# TRADITIONAL MEDICINAL PLANTS USED BY INDIGENOUS PEOPLE OF WAGHEMRA ZONE, DEHANA WOREDA, AMHARA REGIONAL STATE, ETHIOPIA.

**M.Sc. Thesis**

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**August, 2018**

**Haramaya University, Haramaya**

# Traditional Medicinal Plants Used By Indigenous People of Waghemra Zone, Dehana Woreda, Amhara Regional State, Ethiopia.

**A Thesis Submitted to the School of Biological Sciences and Biotechnology, College of Natural and Computational Sciences, Postgraduate Program Directorate, Haramaya University**

**In Partial Fulfillment of the Requirements for the Degree of Master of Science in Biology**

**Adimasu Mekonen**

**August , 2018**

**Haramaya University, Haramaya**

# HARAMAYA UNIVERSITY

## POSTGRADUATE PROGRAM DIRECTORATE

As thesis research advisors, we hereby certify that we have read and evaluated this thesis prepared under our guidance by Adimasu Mekonen entitled**: Traditional Medicinal Plants used by Indigenous People of Dehana Woreda in Waghemra Zone of Amhara Regional state, Ethiopia**. And we recommend that it be submitted as fulfilling the thesis requirement for the degree of Master of Science in Biology

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# DEDICATION

This thesis is dedicated to my wife Alemgena Yirga and my mother Wudie Getnet and all my sisters and brothers for nursing me with affection and love and for their dedicated partnership in success of my life.

## STATEMENT OF THE AUTHOR

I hereby certify that this thesis is my own work and that all the sources of materials used for the thesis have been duly acknowledged. This has been submitted in partial fulfillment of the requirements of an M.Sc. degree at Haramaya University and is deposited at the University Library to be made available to borrowers under the 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.

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# BIOGRAPHICAL SKETCH

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## ACKNOWLEDGEMENTS

I express my profound sense of gratitude to Dr. Meseret Chimdessa and Dr. Yohannes Petros for their assistance and guidance that helped me to accomplish this work.

I would like to thank the local people of Dehana Woreda for their kindness in providing me information on the medicinal plants; Dehana Health Center and Veterinary clinic for their provision of data on major health problems and health facilities of the District; District Agricultural and Rural Development Office for various basic data concerning climate of the area.

# ABBREVIATIONS/ACRONYMS

| | |
|---|---|
| CSA | Central Statistical Agency |
| FL | Fidelity Level |
| ICF | Informant Consensus Factor |
| IK | Indigenous Knowledge |
| IUCN | International Union for Conservation of Nature |
| NMAE | National Metrological Agency of Ethiopia |

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## ABSTRACT

*Assessment of traditional medicinal plants was conducted to document the indigenous plant-based medical knowledge of the people in Dehana woreda, northern Ethiopia from January to July, 2018. A total of 100 informants (age≥25) were selected to collect information on medicinal plant use from three sampled kebeles. Of these, 12 key informants were selected purposively based on recommendation by local elders and authorities. The rest were selected randomly. Data were collected using semi-structured interviews, field observations and group discussions with key informants. Informant consensus factor (ICF) and fidelity level were calculated to assess the agreement of informants on the medicinal value of plants. A total of 52 plant species distributed in 51 genera and 41 families were collected and identified. From 52 collected medicinal plants of the study area, 33 species (63.46%) were used against human ailments, 5 species (9.61%) were used against livestock ailments and the remaining 14 species (26.92%) were used to treat both human and livestock ailments. From the total medicinal plant species, 19 ( 36.53%) were herbs , 17(32.69%) were shrubs , 13 (25%) were trees and 3 (5.77%) were climbers The most frequently used plant parts were leaves 20(38.47) followed by roots 10(19.23%) The most widely used method of preparation was crushing of the different part of plants. The common route of administration recorded was oral followed by dermal.Disease categories such as snake bite, rabies, malaria had ICF values 0.92 and febrile illness, cough, common cold had ICF values of 0.88 this high ICF value indicates high incidence of these diseases in the study area and agreement of people on their remedies. The study area people have similar medicinal knowledge based on Jaccard's similarity Index. Preference ranking was done by Rabies which was common on the district and treated by 5 medicinal plants. Local government participation is need to minimize transmission of rabies .*

