

**ETHNOBOTANICAL STUDY OF MEDICINAL PLANTS USED BY  
THEPEOPLE OF WADERA WOREDA, EAST GUJI ZONE,  
OROMIA REGION, ETHIOPIA**

**M.Sc. THESIS**

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**Ethnobotanical Study of Medicinal Plants Used by The People of Wadera  
Woreda, East Guji ,Oromia Region, Ethiopia**

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# HARAMAYA UNIVERSITY

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## **DEDICATION**

I dedicate this manuscript to my beloved mother, BureriDubu, my father Gamba Edema and my wife RahmatShunawho sacrificed a lot to bring me up to this level, nursing me with affection, and for their dedicated partnership in the success of my life.

## STATEMENT OF THE AUTHOR

By my signature below, I declare that this thesis is my own work and all sources of materials consulted for this work have been duly acknowledged. I have followed all ethical principles of the research in data collection, analysis, the preparation and compilation of this thesis. All scholarly matters that are included in the thesis have been given recognition through citation. This thesis has been submitted in partial fulfillment of the requirement for the degree of master of science in biology from the Postgraduate Program Directorate at Haramaya University. The thesis is deposited in the university library to be made available to borrowers under rules of the library. I solemnly declare that this thesis is not submitted to any other institution anywhere for the award of any academic degree, diploma or certificate. Brief quotations from this document are allowable without special permission provided that an accurate acknowledgment of the source is made. Request for permission for extended quotation from or reproduction of the manuscript in whole or in part may be granted by the head of the School of Biological Sciences and Biotechnology or the director of Postgraduate Program Directorate when the proposed use of the material is in the interest of scholarship. In other instances, however, permission must be obtained from the author.

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## **BIOGRAPHICAL SKETCH**

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## **LIST OF ABBREVIATIONS/ACRONYMS**

CSA	Central Statistics Agency
FL	Fidelity Level
ICR	Informant Consensus Factor
IK	Indigenous Knowledge
MP	Medicinal Plant
TM	Traditional Medicine
WHO	World Health Organization



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# **Ethnobotanical Study of Medicinal Plants Used by the People of Wadera District in East Guji Zone of Oromia Region, Ethiopia**

## **ABSTRACT**

*The study of indigenous knowledge on utilization of native plants as source of Medicine is important to conserve and preserve indigenous knowledge for next generation. This study was conducted to document indigenous knowledge and medicinal plants used by the people of Wadera District. A total of 100 respondents (age ≥ 20) were selected to collect information on medicinal plants selected Kebele. Of these 10 key informants were selected purposely based on recommendation by local elders and authorities and the rest were selected randomly. Ethnobotanical data were collected using semi-structured interviews, field observations and group discussions. Descriptive statistics were used to summarize Ethnobotanical data. Further, 80 medicinal plant species distributed in 73 genera and 46 families were documented in the study area. Of the recorded plant species, 32 species (40%) of them were reported to treat human ailments. From the total medicinal plant species, 28 (35%) were herbs followed by shrubs 22 (27.5%), trees 19 (23.75%), and climber 11 (13.75%). The most frequently used plant part was leaf 50 (83.3%) followed by root 26 (42.3%). The most widely used method of preparation was pounding 15 (25%) of the different plant parts. The common route of administration recorded was oral (47.96%) followed by dermal (35%) and nasal (7.4%). Disease categories such as Common cold, Tonsillitis, cough and Respiratory structure related diseases had relatively high ICF value. *Dichrostachys cinea*, *Bersama abyssinica* and *Nicotiana tabacum* had the high fidelity level value, suggesting agreement between respondents on their efficacy to treat the diseases therefore, further phytochemical screening done on these plant species to look for the active components.*

**Key words:** Ethnobotanical, Informant conscience Factors, Medicinal Plants, Plant remedies, Traditional medicine.

## 1. INTRODUCTION

Ethnobotanical studies are often significant in revealing locally important plant species especially for the discovery of crude drugs. Right from its beginning, the documentation of traditional knowledge especially on the medicinal use of plants has provided many important drugs to treat human and livestock ailments in modern day (Wright, 2005). Thus, people depend on plants not only for food, but also for preparation of remedies- Ethno biology is the scientific study of the way plants and animals are treated or used by different human cultures. It studies the dynamic relationships between peoples, biota, and environments, from the distance past to the immediate present. It is the interdisciplinary study of how human culture interacts with and uses their native plants and animals. It is therefore, the scientific study of the complex set of relationships of the biota to present and past human societies (Stephen, 2005).

Since ancient times, plants have been vital sources of both preventive and curative traditional medicine preparations for human beings and livestock. Historical accounts of traditionally used medicinal plant depict that different medicinal plants were in use as early as 5000 to 4000 BC in China and 1600 BC by Syrians, Babylonians, Hebrews and Egyptians (Deryet *al.*, 1999). Considerable indigenous knowledge system, from the earliest time, is linked to the use of traditional medicine in different countries (Farnsworth,1994). Evidence obtained from observations of animals shows that even In most situations, the traditional knowledge in Ethiopia is passed verbally from generation to generation and valuable information can be lost whenever a traditional medical practitioner passes away without conveying his traditional medicinal plant knowledge to other. In addition, the loss of valuable medicinal plants due to population pressure, agricultural expansion and deforestation is widely reported by different workers (Abebe, 2001)

In Ethiopia knowledge from herbalists is passed either secretly from one generation to the next through words of mouth or their descendants inherit the medico-spiritual manuscripts (Jansen, 1981)). One of the widely used indigenous knowledge system in many countries is the knowledge and application of traditional medicine by local people.

Such knowledge, known as Ethno-medicinal knowledge involves traditional diagnosis, collection of raw material, preparation of remedies and its prescription to the patients (Farnsworth, 1994). In Ethiopia, traditional medicine is faced with a problem of sustainability and continuity mainly due to the loss of taxa of medicinal plants (Ensermu *al.*, 1992; Zemedede, 2001). According to Abebe, (2001) the diversity of plants in Ethiopia is on the process of being eroded mainly due to human induced pressures. With the present ecological and socio-economical changes, the medicinal plants together with Ethnobotanical knowledge, may disappear and thus may be lost from humanity forever (Tesfaye , 2003).

The knowledge of medicinal plants use is yet incomplete because there has not been a total inventory of medicinal plants that has been traditionally known to indigenous people (Mesfinet *al.*, 2005). Most of the reviewed literatures show that studies on medicinal plants of Ethiopia have so far concentrated in the south and south-west (Dula, 2013; Yibrah, 2014; Kidane*etal.*,2014; Birhanuet *al.*, 2015), central (Birhanet *al.*, 2011; Ermiaset *al.*, 2013; Avigdoret *al.*, 2014), north, north-western and north-east (Gidey, 2010d, and Teklehaymanot 2013; Yigezu *et al.*, 2014), and western parts (Bussmannet *al.*, 2011;Gideyand Samuel, 2012; Megersaet *al.*, 2013) of the country. However, there is no much study in eastern part of Ethiopia, and particularly no documented study is found from Wadera District of Oromia Region, Ethiopia. According to Pankhurst (2001), detailed information on the medicinal plant could only be obtained when studies are done in the various areas where little or no botanical and Ethnobotanical explorations have been made. Thus, this study was designed to carry out ethno-botanical investigation on medicinal plants of Wadera District, Oromia regional state with the following general and specific objectives.



**General Objective**

- ❖ To investigate the use of medicinal plants used by local people of Wadera district as a remedy for various human and livestock ailments.

**Specific Objectives**

- To collect, identify and document traditional medicinal plants used to treat human and livestock health problems
- To describe plant parts used for medicinal purposes, methods of their preparations and ways of administration in the study area.

## 2. LITERATURE REVIEW

### 2.1.Indigenouse Knowledge on Medicinal plants

Indigenous knowledge refers to accumulation of knowledge, rule, standards, skills and mental stets, which are possessed by local people in particular area (Quanash,1998). The dependence of local people on immediate natural resources resulted in the accumulation of indigenous knowledge that helps people to adapt to and survive in the environment in which they live. It is also local knowledge that is unique to a given culture or society, and the base for agriculture, health care, food preparation, environmental conservation and a host of other activities (Thomas, 1995).

John Hershberger proposed the term Ethnobotany for the first time in 1895 (Balick, 1996). However this term has been given different interpretations and definitions depending on the interest of workers involved in the study (Cotton, 1996). Currently, Ethnobotany has become a more diversified and multidisciplinary subject that requires experts in various fields of academic study such as Botany, Anthropology, Agriculture, Linguistics, Archeology and Economics (Martin, 1995; Alexiades, 1996; Balick, 1996). Ethnobotany is also a rapidly growing science, attracting people with widely varying academic backgrounds and interests (Mac Donald, 2009). Now a days, Ethnobotany has tended to become more cross-disciplinary and multi- institutional (Hamilton *et al.*, 2003).

According to Cotton (1996), Ethnobotany encompasses all studies that is concerned with the mutual relationship between plants and traditional people. Among the relationships of humans with plant, indigenous knowledge on traditional medicine is one. Thus, people depend on plants not only for food, but also for preparation of remedies. The focus of Ethnobotany is on how plants have been used, managed and perceived in human societies and includes plant used for medicine, rituals, social life and others. Thus the relationship between plants and human cultures is not limited to the use of plants for food, clothing and shelter but also includes their use for religious ceremonies, ornamentation and health care (Khan *et al.*,2007).

