Regional State southwest

### Ethiopia

No	Scientific name	Family	Local name	Disease treated	Plant part used	Habit	Habitat	Mode of preparation, dosage and application	Route
1	<i>Acmella caulirhiza</i>	Asteraceae	Bacharree	Tonsillitis	Flowers	Herb	Wild	Flowers of <i>Acmella caulirhiza</i> collected and chewed	Oral
2	<i>Allium sativum</i>	Alliaceae	Qullubbii adii	-Abdominal cramp, -Evil eye -Malaria	Bulb	Herb	Home garden	The bulb of <i>Alluvium sativum</i> chewed	Oral

3	<i>Aloe macrocarpa</i>	<i>Aloaceae</i>	Argisa	Fire burn	Leaf		Herb	Home garden	Simply by cutting the leaf of <i>Aloe macrocarpa</i> added vitreous liquid part from its leaf on fire burn part	External
4	<i>Beta vulgaris</i>	<i>Amaranthaceae</i>	Hunde diimaa	Blood pressure	Root		Herb	Home garden	Crashed and extract its juice directly drinking	Oral
5	<i>Brucea antidysenterica</i>	<i>Simaroubaceae</i>	Qomonyoo	-Abdominal cramp -Eye evil	Leaf		Shrub	Wild	Buds of <i>Brucea antidysenterica</i> collected,crashed and extract its juice is and given to human	Oral
6	<i>Calpurnia aurea</i>	<i>Fabaceae</i>	Ceekaa	-Vomite, -Diarrhea and -Abdominal camp	Seed		Shrub	wild	After seed of <i>Calpurnia auria</i> dried given to human one tea spoon in morning for ,four days	Oral

7	<i>Catha edulis</i>	<i>Celastraceae</i>	Caatii	Cough	Leaf	Shrub	Home garden	Leaf part collected and mixed with <i>coffea arabica</i> leaf, boiled and given to human	Oral
8	<i>Celosia anthelmintica</i>	Amaranthaceae	Amaasilloo	Tape worm	Leaf	Herb	Wild	Crashed and powdered ,eat directly with gebs kolo or Niger powder	Oral
9	<i>Citrus limon</i>	<i>Rutaceae</i>	Loomii	-Teeth infection -Blood pressure	Fruit	Shrub	Home garden	Extract juice from seed and given for human	Oral
10	<i>Clematis clauda</i>	<i>Ranunculaceae</i>	Hidda fiitii	Hemorrhoid Teeth	Root	Climbers	Wild	Crashed ,squeezed and extract its juices add drops on infected part	External
11	<i>Cleroden drummyricoides</i>	<i>Lamiaceae</i>	Marariisa	Hemorrhoid	Root	Shrub	wild	Its leaf collected ,crashed and extract the juice and add on infected part	External

12	<i>Coffea Arabica</i>	<i>Rubiaceae</i>	Buna	Cough	Leaf	Shrub	Home garden	The leaf part collected and mixed with <i>khta edulis</i> leaf, after boiled one glass of its water given for human before meal.	Oral
13	<i>Combretum paniculatum</i>	<i>Combretaceae</i>	Baggee	Eye infection	Stem	Climbers	wild	Cut the stem and added 2-3 drops on infected eye	Optical
14	<i>Cordia africana</i>	Boraginaceae	Waddeesa	Spider infection	Leaf	Tree	Wild	After drying its leaf crashed and powdered rubbed on infected part	External
15	<i>Crotalaria pycnostachya</i>	<i>Fabaceae</i>	Atoo Qalamee	Spider infection	All part except root	Herb	wild	Crashed the leaf part and tied on infected part until it curried	External
16	<i>Croton macrostachyus</i>	Euphorbiaceae	Bakkanniisa	-Stop bleeding (fresh wond)	Leaf	Tree	Wild	Leaf squeezed and extract its juice add a drops on infected part	External

17	<i>Cucumis ficifolius</i>	Cucurbitaceae	Faaroo	Rabies	Root	Herb	Wild	Root of <i>Cucumis ficifolius</i> mixed with roots of <i>Phytolacca dodecandra</i> and leaf of <i>Justicia schimpernia</i> crashed together and given for human	Oral
18	<i>Cymbopogon citrates</i>	Poaceae	Marguggaa	- Evil eye -Abdominal cramp	Root	Herb	Home garden	Extract the juices and given for children in very little amount	Oral
19	<i>Cynodon aethiopicus</i>	Poaceae	Wraatii	Liver case	Leaf	Trailers	wild	Mixed with <i>Phytolacca dodecandra</i> leaf crashed ,squeezed its juice given to human	Oral
20	<i>Cynodon nlemfuensis</i>	Poaceae	Coqorsa gurraacha	Tonsil	All parts	Trailers	wild	Crashed the leaf part and chewed	Oral