**Keywords: Ethnobotany, Indigenous Knowledge, Semi-structured interview,Traditional healer**

# 1. INTRODUCTION

Ethiopia is a country characterized by a wide range of climate and ecological conditions, possessing enormous diversity of fauna and flora (Pankhurst, 2001). The country possesses a wide range of potentially useful medicinal plants, more extensive indeed than available in many other parts of the world. Popular knowledge of plants used by humans is based on thousands of years of experiences. By "trial and error", people have learnt how to recognize and use plants, including those with a magico-religious function. In Ethiopia, even though the traditional medical practitioners are the best sources of information about the knowledge of the medicinal plants, it was found very difficult to obtain their traditional medicinal information as they consider their indigenous knowledge as a professional secret, only to be passed orally to their older son, at their oldest age (Jansen, 1981). As a result, the local indigenous knowledge on medicinal plants is being lost at a faster rate with increase in modern education, which has made the younger generation to underestimate its traditional values. In addition, the increase in population growth rate resulted in the intensification of agriculture in marginal areas which lead to deforestation and decrease in number or loss of medicinal plants in the wild (Phankhurst, 2001).

Dawit (1986) estimated that 95% of traditional medical preparations in Ethiopia are of plant origin. Medicinal plants are the base for the development of new drugs and the survival of mankind as well as livestock. In Ethiopia, little emphases have been given to traditional medicinal studies over the past decades (Debella, 2001). Therefore it can be said that ethnobotanical studies are merely at the start in Ethiopia though there have been some attempts in investigating medicinal plants uses and there is as yet no in depth study on the relation between medicinal plants and indigenous knowledge on sustainable management of such plant resources. Modern healthcare has never been and probably will never provide for the foreseeable future adequate and equitable health service anywhere due to the financial limitations related to rapid population growth, political instability and poor economic performance (Pankhurst, 2001). Due to incomplete coverage of modern medical system, shortage of pharmaceuticals and unaffordable prices of modern drugs, the majority of Ethiopians still depend on traditional medicine.Therefore, traditional medicine remains the main resource for a large majority (80%) of the people in Ethiopia to treat their illnesses and veterinary diseases (Asfaw *et al.*, 1999).

However, 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. So medicinal plants are the main source of traditional medicine for the rural population and are of high demand in the healthcare systems of the population, and when compared to modern medicine, ethnomedicine activities need special consideration and back-up (Abbiw, 1996).

The problem of ensuring the equitable distribution of modern healthcare has become more serious as the gap between supply and demand has continued to widen. According to Sebsebe (2003), there is a considerable global interest in tapping the accumulated knowledge of traditional medicine, and therefore, researches are being carried out in many countries with the aim of increasing the use of traditional medicine to the welfare of the human population. The same document also explains that basic and applied researches on medicinal plants are interconnected and the basic research is primarily important in realizing new knowledge and serving as the basis for applied research. Ethnobotanical studies are useful in documenting, analyzing and disseminating of knowledge and interaction between the plant world and human society. It can emphasize how diversity in nature is used and influenced by human activities, how human beings classify, manage and use plants available around them (Mathias, 1996). 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 lives-stock ailments in modern day (Wright, 2005). Traditional medicinal consultancy including the consumption of the medicinal plants has a much lower cost than modern attention (Tesema et *al*., 2003). The current account of medicinal plants of Ethiopia, as documented for national biodiversity strategy and action plan by Tesema *et al*. (2002), shows that about 887 plant species are reported to be utilized in the traditional medicine. Among these, about 26 species are endemic and they are becoming increasingly rare and rare at the verge of extinction. Moreover, both the traditional medicinal plants and the indigenous knowledge about them are equally threatened as the ethnobotanical information is not documented and remains in the memory of elderly practitioners. Ethiopian traditional medical system is characterized by variation and is shaped by the ecological diversity of the country, socio-cultural background of the different ethnic groups as well as historical developments,

which are related to migration. Previous studies (Birhanu *et al*, 2015 and Zenebe *et al*,2012) showed the existence of traditional medical pluralism in the country. Therefore, in Ethiopia in general and in Amhara regional state in particular, 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), as there is little accessibility to written documents and records on medicinal plants.

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; Tolossa *et al*., 2013; Yibrah, 2014; Kidane *et al*.,2014; Birhanu *et al*., 2015), central (Birhan *et al*., 2011; Ermias *et al*., 2013), north, north-western and north-east (Gidey, 2010; Birhane *et al*., 2011; Zenebe, *et al*., 2012; Giday and Teklehaymanot, 2013; Yigezu *et al.*, 2014), and western parts (Gidey, 2012; Megersa *et al.*, 2013) of the country. However, there is no study conducted in Dehana woreda of Amhara 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, the purpose of this study is to investigate and document the traditional medicinal plants used by indigenous people of Dehana woreda, Amhara Regional State for the treatment of human and livestock ailments with the following objectives.