## **2.2. Development of Traditional Medicine**

Terms used in the field of sustainable development to designate this concept include indigenous technical knowledge, traditional environmental knowledge, rural knowledge, local knowledge and farmer's or pastoralist's knowledge (Johnson, 1992). Such traditional knowledge on traditional medicine which originated in ancient China, has developed and expanded to neighboring countries such as Japan, the Republic of Korea and Vietnam (WHO, 2007). Indigenous knowledge is important as an essential first step in the development project and allows better innovation and adaptation of technologies, adds to scientific knowledge, increases understanding between research and local people, increases the local capacity to experiment and empowers local people (Warburton and Martin, 1999). Traditionally people around the world possess unique knowledge of plant resource of their locality in terms of their use of food medicine and other uses, (Marin 1995). Indigenous knowledge in broadly speaking is the knowledge used by local people to make a living in a particular environment (Warren, 1991).

## **2.3. Traditional medicine in Ethiopia**

Traditional medicine has been defined as the practices whether explicable or not, used in the diagnosis, prevention and elimination of physical, mental or social imbalances and relying exclusively on practical experience and observation handed down from generation to generation (WHO, 2008). This system of health care is also known as folk medicine, Ethno medicine, or indigenous medicine. In Africa, traditional medicine plays a central role in health care needs of rural people and urban poor people. Here, it is said that, this situation would remain so long as modern medicine continues to be unable to meet the health care of the people of the continent effectively (Jansen, 1981). According to Fassil. (2001) about 75-90% of the rural population in the developing world including Ethiopia relies on traditional medicines as components of their health care system. This is not only because of poverty where people cannot afford to buy expensive modern drugs, but traditional systems are also more culturally acceptable and meet the psychological needs in a way modern medicine does not.

In Ethiopia, plants have been used as a source of traditional medicine from time immemorial to combat different ailments and human sufferings (Asfaw, *et al.*, 1999). Due to its long period of practice and existence, traditional medicine has become an integral part of culture of Ethiopian people (Behura, 2003). It is common for people living in rural and urban centers to treat some common ailments using plants available around them. For example, the flowers of *Hagenia abyssinica* is used to expel tape worm, *Ruta chalepensis* leaves are used to treat various health problems (Abbink, 1995).

The continued dependence on herbal medicine alongside with modern medicine is largely conditioned by economic and cultural factors (Abbiw, 1996). Modern health care has never been and probably never will provide for the foreseeable future adequate equitable health service anywhere in Africa due to the financial limitation related to rapid population growth, political instability and poor economic performance system.

#### **2.4. Ethnobotanical studies of medicinal plants in Ethiopia**

Most pharmaceutical companies recently have developed mechanisms to involve indigenous people to collect plant samples on the recommendations of the traditional practitioners. This approach is reported to be more successful than random collections of sample of medicinal plants (Alexiades, 1996; Balick and Cox, 1996; Asfaw *et al.*, 1999). WHO established a worldwide program to promote and develop basic and applied research in traditional medicine (WHO, 1978). Traditional medicine has been practiced for the last several thousands of years, but found its legitimate place in the WHO program only about 35 years ago (WHO, 1998). Furthermore, pharmaceutical industries and western researches on plant based drugs have now rediscovered that plants have much to contribute to the discovery of new effective, safe and profitable therapeutic agents (Pistorius and Vanwiik, 1993).

Medicinal plants that have got special attention and regional offices were established by world health organization to coordinate basic and applied research activities on medicinal plants. To preserve indigenous knowledge of plant use in general and traditional medicine in particular, an Ethnobotanical survey on socio-cultural group is very crucial. However, in Ethiopia research and documentation on medicinal plants have been started

only very recently (Mesfin and Sebsibee, 1992) as this was neglected and considered irrelevant in the past (Dawit and Ahadu, 1993). Only little effort has so far been made to record and document medicinal plants use and the associated knowledge. And also a limited number of papers dealt with specific socio-cultural groups in specific areas when compared to the countries diverse flora and socio-cultural diversity. Hence, attention should be given to Ethno-botanical studies of the country with all the necessary endeavors to have a full picture of the country in medicinal plant potentials. Although there have been some Ethnobotanical studies conducted in different parts of the country, (Gidey, 2010d Birhane *et al.*, 2011; Bussmann *et al.* 2011; Gidey and Samuel, 2012; Dula, 2013; Giday and Tilahun, 2013; Megersa Moa *et al.*, 2013; Yibrah, Takle 2014; Ermias *et al.*, 2013; Ermias Luleka. 2005, Avigdore *et al.*, 2014; Kidane *et al.*, 2014; Yigezu *et al.*, 2014; Birhanu *et al.*, 2015) still many areas of the country remain unexplored.

## **2.5. Threats to and Conservation of Traditional Medicinal Plants in Ethiopia**

Even though plants play a vital role in treating various human and livestock health problems, they are currently under pressure because of accelerated devastation of plant resources with loss of indigenous knowledge ( Ensmuet *et al.*, 1991, Giday, 2010). The current loss of medicinal plants and the associated indigenous knowledge in Ethiopia is due to natural and anthropogenic factors Ermias *et al.*, 2008; Giday, 2010). Some medicinal plant species of Ethiopia are reported to have been threatened because of over harvesting for marketing as medicine. Among many medicinal plants in Ethiopia, about 26 species are endemic and they are becoming increasingly rare and at the verge of extinction (Tsfaye and Sebsebe, 2009).

As the ethno-medicinal information is not much documented and remains in the memory of elderly practitioners with only 2% transferred to younger generations (Fisseha *et al.*, 2009) traditional knowledge on medicinal plants are also being threatened. Therefore, detailed information on the medicinal plants of Ethiopia should be obtained through Ethnobotanical studies. A good example of threatened medicinal plant is *Tavarniera abyssinica* whose slender roots are swathed and small coiled bundles are presented for

market. *Tavarniera abyssinica* is a popular traditional medicine for what is known as sudden diseases (Endashaw 2007). There are 40 species of Aloe where the sap of some species is used for medicinal food and cosmetic application and is widely used internationally. Of these 20 species are endemic and 18 of them are threatened. Debelu Hundee *et al.* (2004) and Mirutse (2001) Also stressed on modern education as having an impact on the deterioration of traditional knowledge on medicinal plants. They pointed out that those students who attended modern schools are showing unwillingness to learn from their parents about traditional medicine, which is an evidence for the gradually disappearing traditional knowledge. To curb this problem, Ethiopia has developed policies and strategies that support the development and utilization of plant resource in a sustainable manner. The policies are reflected under various sectors including environmental protection, development of natural resources and diversification of the domestic and export commodities (Endashawe 2007).

### 3. MATERIALS AND METHODS

#### 3.1. Description of the Study Area

The study was conducted in Wadera District, East Guji Zone ,of Oromia Region, Ethiopia. Wadera District is found at 520 km away from Addis Ababa to the south east. It is located between  $5^{\circ} 41' 45''$  to  $5^{\circ} 59' 36''$  N and  $39^{\circ} 6' 0''$  to  $39^{\circ} 24' 0''$  E latitude and longitude, respectively. The altitude of the study area ranges between 1250 m and 1750 m above sea level. The minimum and maximum daily temperatures of the area are  $25^{\circ}\text{C}$  to  $32^{\circ}\text{C}$  respectively, the average annual rainfall about 420 - 900mm per annual. The total land mass coverage of Wadera district is about  $941\text{km}^2$  and is subdivided into 20 kebeles (Wadera District Agricultural office, 2016). Wadera shares boundaries with Girja District of Guji zone to East, Gorodola District of Guji zone to the South, Sababoru District of Guji zone to west and Adolareda to north . The ethnic composition of the District are Oromo (89%), (8%) Amara and others (3%) (Central statistics agency, 2008)