21	<i>Cynoglossum amp-lifolium</i>	<i>Boraginacea</i>	Maxxannee	-Teeth infection	Root	Herb	wild	After inserted under fire bitten by infected teeth	Oral
22	<i>Datura metel</i>	Solanaceae	Asaangira Gurraacha	-Rabies -Snake bite	Leaf	Shrub	Wild /Home garden	Leaf of <i>Datura metel</i> mixed squeezed,extract the juice and given to human after 5 days bitten with dog,	Oral
23	<i>Datura stramonium</i>	<i>Solanaceae</i>	Asaangira magariisa	Infected head	Leaf	Shrub	wild	The leaf of <i>Datura stramonium</i> Collected ,crushed and mixed with leaf of <i>luffa cylindrica</i> And creamed on infected part	External
24	<i>Daucus carota</i>	<i>Apiaceae</i>	Kaarotii	For poor eye sight	Root	Herb	Home garden	Removing the external part and eating directly without cocking	Oral

25	<i>Drymaria cordata</i>	Caryophyllaceae	Baala aatoo	-Spider poisonous -Snake bite	All parts	Herb	Wild	Crashed all parts of plants ,insert under fire and pointed with two finger on the infected part	External
26	<i>Euphorbia plantyphyllos</i>	<i>Euphorbiaceae</i>	Annannoo Qalamee	Tinia versicol	Stem	Herb	wild	Cut its stem and added one drops of liquid on the infected part	External
27	<i>Gloriosa superba</i>	<i>Colchicaceae</i>	Batalquris	Wond relief	Root	Herb	wild	Crashed the root and pointed on the infected part	External
28	<i>Herniaria hirsuta</i>	<i>Caryophyllaceae</i>	Mattarree	Tape worm	All part	Herb	wild	Grinding and powdered and directly eat with gebs kolo	Oral
29	<i>Justicia schimperiana</i>	Acanthaceae	Dhummuu gaa	-Stop bleeding. -Breast pain. -Decrease body fever.	Leaf	Shrub	Wild	Leaf of <i>Justicia schimperiana</i> crased, squeezed ,extract the juice and add its drop on infected part	External

30	<i>Lepidium sativum</i>	<i>Brassicaceae</i>	Shinfaa	Malaria(for prevention)	Seed	Herb	Home garden	Crashed ,powdered and rubbed on external body	External
31	<i>Luffa cylindrical</i>	<i>Cucurbitaceae</i>	Adhooftuu	Fungus infection	Leaf	Climbers	Home garden/Wild	Crashed and rubbed on infected part	External
32	<i>Momoridica foetida</i>	<i>Cucurbitaceae</i>	Sarobofaa	Rabies	Root	Climbers	Wild	Its root crashed and extract the juice and given for human	Oral
33	<i>Nicotiana tabacum</i>	<i>Solanaceae</i>	Tamboo	Snake bite	Leaf	Shrub	Home garden	The leaf part collected, crashed and given for human bitten by snake.	Oral



34	<i>Ocimum lamiifolium</i>	Lamiaceae	Damakasee	Fiber illness	Leaf	Shrub	Wild	Extract its juice and add some drops on the infected part	External
35	<i>Phytolacca dodecandra</i>	<i>Phytolaccaceae</i>	Andoodee	-Liver case -Abortion	Root	Shrubs	Wild	Crashed the root part and extract the juice and given to human	Oral
36	<i>Plantago lanceolata</i>	Plantaginaceae	Qorxxobbii	Tinia versicol	All parts	Herb	Wild	Squeezing and crashing all parts and added a droplets of juice on infected part	External
37	<i>Plectranthus edulis</i>	<i>Lamiaceae</i>	Dinnicharomoo	Common cold	Root	Herb	Home garden	Cooked the root and smocked its steam	Nasal
38	<i>Premna schimperi</i>	<i>Lamiaceae</i>	Urgeessaa	Teeth infection	Leaf	Shrub	Wild	The leaf part crashed and bitten on infected teeth	Oral
39	<i>Pycnostachys abyssinica</i>	<i>Lamiaceae</i>	Yeeroo	Gonorrhea	Leaf	Shrub	Wild	Crashed its leaf,squeezing and extract the juices and given to human	Oral