**General objective**

- To carry out ethnobotanical investigation on medicinal plants used by people of Dehana woreda in Amhara Regional State to treat the human and livestock ailments

**Specific objectives**

- To collect and identify the traditional medicinal plants that are used by local people of Dehana woreda for the treatment of human and livestock ailments;
- To identify plant part (s) used and mode of administration of the drugs/ of plant used by the local people;
- To document indigenous knowledge on the use and management practices of medicinal plants by indigenous people of Dehana woreda;

# 2. LITERATURE REVIEW

## 2.1 Overview of medicinal plants in Ethiopia

Ethiopia is believed to be home for about 6,500-70000 species of higher plants with approximately 12% endemism, and hence one of the six plant biodiversity rich countries of Africa (USAID, 2008). The diversity is also considerable in the lower plants, but exact estimate of these has to be made. The genetic diversity contained in the various biotic make up is also high thus making the country a critical diversity hot spot for plants.

As one of the 12$^{th}$ Vavilovian centers of origin/ diversity for domesticated crops and their wild relatives, Ethiopia is home of many endemic crops and genetic stocks (Vavilov, 1951). Ethiopia has a significant portion of two of the world's 25 biodiversity hot spot areas i.e. the eastern Afrmontane Biodiversity Hotspot and the Horn of Africa-Biodiversity Hot Spot (Conservation International at www. biodiversityhotspots.org). These hotspots house a lot of 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 (Tizazu, 2005).

## 2.2 Medicinal plants diversity and distribution in Ethiopia

Different vegetation types that are found in the various agro-ecological zones of Ethiopia accommodate various types of medicinal plants. Edwards (2001) reported that the woodlands, Montane vegetation including grasslands and forests and the evergreen scrubs and rocky areas contain more medicinal plants with higher concentrations in the woodlands. She observed that the microphyllous vegetation of the wood lands listed more medicinal plants species followed by the Montane-grassland and riverine vegetation while the afroalpine vegetation ranked last.

The number of different languages spoken in Ethiopia approaches 90 (Fisseha,2009) and each corresponds to its unique socio-cultural population thus amounting to the high human cultural diversity. Each of these cultural domains has its own set of written and/or oral pharmacopoeias with the medicinal use of some species being restricted to that given culture. One thousand

identified medicinal plant species are reported in the Ethiopian Flora, however, many others are not yet identified. About 300 of these species are frequently mentioned in many sources. Jansen (1981) asserts that Ethiopia has rich medicinal plant lore and points out that almost all plants of the Ethiopian flora are used somewhere somehow medicinally. Other workers on the other hand estimated about 60% of the flora to be medicinal, and most sources give about 10% of the vascular flora to be medicinal. The list cover plants that are widely used by the local communities in lowlands and highlands for treating human ailments and some of them for livestock ailments as well as for prevention of pests and vectors.

Globally, the estimate of medicinal plant species range from 35, 000 - 50, 000 species and out of this about 4000 - 6000 species have entered the world market of medicinal plants (Farnsworth, 1991). However, only about one hundred species having been used as a source of modern drugs. In Ethiopia, the greater concentration of medicinal plants are found in the south and south western Ethiopian parts of the country following the concentration of biological and cultural diversities (Edwards, 2001). The various citations made from various written records of medicinal plants from central, north and northwestern parts of Ethiopia are thus small fractions of medicinal plants present in Ethiopia. Study on the Bale Mountains National Park in the South East Ethiopia revealed that the area, as much as it is a biodiversity hotspot, also turned out to be a medicinal plant hotspot with 337 identified medicinal species of which 24 are endemic (National Herbarium, 2004; Ermias, 2005; Haile, 2005). The species comprised of 283 used as human medicine, 47 used as livestock medicine

## 2.3 Threats To Conservation of Traditional Medicinal Plants of Ethiopia

Ethiopia's traditional medicine as elsewhere in Africa is faced with problems of continuity and sustainability (Ensermu *et al*., 1992). Nowadays, herbal practitioners have to walk greater distances for herb collections that once grew in the vicinity of their homes. This is because of availability of plants in general and medicinal plants in particular have been affected by a dramatic decrease in areas of native vegetation (Mirutse (2003).The primary causes of this problem are loss of taxa of medicinal plants, loss of habitats of medicinal plants and loss of indigenous knowledge (Ensermu *et al*., 1992). In support of this, Mirutse (2003) found out that the practice of using plant remedies by Zay people to treat different ailments has been declining from time to time mainly as a result of continued deforestation in the area. In addition,

Zemede (2001) argues that medicinal plants are considered to be at conservation risk due to over use and destructive harvesting (roots and barks collection).