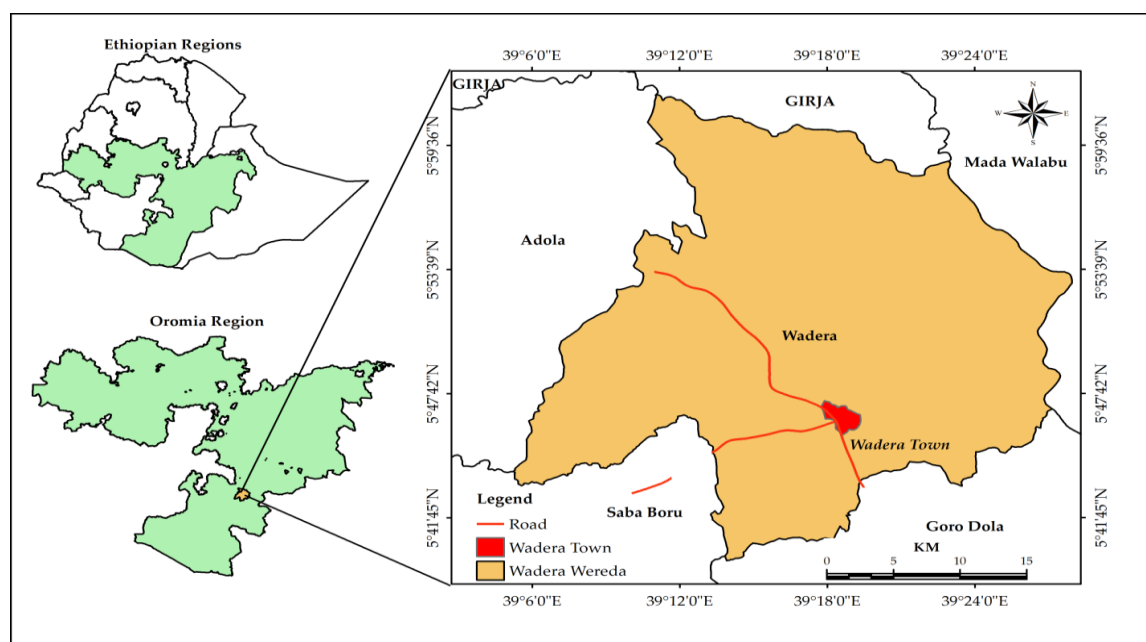


Figure 1 Map of the study Area; [www.och.etho/maps/downloaded/OREMIA.pdf](http://www.och.etho/maps/downloaded/OREMIA.pdf)

### 3.2. Vegetation and Major Crops

Vegetation of the study area consists of different herbs, shrubs and trees. Some common wild plant species of this area include, *Croton macrostachyus*, *Cordia africana*, *Acanthospermum hispidum*, *Balanites aegyptiaca*, *Olea europaea*, *Vernonia amygdalina*, *Ehretiacymosa*, *Justicias chimperiana*, *Premnas chimperi*, *Podocarpus falcatus*, *Juniperus procere*, etc. Some commonly cultivated crop plants in the study area include *Zea mays*, *Eragrostis teff*, *Citrus sinensis*, *Hordeum vulgare*, *Solanumtuberosum*, *Coffeaarabica*, Wheat (*Triticum species*), *Brassica carinata*, and *Lycopersicon esculentum*, *Catha edulis*, (Wadera District Agricultural office 2016).

### 3.3. Ethnobotanical Data Collection

Reconnaissance survey was conducted from May 2 -10, 2018 to select 4 kebeles that had clear altitudinal variation. Selection criteria also included availability of traditional medicine practitioners. Prior to Ethnobotanical data collection, respondents were selected from selected kebeles. Informants (100) were involved in this study. Out of this, 100 informants (aged  $\geq 20$  years ) from selected kebeles while 10 key informants (traditional medicine practitioners) were purposively selected with the assistance of local authorities, elders and knowledgeable persons. Semi-structured interviews, group discussions, and guided field walks with key informants for field observations are methods of data collection (Abebe Demissie 2013). Respondents were first interviewed individually to mention about the local names of the plants, their use to treat diseases, diseases treated, part(s) of plants used, methods of preparation of remedies, route of application of the remedies, dosage, and factors that threaten medicinal plants. Later on, field observation was made with key informants to collect plant specimens. Voucher specimens were collected, pressed, dried and identified in Haramaya University herbarium with the help of herbarium experts and samples were deposited in the herbarium.



### 3.4. Data Analysis.

A descriptive statistical method (e.g., percentage and/or frequency) was employed to summarize Ethnobotanical data. Informant consensus factor (ICF) was calculated for categories of ailments to identify the agreements of the informants on the reported cures using the formula used by Tilahun (2007). ICF was calculated as follows: number of use citations for each ailment ( $n_{ur}$ ) minus the number of species used ( $n_t$ ) for that ailment, divided by the number of use citations for each ailment minus one.

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

**Fidelity level:** The fidelity level (FL), the percentage of informants claiming the use of a certain plant for the same major purpose, was also calculated for the most frequently reported diseases or ailments using the following equation Tilahun, (2007).

$$\mathbf{FL(\%)} = \frac{\mathbf{NP}}{\mathbf{N}} \times \mathbf{100}$$

Where NP 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 plants as a medicine to treat any given disease

**Preference ranking:** To compare the most effective medicinal plants used by the community to treat wound, preference ranking was conducted following Martin (1995) and Cotton (1996). For this, 10 informants were and each informant was provided with six medicinal plants mentioned to treat wound. The medicinal plant were paper tagged and then informants were asked to assign the highest value (6) for the most preferred species against the illness and the lowest value (1) for the least preferred plant. The value of each species was summed up and the rank for each species was determined based on the total score. This helps to indicate the rank order of the most effective medicinal plants used by the community to treat the disease

## 4. RESULTS AND DISCUSSION

### 4.1. Ethno-medicinal Plant Species Used by People of the Study Area

A total of 80 species of medicinal plants used to treat 43 different health problems were gathered and documented from the study area (Appendix Table 1). These plants belong to 73 genera and 46 families. Out of these plants, 32 species (40%) were used to treat only human ailments, 26 species (32.5%) were used to treat both human and livestock ailments, 17 species (21.25%) were noted to treat only livestock ailments (Figure 2)

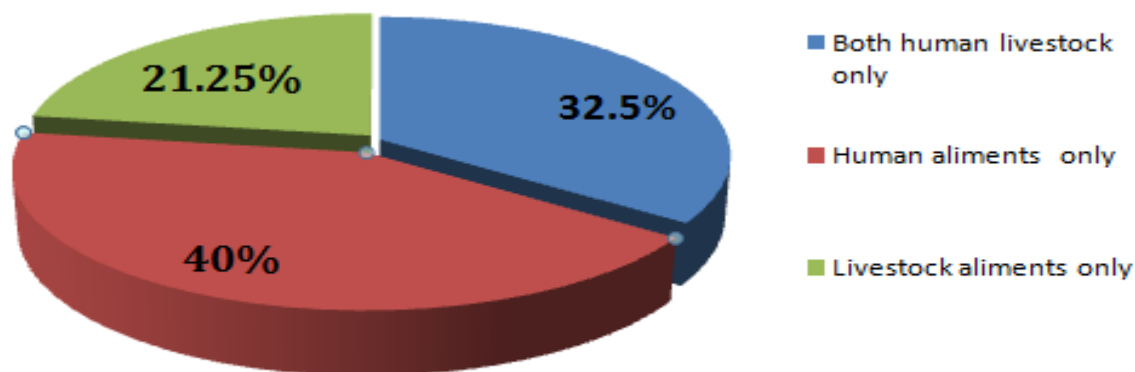


Figure 2 Number of medicinal plants used to treat human, livestock, and both human and livestock ailments

In terms of species composition, family Fabaceae consisted of 8 species followed by Asteraceae with 5 species, Solanaceae and each with 4 species and the remaining families contained two or one species (Appendix Table 1). The majority of medicinal plant species were obtained from wild area followed by Home garden, agricultural field, road side and live fence (Table 1). The fact that high number of medicinal plant species was obtained from wild suggests that maintaining these areas will help to conserve these plant species.

Table 1. Distribution of medicinal plants in different habitats

Habitat type	No. of medicinal Plant species	Percentage
Wild Vegetation	40	50
Home garden	20	25
Agricultural fields	15	12
Road side	4	32
Live fence	1	1.25
Total	80	100

In this study some plants were reported to have medicinal value more frequently than others to treat various ailments. For example, *Croton macrostachyus* was cited by 40% of the informants as a source of remedy for treating Lymphatic swelling, Febrile illness, Gonorrhoea, Headache, Hemorrhoid, Leshmaniasis, Rabies followed by *Cucumis ficicifolius* used by 38% of informants for Stomach ache, Febrile illness, Epilepsy, Wound and Hemorrhoid; *Pentas schimperianaby* 35% of informants to treat Diarrhea, Nasal bleeding, Febrile illness, Skin infection (ring worm) and *Phytolacca dodecandrab*y 30% informants to treat Liver problem, Gonorrhoea, Hemorrhoid and Rabies (Table 2).

**Table 2. Some of the most used medicinal plants**

Scientific Name of Medicinal plants	No. of Informants	Percentage
<i>Croton macrostachyus</i>	40	40
<i>Cucumis ficicifolus</i>	38	38
<i>Pentas schimperiana</i>	35	35
<i>Phytolacca dodecandra</i>	30	30
<i>Pterolobium stellatum</i>	20	20
<i>Ocimum forskolei</i>	19	19
<i>Embelias chimperiana</i>	19	19

#### 4.2. Plant habit (growth forms) and Plant part(s) used for medicine

Of the total of 80 medicinal plants collected from the study area, 28 (35%) were herbs followed by shrub species 22(27.5%), (23.75) tree species and 11 (13.75%) climbers (Figure 3). This shows that most widely used medicinal plants habit in the study area, where herbs, trees, shrubs and climbers are used for medicinal purposes.