40	<i>Rhamnus prinoides</i>	<i>Rhamnaceae</i>	Geeshoo	Tiniaversicol	Seed	Shrub	Home garden / wild	Crashed the leaf and rubbed on the infected part	External
41	<i>Ricinus communis</i>	<i>Euphorbiaceae</i>	Qobboodiimaa	Hepatitis	Leaf	Shrub	Wild / Home garden	Crashed and cover with another leaf and inserted under fire and pointing on infected part	Oral
42	<i>Rumex nepalensis</i>	<i>Polygonaceae</i>	Timijjii	Fibilliness	Leaf	Herb	Wild	Leaf of <i>Rumex nepalensis</i> spring mixed with leaf of <i>Ocimum lamiifolium</i> and <i>Justicia schimperiana</i> rubbed on infected part	External
43	<i>Ruta chalepensis</i>	<i>Rutaceae</i>	Cillattama	Abdominal cramp	Leaf	Herb	Home garden Garden	Extract juice and given to human	Oral
44	<i>Senna didymobotrya</i>	<i>Fabaceae</i>	Kikishii Bofaa	Snake bite	Leaf	Shrub	Wild	Extracted the juice from leaf and given by measuring at tip of finger	Oral

45	<i>Solanum incanum</i>	Solanaceae	Hiddii	Hemorrhage	Leaf	Shrub	Wild	Crashing its leaf and putting in the bleeding nose.	Nasal
46	<i>Tanacetum parthenium</i>	Asteraceae	maxxannee	Hemorrhage	Leaf	Herb	Wild	Squeezed and extract its juice and added a drop of juices on infected part	External
47	<i>Thalictrum rhynchocarpum</i>	Ranunculaceae	Faca'aa	Rabies Liver case	Leaf	Herb	Wild	Collect the leaf part crashed ,squeezed and given for human infected with rabies	Oral
48	<i>Verbena officinalis</i>	Verbenaceae	Calaasee	-Abdominal cramp, -Teeth infection	All parts	Herb	Wild	All plant part except root crashed ,squeezed and one tea cup for adult and half for children	Oral
49	<i>Vernonia amygdalina</i>	Asteraceae	Ebicha	Cough	Leaf	Shrub	Wild	Juices of its leaf bud squeezed and extracted and given to human one coffee cup per day	Oral

50	<i>Vernonia auriculifera</i>	Asteraceae	Reejiii	-Teeth infection -Stop bleeding	Leaf	Shrub	Wild	Squeezed the leaf buds ,extract juice and add its drop on infected part	External
51	<i>Zingiber officinale</i>	<i>Zingiberaceae</i>	Ziginbila	Abdominal cramp	Rhizomes	Herb	Home garden	The rhizomes of <i>Zingiber officinale</i> Roscoe chewed directly	Oral

Appendix- 2 Semi structured interviews for collecting ethno- botanical information

Name of the respondent-----sex---- Kebele-----  
occupation-----age.....religion-----educational status-----  
marital status—

-----Other information----

1. What are the main human health problems in your locality or Kebele?
2. How do you prevent /control those diseases?
3. Do you use plants to treat those diseases in your locality?
4. Which plants do you use for treating those diseases?
5. Local name(s) of the plants?
6. Is it woody or herbaceous?
7. From where are the plants harvested (wild or cultivated?)
8. Habitat of the plant-forest/reverie/home garden/road side//rocky area/agricultural field/grazing land?
9. Plant parts used: Root/stem/root bark/ Leaves/flowers/fruit/seed/whole
10. Used alone mixed with other materials, others-----
11. Preparation for medicinal use: crushed/crushed and powdered/ crushed pounded/extract with cold water /boiled/juice/ latex/: other-----
12. What are measurement unit to know the Dose/amount? Tea spoon/coffee cup,/other
13. Does the dose differ among males, females, children, and elders?
14. Any noticeable side effects?
15. How do you preserve traditional medicines?
16. How do you conserve traditional medicinal plants?
17. How is the knowledge of traditional medicine passed to family members?
18. Are there members of the community who frequently use the medicinal plants?