Environmental degradation, agricultural expansion, loss of forests and woodlands, over-harvesting, fire, cultivation of marginal lands, overgrazing and urbanization appear to be the major threats to the medicinal plants of Ethiopia. Such a threat poses a significant threat to the future wellbeing of the human and animal populations that have for generations, relied on these resources to combat various ailments. Changing of cultures, habits and lifestyles further aggravate the situation.

Some medicinal plant species of Ethiopia are reported to have been threatened by the overuse over harvesting for marketing as medicine. A good example is *Taverniera abyssinica* whose slender roots are swathed and small coiled bundles presented for market. *T. abssynica* is a popular traditional medicine for what is known as sudden disease. The species is labeled as critically endangered in the Red List of Endemic Trees and Shrubs of Ethiopia (Ensermu *et al.*, 1992). It has been reported that Ethiopia has 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 are threatened. The 1997 **IUCN** Red List gives threatened Plants by International trade in Kenya through smuggling and this might soon pose a threat to Ethiopia if appropriate control methods and propagation are not timely put in place. *Prunus africana* is another medicinal plant threatened like the *T. abyssinica.*

## 2.4 The Role of Medicinal Plants

The majority of the populations in developing countries (for instance, 80% of the population in Africa) primarily rely on traditional medicinal plants for their healthcare (WHO, 2002). In northern Ethiopia, the major portion (87%) of the parts used in traditional medicine come from plant sources, while animal parts and minerals contribute only a small supply (Dawit and Ahadu , 1993). More than 35,000 plant species are being used around the world for medicinal purposes (Turner, N.J. 2000) and in Ethiopia there are 887 or more plant species employed as medicinal agents (Tesema *et al.*, 2002); which according to the data base of the National Herbarium has grown to 1000 and more will be added as new studies bring as new medicinal plants from various cultures.

## 2.5. Indigenous Knowledge

Indigenous knowledge (IK) is the knowledge used by local people to make a living in a particular environment (Warren, 1991). Terms used in the field of sustainable development to designate this concept include indigenous technical knowledge, traditional environmental knowledge, rural knowledge, local knowledge and farmers or pastoralist's knowledge. Indigenous knowledge also refers to the accumulation of knowledge, rule of standards, skills and mental sets, which are possessed by local people on natural area (Quansh, 1998).

The immediate and intimate dependency of local people on natural resources resulted in the accumulation of indigenous knowledge that helped to adapt to and survive in the environments in which they live. It is local knowledge that is unique to a given culture or society and the base for agriculture, health care, food preparation, education, environmental conservation and a host of other activities (Thomas, 1995). The complex knowledge beliefs and practices generally known as indigenous knowledge develops and changes with time and space. Hence, such knowledge includes time tested practice that developed in the process of interaction of humans with their environment (Alcom, 1984). Therefore, it is the result of many generations long year's experiences, careful observations and trial and error experiments (Martin, 1995).

Indigenous knowledge is a body of knowledge built up by a group of people through generations of living in close contact with nature and it is cumulative and dynamic. It builds up on the historic experiences of people and adapts to social, economic, environmental, spiritual and political change. The quantity and quality of traditional knowledge differs among community members according to their gender, age, social standing, profession and intellectual capabilities. For instance, societies concerned with biological diversity will be most interested in knowledge about the environment; this information must be understood in a manner, which encompasses knowledge about the cultural economic political and spiritual relationships with the environment. It provides a distinctive worldview of which outsiders are rarely aware and at best can only incompletely grasp (Balick and Cox, 1996).

Indigenous people of different localities have developed their own specific knowledge on plant resources, use, management and conservation (Cotton, 1996). Thus, systematic application of indigenous knowledge is important for sustainable use of resources and sustainable de-

velopment (Thomas, 1995). One of the widely used indigenous knowledge system in many countries is the knowledge and application of traditional medicine. 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).