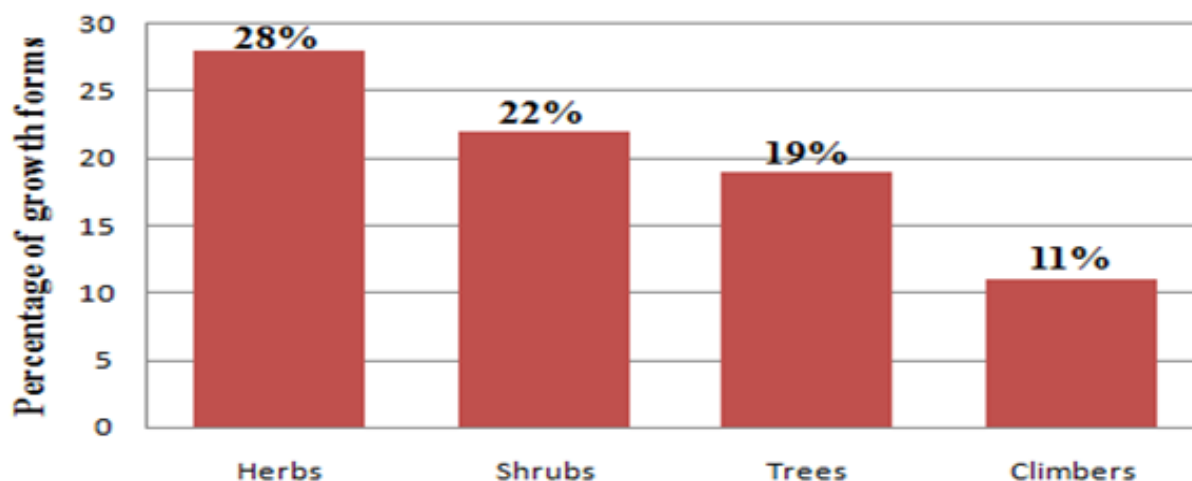


Figure 3 Growth form of medicinal plants

People of the study area use different plant parts for the preparation of traditional medicines. Results of this study showed that leaf is the most cited plant part in medicine preparation followed by root and seed/bark. Plant parts such as fruit, bulb, flower, sap,

latex, entire part, and stem were also reported (Table 3). This result agrees with some previous studies conducted in different parts of the country (Bayafers, 2000; Bishaw,1999; Endalew 2007). According to Dawit and Ahadu (1993), herbal preparation that involves roots, rhizomes, bulbs, barks, stems or whole parts have negative effects on the survival of the mother plants. Therefore, emphasis should be given not to excessively collect these plant parts in order to ensure their survival for future use or replacement of such medicinal plants is highly required..

Table 3. Plant parts used for traditional medicine preparations in Wadera Distracts

<b>Plant parts</b>	<b>Total responses</b>	<b>% of total</b>
Leaf	50	40.65
Root	26	21.13
Bark	16	13.00
Fruit	6	4.87
Seed	4	3.25
Sap	4	3.25
Entire part	4	3.25
Bulb	4	3.25
Root and leaf	3	2.43
Flower	2	1.62
Leaf and stem	2	1.62
Entire above ground	2	1.62
<b>Total</b>	<b>123</b>	<b>100</b>

#### **4.3. Preparation methods of remedies, dosage and route of administrations.**

Concerning the preparation of traditional medicine, the local people employ various methods of preparation of traditional medicines for different types of ailments. The preparations vary based on the type of disease treated and the actual site of the ailment. The principal methods of traditional medicine preparation reported were pounding,

crushing and powdering (Table 4). This may be due to the possibility of effective extraction of plant ingredients when pounded or crushed and powdered so that its curative potential would increase. Preparations may involve using a single plant part or mixtures of different organs of the same plant. In this study, the local people also use some other products as additives in their preparations. For example, water, oil, sugar, salt, milk, honeys are some of the additives that the local people reported to be used to improve the flavor and reduce adverse effects such as vomiting and diarrhea. Such additives were also reported by some previous researchers (Mirutse 1999, Bayafers Tamene ,2000)

Table 4 Preparation methods of herbal medicine reported by people of Wadera district

<b>Forms of preparation</b>	<b>Total responses</b>	<b>% of total</b>
Pounding	15	25
Crushing	12	20
Powdering	10	16.67
Squeezing	7	11.67
Chewing	7	11.67
Burning/Heating	4	6.67
Powdering/Painting	2	3.33
Smoking	1	1.67
Rubbing	1	1.67
Immersing	1	1.67
Total	60	100

The dosage of medicine to be administered is given by rough estimation of the age and physical condition of the patient. Hence there is no precision on the dosage of the remedy. Dawit and Ahadu (1993) reported that lack of precision in the dosage is one of the major drawbacks of practicing traditional remedy. Route of administration reported were through oral, dermal, nasal, and others. Overall, oral administration (by drinking, chewing/eating) was reported as a dominant route of administration (47.69%) followed by dermal route (35.38%) where remedies are creamed or rubbed onto the skin. This

finding agrees with some of the previous reports ( Bayafers 2000;KebuBalemieet *al.*, 2004).

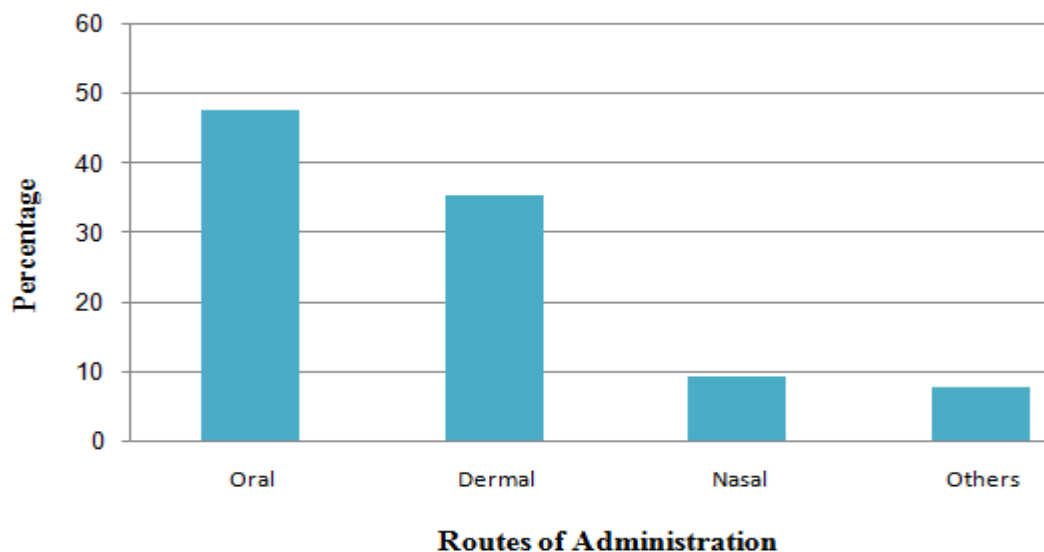


Figure 4 percentage distribution of route of administration of plants remedies used for human and livestock

#### 4.4. Informant consensus factor (ICF)

All cited human diseases were categorized into 7 major disease categories based on sources/assumed causative agents of the disease and body parts involved (Table 4) and ICF was calculated. Analysis of ICF showed that values ranged from 0.92 to 0.66 for the diseases categories (Table 5). Of the disease categories, 0.92 had the highest ICF value suggesting the common occurrence of these problems and agreement of the people on their remedy. It has been shown that medicinal plants that are effective in treating certain diseases and well known by community members have higher ICF values. 0.66 had the lowest, ICF value, which may be due to the rare occurrence of these diseases.

Table 5 Informant Consensus Factor (ICF)

Disease categories	n <sub>t</sub>	n <sub>ur</sub>	ICF
Respiratory structure related disease (Common cold , tonsillitis cough, Febrile illness	4	40	0.92
Urino-genital problems (Placenta retention, urine retention, kidney disease, gonorrhea,	3	15	0.85
Gastro-intestinal problems (stomach ache, diarrhea, gastritis, intestinal parasites, Blotting	27	148	0.82
Dermal related problems(skin rash, swelling, wound, warts, Ring worm	6	22	0.76
Circulatory problems (Anemia, Hypertension, Malaria, Rabies, spider poison, snake bite,	10	40	0.76
Sensorial problems ( eye diseases, nasal bleeding,, headache, Toothache,	10	28	0.66
Anthrax ,Skin rash, skin infection, External parasites, Arthropod disease, Rheumatism, Breast ulcer,	3	7	0.66

**Fidelity level (FL)** values were calculated for some commonly used medicinal plants against some commonly reported ailments. Results showed that *Croton macrostachyus* had the lowest fidelity level followed by *Cucumis ficifolius*, *Pentas schimperiana*, *Nicotiana tabacum*, *Bersama abyssinica* and *Dichrostachys cinea* (Table 6). The medicinal plants that are widely used by the local people to treat one or very few ailments will have higher FL values than those that are less popular (Tilahunt and Mirutset 2007). High FL could also be an indication of efficiency of the reported plant to cure a specific ailment.



Table 6 Fidelity index of some medicinal plants

Scientific Name of Medicinal plants	Examples of ailment Treated	NP	N	FL%
<i>Dichrostachy cinea</i>	Snack bite	26	28	92.8
<i>Bersama abyssinica</i>	Intestinal parasites, Rheumatism	22	26	84.6
<i>Nicotian; tabacum</i>	Blotting, Leeches problems, Headaches	20	24	83.3
<i>Pentas schimperiana</i>	Diarrhea Febrile illness Skin infection Diarrhea Nasal Bleeding	18	22	81.8
<i>Cucumis ficifolius</i>	Stomach ache, Febrile illness, Wound, Epilepsy, Hemorrhoid	16	20	80
<i>Croton macrostachyus</i>	Febrile illness Gonorrhoea Headache, Haemorrhoids Rabies ,Diffuse Cutaneous Leshmaniasis, Lymphatic	14	19	73.6

#### 4.5. Preference ranking

When there are different species prescribed for the same health problem, people show preference to one over the other. Preference ranking of six medicinal plants that were reported for treating wound. showed that *Cucumis ficifolius* scored 45 and ranked first indicating that it is the most effective in treating wound followed by *Cynodon dactylon* and the least effective was *Ficus sycomorus* (Table 7) .

Table 7 Preference ranking of medicinal plants used for treating Wound.

medicinal plants	R1	R2	R3	R4	R5	R6	R7	R8	R9	R 10	Total	Rank
<i>Cucumis ficifolius</i>	6	5	5	6	4	3	3	6	2	5	45	1 <sup>st</sup>
<i>Cynodon dactylon</i>	5	6	5	5	6	4	4	3	1	1	40	2 <sup>nd</sup>
<i>Cordia africana</i>	5	4	5	3	3	2	6	3	2	1	34	3 <sup>rd</sup>
<i>Prunus africana</i>	4	2	2	3	6	4	3	3	2	1	30	4 <sup>th</sup>
<i>Datura stramonium</i>	3	3	3	1	2	4	1	1	3	3	24	5 <sup>th</sup>
<i>Ficus sycomorus</i>	2	2	1	2	1	4	1	3	1	3	20	6 <sup>th</sup>

**R=Respondent**

## **5. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS**

### **5.1 . Summary and conclusions**

A study on Ethnobotanical Study of Medicinal Plants Used by People of Wadera Woreda, East Guji Zone, Oromia Region, Ethiopia was conducted with the objective of identifying and documenting the plants used to treat human and livestock diseases and indigenous knowledge on medicinal plants. Hundred individuals (age > 20) have participated in this study as respondents. Data on medicinal plants use were collected through semi-structured interviews, field observation, group discussion and guided field walk. Totally 80 medicinal plant species treating human and livestock diseases were documented. Herbs were found to be the dominant growth forms used for the preparations of traditional remedies followed by shrubs. Leaves were the most frequently used plant parts followed by roots for preparation of remedies. The most commonly used route of administration was oral followed by dermal. Overall result show the people of the study area depend on traditional medicine as elsewhere in other parts of rural Ethiopia, hence, proper harvest and cultivation of traditional medicine should be encouraged for sustainable use of these medicinal plants.

### **5.2. Recommendations**

Finally, based on the finding of the study, the following recommendations were forwarded.

- ❖ Encourage the local herbal medicine practitioners to enhance the use of traditional medicine through licensing and other incentives;
- ❖ Attention should be given to standardization of measurement and hygiene of the medicines made from plants by training both the healers and other members of the local community;
- ❖ Young generations need to be aware of preserving indigenous knowledge on traditional medicine. Local community must be aware of cultivating medicinal plants so as to minimize risk of extinction

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## 7. APPENDEX

Appendix 1 List of Medicinal plant used to treat Human and livestock health problems

Scientific Name and Plant Habit	Local Name	Family Name	Health problem Treated	Part (s)used, mode of preparations and Application.	Route of application
<i>Rhamnus prinoides</i> <b>Shrub</b>	Geshoo <b>HG</b>	Rhamnaceae	Skin Infection	<b>Leaf:</b> Leaf of <i>Rhamnu sprinoides</i> will be pounded and applied on the affected part.	Dermal
<i>Lagenaria siceraria</i> (Molina)Standi <b>Climber.</b>	Buqqe Hadha <b>AF</b>	Cucurbitaceae	Malaria	<b>Fruit:</b> Thesap from ripe <i>Lagenaria siceraria</i> fruit will be mixed with water and drunk before breakfast	Oral
<i>Ficus sur</i> Forssk. : <b>Tree</b>	Harbu <b>HG</b>	Moreceae	Skin infection	<b>Sap:</b> sap from <i>Ficus sur</i> will be creamed on affected skin	Dermal
<i>Cordia africana</i> Lami ; <b>Tree</b>	Weddessa <b>HG</b>	Boraginaceae	Wound	<b>Leaf:</b> Leaf of <i>Cordia africana</i> will be burned and its ash mixed with butter will be creamed on the affected part.	Dermal
<i>Capparis cartilaginea</i> Decne .: <b>Climber</b>	Goraa <b>WV</b>	Capparidaceae	Tooth ache	<b>Root:</b> Root will chewed and held into the teeth	Tooth

Continued....

<i>Guizotia scabra</i> <b>Herb</b>	Daboobesa <b>WV</b>	Asteraceae	Abbagorba (Black Leg)	<b>Leaf;</b> Chopping the leaves and given with one glass of water	Oral
<i>Rhus natlensis</i> <i>Krauss</i> <b>Shrub**</b>	Hadaa <b>HG</b>	Anacardiaceae	Snake bite	<b>Leaf:</b> Leaf will be pounded and the extract will be mixed with coffee and drunk as well as given for livestock	Oral
<i>Allium sativum</i> <b>Herb**</b>	Qulubbi adii <b>HG</b>	Alliaceae	Malaria	<b>Bulb:</b> Bulb of <i>Allium sativum</i> and rhizome of <i>Ginger officinale</i> are pounded together and eaten with honey	Oral
			Stomach ach	<b>Bulb:</b> Bulb will be eaten when there is pain and also given to livestock.	Oral
<i>Pterolobium stellatum</i> Brenan: <b>Shrub</b>	Arangama <b>WV</b>	Fabaceae	Head ache	<b>Root:</b> Root of <i>Pterolobium stellatum</i> and root of <i>Ruta chalapensis</i> will be powdered together and sniffed	Nasal or Oral
<i>Scandoxus multiflorus</i> : <b>Herb**</b>	Buttee Warabesa <b>WV</b>	Amaryllidaceae	Rabies	<b>Bulb:</b> Bulb of <i>Scandoxus multiflorus</i> will be pounded with bark of <i>Croton macrostachyus</i> and put in cold water and given to livestock and human.	Oral
<i>Englerina woodfordiodes</i> <b>Climber</b>	Digaluu <b>RS</b>	Loranthaceae	Diarrhea	<b>Leaf:</b> Leaf of <i>Englerina woodfordiodes</i> is pounded and mixed with water then with one cup of local tella is given to human	Oral

Continued....

<i>Hordeum vulgare</i> <b>Herb**</b>	Garbuu <b>HG</b>	Poaceae	Broken bone and bleeding	<b>Seed</b> ; soup made of seed flour will be consumed./applied on effected parts for both human and livestock.	Oral/dermal.
<i>Bersama abyssinica</i> Fresen <b>:Tree**</b>	Lolchiisa <b>WV</b>	Melianthaceae	Rheumatism	<b>Leaf:</b> Fresh leaf will be heated on fire and held on the affected area.	Dermal
			Intestinal parasite	<b>Stem:</b> Chopped young stem will be cooked with common bean seed and consumed	Oral
<i>Brucea antidysenterica</i> <b>;Shrub**</b>	Qomonyoo <b>RS</b>	Simaroubaceae	Malaria	<b>Seed</b> :One raw seed will be eaten every month for prevention of malaria	Oral
			Rheumatism	<b>Leaf</b> :The leaf will be heated on fire and held on the affected area every night .	Dermal
			Rabies	<b>Root</b> : Root of <i>Brucea antidysenterica</i> pounded with bark and root of <i>Croton macrostachyus</i> and root of <i>Rumex nervosus</i> and given to animals as well as humans	Oral

Continued...

<i>Calpurnia aurea</i> : <b>Shrub**</b>	Ceekaa <b>RS</b>	Fabaceae	Snake bite	<b>Leaf:</b> Fresh leaf of <i>Calpurnia aurea</i> will be smashed and 2-3 drops of the sap is taken orally. but for livestock by one glass.	Oral
			Skin rash	<b>Leaf:</b> The leaf infusion is used to wash the affected body daily for a week.	Dermal
			parasite (e.g., fleas, lice, bed bug, etc.	<b>Leaf :</b> The leaf is ground along with barks of <i>Millettia ferruginea</i> and sprayed on the area of problem (external human body part (s ,clothes, rooms ,beds, etc.	Dermal
<i>Vernonia amygdalina</i> del.: <b>Shrub</b>	Eebicha <b>HG</b>	Asteraceae	Tooth ache	<b>Leaf:</b> Fresh leaf of <i>Vernonia amygdalina</i> and bulb of <i>Allium sativum</i> will be chewed	Oral
			Stomach ache	<b>Leaf:</b> Fresh leaf of <i>Vernonia amygdalina</i> and bulb of <i>Allium sativum</i> will be chewed	Oral
			Intestinal Parasite	<b>Leaf:</b> The leaf infusion will be made and drunk before breakfast. Food and water will not be taken until 5 hours since then	Oral
			Malaria	<b>Leaf:</b> Crushed leaves of <i>Vernonia amygdalina</i> concocted with leaves of <i>Ruta a chalapensis</i> and one cup is served as a drink for 3-5 days with cold water in the morning	Oral
<i>Capsicum annum</i> <b>Herb**</b>	Qaara <b>CF</b>	Solanaceae	Blotting\Black leg, and Rabies	<b>Fruit:</b> Fruit will be crushed together with roots of <i>Cucumis ficifolius</i> , <i>Brucea antidysenterica</i> , <i>Vernonia amygdalina</i> , <i>Allium sativum</i> , <i>Ruta chalapensis</i> , and leaves of <i>Justicia schimperiana</i> mixed with water then drunk.	Oral
<i>Linum usitatissimum</i> .;* <b>Herb</b>	Talba <b>CF</b>	Linaceae	Retained	<b>Seed:</b> Seed of <i>Linum usitatissimum</i> is	Oral

Continued.....

			Placenta	powdered and half a glass of the powder is dissolved in water and given to cattle	
<i>Mikaniopsis clematoides.</i> : <b>Climb**</b>	Hidda Kalalaa <b>WV</b>	Menispermaceae	Eye disease	<b>Leaf</b> :leaf of <i>Mikaniopsis clematoides</i> together with that of <i>Premna schimperi</i> , <i>Ocimum forskolei</i> , <i>Vernonia amygdalina</i> , <i>Acacia abyssinica</i> , and <i>Cynodon dactylon</i> will be smashed and squeezed to add few drops in to the eye for both human and livestock	Through Eye
<i>Nicotiana glauca</i> <b>:Shrub*</b>	Tamboo <b>HG</b>	Solanaceae	Blotting	<b>Leaf and root:</b> Dry leaf and root of <i>Nicotiana glauca</i> will be powdered, mixed with salt and given to cattle.	Oral
			Leeches Problem	<b>Leaf:</b> Dried and powdered, leaf of <i>Nicotiana glauca</i> will be given to cattle	Oral
<i>Carissa spinarum</i> <b>:Shrub</b>	Agamsa <b>WV</b>	Apocynaceae	Headache	<b>Leaf:</b> Dry leaf of <i>Carissa spinarum</i> will be smoked and inhaled through nostrils	Nasal
			Stomach ache	<b>Leaf:</b> pounded leaf of <i>Carissa spinarum</i> will be mixed with honey and 2-3 teaspoons will be eaten before breakfast.	Oral
			Gonorrhoea	<b>Root:</b> Fresh root of <i>Carissa spinarum</i> will be pounded mixed with local beer (tella) and one glass of it (-250ml) will be drunk for three days	Oral
<i>Catha edulis.</i> <b>:shrub</b>	Caatii <b>HG</b>	Celastraceae	Intestinal parasite	<b>Leaf:</b> Fresh leaf and bark will be chewed and swallowed.	Oral
			Common	<b>Leaf</b> :The leaf of <i>Catha edulis</i> will be boiled	

Continued.....

			Cold	with that of <i>Ruta chalapensis</i> , and drunk	Oral
<i>Rhamnus prinoides</i> .:Shrub*	GeshooHG	Rhamnaceae	Skin.fungal Infection	<b>Leaf:</b> leaf of <i>Rhamnus prinoides</i> will be pounded and applied on the affected part.	Dermal
<i>Erythrina brucei</i> Schweinf .:Tree**	Walensuu WV	Fabaceae	Lymphatic swelling	<b>Bark:</b> Bark of <i>Erythrina brucei</i> pounded with leaf of <i>Taclea nobilis</i> mixed with water and half glass is given to the animal.	Oral
			Eye	<b>Bark; Bark of</b> <i>Erythrina brucei</i> will be mashed, and mixed with water then dropping in to eyes for both human and livestock.	Eye
<i>Citrus aurantifolia</i> Shrub* *	LoomiiCR	Rutaceae	Stomachache	<b>Fruit:</b> Fruit of <i>Citrus aurantifolia</i> , bulb of <i>Allium sativum</i> will be pounded together, mixed with honey and eaten with wheat bread.	Oral
			Nasal bleeding	<b>Fruit :</b> The juice of <i>Citrus aurantifolia</i> will be added into the nose or drunk	Oral
<i>Clematis hirsute</i> Climber	Hidda fiitii	Ranunculaceae	Tonsillitis	<b>Leaf:</b> leaf of <i>Clematis hisuta</i> will be crushed and pressed, rubbed with clean cloth and tied on the neck	Neck Derma 1
			Lymphatic swelling	<b>Leaf:</b> leaf of <i>Clematis hirusuta</i> and <i>Lagenaria siceraria</i> will be crushed together and tied on swelling	Neck
<i>Coffea arabica</i> .:shrub	Buna CF	Rubiaceae	Diarrhea	<b>Seed :</b> Powder of roasted coffee bean will be eaten or drunk before breakfast for 2-3 days	Oral
<i>Coriandrum sativum</i> .Herb	Dimbilaal HG	Apiaceae	Diffuse Coetaneous Leshmaniasis	<b>Leaf:</b> The leaf of <i>Coriandrum sativum</i> pounded with leaf of <i>Croton macrostachyus</i> and <i>Rumex nervosus</i> and creamed on affected area for 2-3 days	Dermal
<i>Croton macrostachyus</i> Tree	Bakkanisa WV	Euphobiaceae	Lymphatic Swelling	<b>Leaf:</b> Dried leaves of <i>Croton macrostachyus</i> and <i>Premna schimper</i> will be powdered and 2-3 teaspoons of the powder	Oral

Continued.....

				will be mixed with alcohol or coffee and drunk	
			Febrile illness	<b>Leaf:</b> Leaf <i>Croton macrostachyus</i> and <i>Ocimum forskolei</i> are fumigated.	Oral/Nasal
			Gonorrhoea	<b>Bark:</b> Bark of <i>Croton macrostachyus</i> and <i>Vernonia amygdalina</i> will be powdered together; 3-4 tea spoons of the powder will be taken with tella	Oral
			Headache	<b>Leaf:</b> leaf of <i>Croton macrostachyus</i> and <i>Ocimum forskolei</i> will be smashed and sniffed.	Nasal
			Haemorrhoids	<b>Leaf:</b> The fresh leaves of <i>Croton macrostachyus</i> and <i>Cucumis ficifolius</i> will be pounded together and creamed	Dermal
			Rabies	<b>Root:</b> Root of <i>Croton macrostachyus</i> pounded with leaf of <i>Hypericum revolutum</i> and given to cattle to drink with tella.For human root of <i>Croton macrostachyus</i> pounded together with root of <i>Scandoxus multiflorus</i> by mixing with water half of cup given on 9 <sup>th</sup> day after infected	Oral
			Diffuse Cutaneous Leshmaniassiss	<b>Leaf:</b> the fresh leaf of <i>Croton macrostachyus</i> will be pounded with leaves of <i>Ricinus communis</i> and <i>Epilobium hirstus</i> heated on fire being rubbed up with the leaf of <i>Croton macrostachyus</i> and sniffed, also creamed.	Oral
<i>Cucumis ficifolius</i> :Climber**	Hiddi Holaa RS	Cucurbitaceae	Stomach ache	<b>Root:</b> A piece of root of <i>Cucumis ficifolius</i> will be chewed with salt and swallowed	Oral
			Febrile illness	<b>Root:</b> Root of <i>Cucumis ficifolius</i> together with the leaves of <i>Ocimum gratissimum</i> and <i>Calpurnia aurea</i> will be pounded and drunk with a cup of coffee.	Oral

Continued.....

			Wound	<b>Leaf:</b> leaf of <i>Cucumis ficifolius</i> will be smashed and 2-4 Drops of the sap will be added to the wound for both.	Derma 1
			Epilepsy	<b>Bark:</b> Dried bark and leaf of <i>Cucumis ficifolius</i> will be powdered together then mixed with alcohol, and one cup is taken by human	Oral
			Hemorrhoid	<b>Leaf:</b> The leaf of <i>Cucumis ficifolius</i> will be pounded with fresh leaf of <i>Croton macrostachyus</i> mixed with butter and applied on the affected area until cured	Derma 1
<i>Eucalyptus globulus</i> : <b>Tree**</b>	Bargamo adi <b>HG</b>	Myrtaceae	Cough	<b>Leaf:</b> The leaf and young branches will be boiled in water and Given for livestock and human.	Nasal
<i>Olea europaea</i> <b>.Tree*</b>	Ejersa <b>WV</b>	Oleaceae	Hemorrhoid	<b>Bark:</b> The bark will be heated on fire held on the pain area.	Derma 1
<i>Embelia schimperi</i> <b>Shrub</b>	Haanquu <b>RS</b>	Myrsinaceae	Intestinal Parsite	<b>Seed:</b> Dry seeds of <i>Embelia schimperi</i> will be powdered and mixed with water and 2 cups of mixture will be drunk	Oral
<i>Epilobium hirsutum</i> : <b>Herb**</b>	Ashufee <b>WV</b>	Onargraceae	Diffuse Cutaneous Leshmaniasis.	<b>Leaf:</b> The leaf of <i>Epilobium hirsutum</i> put in fire by taking away from fire and by rubbing creamed on pain area. Also leaf of <i>Epilobium hirsutum</i> pounded with flesh leaf of <i>Croton macrostachyus</i> and <i>Ricinus communis</i> are creamed for both human and cattle.	Oral
<i>Periploca linearifolia</i> <i>Quartin</i> : <b>Climber</b>	Adamii <b>WV</b>	Euphorbiaceae	Gonorrhea	<b>Sap:</b> Four to six drops of collected sap will be mixed with a cup of wheat flour, baked and eaten to the empty stomach for 5 days	Oral
			Breast ulcer	<b>Stem:</b> stem of <i>Euphorbia apliphylla</i> is creamed and fumigated to the affected breast.	Derma 1



Continued....

<i>Ficus vasta</i> Forssk <b>Tree**</b>	Qilxuu <b>WV</b>	Moraceae	Haemorrhoid	<b>Sap:</b> Sap from <i>Ficus vasta</i> and powdered root of <i>Pterolobium stellatum</i> are mixed together and creamed to the external haemorrhoid.	Anal
<i>Salix mucronata</i> : <b>Herb*</b>	Alaltuu <b>WV</b>	Salicaceae	Joint dislocation	<b>Leaf:</b> The leaf ground along with young stem, mixed with bread and given to the cattle in problem	Oral
<i>Zingiber officinale</i> Roscoe. <b>Herb**</b>	Jinjiibilli; <b>HG</b>	Zingiberaceae	Tonsillitis	<b>Rhizome:</b> Rhizome will be crushed together with <i>Solanum incanum</i> flower and applied.	Oral
<i>Gnidia glauca</i> <b>Shrub*</b>	Qaqaroo <b>WV</b>	Thymelaeaceae	Kidney problem	<b>Root;</b> Root of <i>Gnidia glauca</i> will be powdered and mixed with teff flour baked and eaten	Oral
<i>Solanum marginatum</i> <b>Herb*</b>	Hiddi horii <b>RS</b>	Solanaceae	Snake bite	<b>Fruit:</b> snake poisoned goat eats fruit of <i>Solanum marginatum</i> against the poison	Oral
<i>Plectranthus edulis</i> <b>Herb.</b>	Dinichaa Oromo <b>HG</b>	Lamiaceae	Antidotes and epilepsy	<b>Root and Leaf;</b> The leaf and flower ground together, and given to the victim, 2-3 teaspoon twice a day for 2 days.	Oral
<i>Juncus oxycarpus</i> : <b>Herb**</b>	Aladduu <b>WV</b>	Juglandaceae	Skin fungal Infection	<b>Leaf:</b> leaf of <i>Juncus oxycarpus</i> together with that of <i>Rumex nervosus</i> will be mixed with wood ash and heated on fire with milk or butter. Then the mixture will be applied on the skin as cream.	Dermal
<i>Justicia schimperiana</i> : <b>Shrub*</b>	Dhumuga <b>HG</b>	Acanthaceae	Rabies	<b>Root and Leaf:</b> Root and Leaf of <i>Justicia schimperiana</i> will be pounded together, mixed with water and drunk	Oral

Continued.....

			Gonorrhea	<b>Root:</b> Root of <i>Justicia schimperiana</i> together with leaf of <i>Erythrina brucei</i> will be pounded and drunk	Oral
<i>Kalanchoe petitiiana</i> <b>Herb</b>	Bosoqqe <b>WV</b>	Crassulaceae	Nasal bleeding	<b>Root and Leaf</b> of <i>Kalanchoe petitiiana</i> will be powdered and sniffed	Nasal
			Lymphatic swelling	<b>Root and leaf</b> :Root and leaf <i>Kalanchoe petitiiana</i> will be powdered together and taken with coffee	Oral
<i>Ocimum Forkolei</i> <b>Herb**</b>	Hancabi <b>WV</b>	Lamiaceae	Febrile illness	<b>Leaf:</b> Leaf infusion will be smelled.	Nasal
			Headache	<b>Leaf:</b> leaf of <i>Ocimum forkolei</i> together with that of <i>Carissa spinarum</i> and <i>Ocimum basilicum</i> will be smashed and sniffed	Nasal
			Eye disease	<b>Leaf:</b> Leaf of <i>Ocimum forkolei</i> together with that of <i>Premna schimper</i> , <i>Vernonia amygdalina</i> , <i>Acacia abyssinica</i> , and <i>Cynodon dactylon</i> will be crushed and squeezed to put drops of the juice in to the eye. for both human and livestock	Through Eye
<i>Mentha aquatic.</i> <b>Herb*</b>	BaalaLagaa <b>WV</b>	Lamiaceae	Diffuse Cutaneous Leshmaniasis	<b>Leaf:</b> Leaf of <i>Mentha aquatic</i> and leaf of <i>Clematis hirsute</i> , <i>Rumex nervosus</i> are rubbed together and creamed affected onto the affected area , and also sniffed.	Dermal/nasal
<i>Ozooro insignis</i> ; <b>Tree**</b>	Biqqaa <b>HG</b>	Anacardiaceae	cold disease	<b>Bark;</b> Bark of <i>Osoora insignis</i> will be crushed and mixed with water then drinking	Oral
			Rabies	<b>Bark andLeaf</b> <i>Ozooro insignis</i> will be pounded together, mixed with water and given to the cattle.	

Continued.....

			Eyes Dieses	<b>Bark and fruit ;</b> Crushing, mashed and one drops on the eye.	Through the Eye
<i>Pavonia procumbens</i> <b>.Herb</b>	Dobii <b>WV</b>	Malvaceae	Hook worm & Abdominal pain	<b>Root</b> The root ground along with roots of <i>Rumex abyssinicus</i> ,. officinale, and <i>Allium sativum</i> , homogenized in water and taken one tea cup every morning for 3 days	Oral
<i>Triticum aestivum</i> . <b>Herb</b>	Qamadii <b>AF</b>	Poaceae	Swelling	<b>Seed:</b> Seed will be chewed and the bolus will be put on the swollen area	Derma
<i>Ficus sycomorus</i> <b>Tree*</b>	Odaa <b>HG</b>	Moraceae	Worm	<b>Latex:</b> Latex of <i>Ficus sycomorus</i> will be drunk with coffee.	Oral
<i>Mikaniopsis clematoides</i> <b>Climber*</b>	Hidda Kalalaa <b>WV</b>	Asteraceae	Wound	<b>Leaf:</b> Leaf of <i>Mikaniopsis clematoides</i> will be pounded and a small amount applied on the wound.	Dermal
<i>Datura stramonium</i> <b>Herb</b>	Asangira <b>HG</b>	Solanaceae	Wound	<b>Leaf:</b> The leaf is pounded and applied (put) on affected area once a day for 2-5 days.	Dermal
<i>Ocimum basilicum</i> : <b>Herb</b>	Gosabila <b>CF</b>	Lamiaceae	Headache	<b>Leaf:</b> leaf of <i>Ocimum basilicum</i> will be crushed and sniffed.	Nasal
			Malaria	<b>Leaf:</b> leaf of <i>ocimum basilicum</i> and bulb of <i>Allium sativum</i> pbulb will be poundede together and eaten with honey	Oral
<i>Ampelocissus bombycina</i> : <b>Climber*</b>	Buqee Seexanaa <b>WV</b>	Vitaceae	Anthrax	<b>Leaf:</b> Leaf of <i>Ampelocissus bombycina</i> with leaf of <i>Croton macrostachyus</i> and <i>Justicia schimperiana</i> are dried together and pounded ,then creamed an affected area	Dermal
<i>Pentas schimperiana</i> <b>Herb**</b>	Maxannee <b>RS</b>	Rubiaceae	Nasal bleeding	<b>Leaf:</b> Freshly squeezed leaves are inhaled through nasal opening.	Nasal

Continued.....

			Diarrhea	<b>Root:</b> Root of <i>Pentas schimperiana</i> will be chewed with salt and swallowed.	Oral
			Febrile illness	<b>Leaf:</b> leaf of <i>Pentas schimperiana</i> will be smashed and sniffed	Dermal
			Skin infection	Leaf: leaf of <i>Pentas schimperiana</i> is immersed in hot water and rubbed to the affected skin of human.	Dermal
<i>Phytolacca dodecandra</i> ; <b>Shrub</b>	Handodee <b>WV</b>	Phytolaccaeaceae	Liver problem	<b>Root:</b> Crushed root of <i>Phytolacca dodecandra</i> will be mixed with water and drunk.	Oral
			Gonorrhoea	<b>Root:</b> Roots of <i>Phytolacca dodecandra</i> and <i>croton macrtachys</i> will be powdered together and drunk with coffee	Oral
			Haemorrhoids	<b>Leaf:</b> of <i>Phytolacca dodecandra</i> , together with that of <i>Ficus vasta</i> , <i>Justica schimperiana</i> , <i>Dodonaea angustifolia</i> , and <i>Rhamnus prinoides</i> will be pounded and drunk with alcohol or tea	Oral
			Rabies	<b>Root:</b> Dried root of <i>phytolacca dodecandra</i> will be powdered drunk with locally made alcohol (Areke).	Oral
<i>Prunus africana</i> : <b>Tree**</b>	Hoomii <b>WV</b>	Rosaceae	Wound	<b>Bark:</b> Bark will be powdered and dusted on the wound	Dermal
<i>Pavetta gardeniifolia</i> <b>Shrub</b>	Qadiidaa <b>WV</b>	Rubiaceae	Tooth ache	<b>Root:</b> Chewing the root for tooth ache.	Oral
<i>Premna schimperi</i> <b>Tree</b>	Urgessa <b>WV</b>	Verbenaceae	Tooth ache	<b>Root:</b> Root of <i>premna schimperi</i> will be chewed and the solution is allowed to be in contact with disease tooth.	Oral
<i>Pterolobium Stellatum</i> <b>Shrub</b>	Arangama <b>WV</b>	Fabaceae	Head ache	<b>Root:</b> Root of <i>Pterolobium stellatum</i> and root of <i>Ruta chalepensis</i> will be powdered together and sniffed	Nasal
				<b>Root:</b> Root of <i>Pterolobium stellatum</i> is dried powdered and one spoon of the powder is	Oral

Continued....

			Epilepsy	mixed with half cup of local alcohol and given to human.	
			Tooth ache	<b>Leaf:</b> leaf of <i>Pterolobium stellatum</i> , <i>croton macrostachyus</i> , <i>vernonia amygdalina</i> and <i>Carissa spinarum</i> are <i>macrostachyus</i> and heated in fire and put on infected teeth.	Tooth ache
			Intestinal parasite eg, Tape worm	<b>Root:</b> Root of <i>Pterolobium stellatum</i> is dried and powdered,mixed with water.Thee spoon is given per a day for three days.	Oral
<i>Acanthospermum hispidium</i> ; <b>Herb*</b>	Hammarresa <b>WV</b>	Asteraceae	Rabies	<b>Bark;</b> Chopping Bark, crushed and drinking with one water of glass.	Oral
			Hypention	<b>Leaf;</b> Leaf of <i>Acanthospermum</i> will beCrushing then boiling it drinking with- 2 days	Oral
<i>Balanites aegyptiaca</i> <b>Tree*</b>	Baddana <b>HV</b>	Balaniteceae	Rabies	<b>Bark;</b> the bark chopping, mashed making and giving with Coffee with -2 -3 days	Oral
<i>Verbascum sinaiticum</i> h.; <b>Herb</b>	Gurra Harree <b>RS</b>	Scrophulariaceae	Diarrhea	<b>Leaf:</b> Leaf of <i>Verbascum sinaiticum</i> will be powdered and for cattle 2-3 spoon with one bottle of water and for human one Spoon with cup of water given as pain is seen.	Oral
<i>Musa acuminata</i> <b>Herb</b>	Mooze <b>HG</b>	Musaceae	urine ulceration	<b>Fruit.</b> the ripen fruits will be eating mornig	Oral
<i>Dodonaea angustifolia</i> : <b>Shrub</b>	Ittacha <b>WV</b>	Sapidaceae	Wound	<b>Leaf:</b> Dried leaves of <i>Dodonaea angustifolia</i> will be powdered and dusted on the wound	Dermas
<i>Carica papaya</i> . <b>Tree</b>	Paappaayy aa <b>HG</b>	Car icaceae	Gastritis	<b>Leaf:</b> Leaf will be crushed mixed with water and drunk before eating brake fast	Oral

Continued.....

			Anaemia	<b>Fruit:</b> Fruit of <i>Carica papaya</i> squeezed and used as a drink early in the morning	Oral
<i>Dichrocephala integrifolia</i> ** <b>Herbs</b>	Xabba gidi <b>WV</b>	Asteraceae	Eye disease	<b>Leaf:</b> leaf of <i>Dichrocephala integrifolia</i> together with that of <i>Acacia abyssinica</i> , <i>Ocimum forskolei</i> , <i>Premna schimperi</i> , <i>Mikaniopsis clematoides</i> will be pounded and the liquid part will be dropped into the eye .	Eye
<i>Zehneria scabra</i> . <b>:Climber **</b>	Hidda adii <b>WV</b>	Cucurbitaceae	Tonsillitis	<b>Leaf:</b> Leaf of <i>Zehneria scabra</i> mashed and after drying will be mixed with butter and put on the head	Derma l
<i>Indigofera vohemarensis</i> . <b>Shrub</b>	Heenaa <b>WV</b>	Fabaceae	Toothache	<b>Leaf:</b> Covered by leaves and placed on fire and put on Surface of teeth	Tooth
<i>Terminalia brownii</i> <b>Tree**</b>	Bidheessaa <b>WV</b>	Combretaceae	Body Swelling	<b>Bark ;</b> Chopping Bark, crushed and drinking with one water of glass.	Oral
<i>Dichrostachys cinerea</i> <b>Tree**</b>	Jirimee <b>WV</b>	Fabaceae	Snake bite	<b>Bark;</b> Chopping Bark ,and crushed drinking with one water of glass for both human and livestock.	Oral
<i>Ozora insignis</i> <b>Tree*</b>	Luqaluqqee <b>WV</b>	Anacardaceae	Blotting	<b>Bark</b> of <i>Ozora insignis</i> will be powdered, mixed with salt and given to cattle.	Oral
<i>Nigella sativa</i> <b>Herb</b>	Ashudaa Guraacha <b>HG</b>	Ranunculaceae	Stomach	<b>Seed Powder</b> <b>Seed</b> of <i>Nigella sativa</i> , together with crushed bulbs of onion will be mixed and give to human	Oral

<i>Acacia albida.</i> <b>Tree</b>	Garbii <b>WV</b>	Fabaceae	Diarrhea	<b>Bark</b> of <i>Acacia albida</i> . Chopping and give to human With milk	Oral
<i>Grewia villosa*</i> <b>Shrub</b>	Ogobdii <b>WV</b>	Tiliaceae	Body swelling	<b>Bark</b> of <i>Grewia villosa</i> Chopping and give with water to ailments	Oral
<i>Cucurbita pepo</i> <b>Herb</b>	Baqulaa <b>WV</b>	Cucurbitaceae	Tapeworm	<b>Seed</b> : Seed will be roasted and eaten	Oral
<i>Erythrina brucei</i> <b>Tree**</b>	Walleenaa <b>WV</b>	Fabaceae	Eye problem	<b>Leaf</b> ; will be crushed and mixed with milk, then dropping into the eye for both human and livestock.	Through the eye
<i>Syzygium uineesa</i> <b>Tree</b>	Badhessa <b>WV</b>	Myrtaaceae	Stomach	<b>Bark</b> <i>Bark of Syzygium uineesa</i> will be Crushed , Squeezed and given with 1 glass cups	Oral
<i>Fluggea virosa</i> <b>Shrub**</b>	Qancacaa <b>WV</b>	Euphorbiaceae	Goiter	<b>Root</b> ; Root of <i>Fluggea virosa</i> is dried powdered and one spoon of the powder is mixed with half cup of local alcohol and given to human as well as livestock's.	Oral

\*= plant species used for livestock ailments, \*\*= plant species used for both human and livestock ailments

**WV, HG, RS** and **AF** are Plant Habitats where, **WV, HG, RS** and **AF** represents; Wild Vegetation, Home Garden, Agricultural fields and Road Side

Appendix 2 List of Informants in the study area

NO of Total Respondants	Sex		Marital Status		Educational status			Residence Kebeles			
	M*	F	M	S	Read/Write	5-8	8-12	Ulaloo	Wabaa	Anoonu	Kinnoo
100	81	19	94	6	69	21	10	25	25	25	25
NO Key informants. 10	6	4	10	-	10	7	3	2	2	3	3

**M\***=males ,**F**=females, **M**= marred **S**= single



**Semi-structured interviews scheduled to be employed in the research area.**

Date \_\_\_\_\_ village (Kebele) \_\_\_\_\_

Name of respondent (informant) \_\_\_\_\_

Sex: Male \_\_\_\_; Female \_\_\_\_; Age \_\_\_\_; Occupation \_\_\_\_; Religion \_\_\_\_

Level of education: High \_\_\_\_; Middle \_\_\_\_; Low \_\_\_\_

1. What are the main or most common human health problems or disease in your locality?
2. What are the main or most common livestock (animals) health problems or diseases?
3. List plant species used to treat a given disease in your area?
4. List plants used to treat both human and livestock diseases?
5. Which plant do you use to treat that particular health problem/disease?
6. For what other purposes do you use the medicinal plants? Beside its medicinal value
7. Season/time of collection \_\_\_\_\_
8. Does the dose differ among men, women, children, and elders? \_\_\_\_\_
9. Any restrictions in taking remedies (pregnancy, age, etc.)? \_\_\_\_\_
10. Do you store the medicine? If yes, how and for how long \_\_\_\_\_
11. Are there conditions, which restrict taking of the medicine? \_\_\_\_\_
12. Are medicinal plants easily accessible? \_\_\_\_\_
13. Preparation forms (crushed, pounded, powder, milky latex/extract with cold water/boiled/juice etc \_\_\_\_\_

**Identification**

Study area - Wadera Woreda

Interviewer: Usman Gamba

Date/month/year-----/------/------

Time: From-----