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

## 2.6. Medicinal Plants in Human Healthcare

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 the culture of Ethiopian people (Pankhurst, 1990, Mirgissa, 1996). It is common for people living in rural and urban centre to treat some common ailments using plants available around them. For example, the flowers of *Hagenia abyssinica* are used to expel tapeworm, *Ruta chalepensis* leaves used to treat various health problems (Abbink, 1995). The continued dependence on herbal medicine alongside modern medicine is largely conditioned by economic and cultural factors (Abbiw, 1996). Modern healthcare has never been and probably never will provide for the foreseeable future adequate and equitable health service anywhere in Africa, due to the financial limitations related to rapid population growth, political instability and poor economic performance system.

## 2.7 .Threats to Indigenous Knowledge on Medicinal Plants

Traditional herbal practitioners are important custodians of indigenous knowledge on the utilization of medicinal plants. Moreover, as a result of their experience they are skilled 'botanists' and have a great talent for locating the correct plant among the many plants species found around them. But, many are less cooperative to show their knowledge and skill on traditional medicine to others. According to Pankhurst (2001), the knowledge on medicinal plants and

method of use circulated mainly among practitioners and the beneficiaries of such practices. This has made the knowledge and skill on traditional medicinal plants and traditional medicine more hidden and less available to the public (Abbink, 1995). Because of the impact of modern education, increase in health coverage and urbanization, indigenous knowledge and usage of medicinal plants are being lost globally at a fast rate (WHO, 2002).

## 2.8. Ethnobotanical Studies of Medicinal Plants in Ethiopia

Traditional medicine has been practiced for the last several thousands of years, but only found its legitimate place in the WHO program only about 35 years ago (WHO,1998). Furthermore, pharmaceuticals' 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 Van wiik, 1993). 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). Medicinal plants then 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 Ethno botanical survey of study in socio cultural group is very crucial. However, in Ethiopia research and documentation on medicinal plants have been started only very recently (Mesfin and Sebsibe, 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 documents of the 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 varied Flora and the socio cultural diversity, this study incomplete as medicinal plants healing systems differed from culture to culture. Hence, attention should be given to the field of Ethno botanical studies of the country with all the necessary endeavors to have a full picture of the countries in medicinal plant potentials.

Currently, among the research conducted on Ethnobotanical study of medicinal plants in Ethiopia, Ermias *et al.* (2008) collected the highest number. For ethno medicinal uses 230 plants species were documented from Mana Angetu district which is found in Bale zone of oromia region. Of these 181(78.70%) were used as human medicine, 27(11.74%) as livestock medicine and the remaining were 22(9.7%) uses for treating both human and livestock ailments. Similar study by Mirutse (2001), on Zay people indicated as herbs stood first in which Zay people derive their medicine (55%), followed by trees and shrubs (33%).

## 2.9. Conservation of Traditional Medicinal Plants

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. Medicinal plants are considered to be at conservation risk due to over use and destructive harvesting of parts (Zemede, 2001). Dawit and Ahadu (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 ailments with no replacement has sever effect on the future availability of the plant. Recent work of Haile (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. In a broad sense, conservation is achieved through in-situ and ex-situ means. In situ conservation is conservation of species in the natural habitat. Some traditional medicinal plants have to be conserved in-situ due to difficulty for domestication and management (Zemede, 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 be also be conserved by ensuring and encouraging their growth in special places, as they have been traditionally

According to Zemede (2001), medicinal plants can be conserved using different 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.

# 3. MATERIALS AND METHODS

## 3.1. Description of the Study Area

The study was carried out in Amhara Regional State northern Ethiopia, Waghemra Zone in Dehana wereda. Dehana is bordered on the south by the North Wollo Zone, on the west by the Tekezé River, which separates it from the South Gondar Zone and the North Gondar Zone, on the north by Zikuala, on the northeast by Soqota, and on the east by Gazgibla. Amde Werq is the administrative centre of Dehana woreda. This town has a latitude and longitude that ranges from 12°20′N-12.333°N and 38°45′E- 38.750°E, respectively with an elevation of 2421 meters above sea level (NMAE IB, 2006) (Fig. 1). Based on the 2007 national census conducted by the Central Statistical Agency of Ethiopia (CSA), this woreda has a total population of 109,725, of whom 54,658 are men and 55,067 are women. Out of these, 4,207 or 3.83% are urban inhabitants. With an area of 1,643.07 square kilometers, Dehana has a population density of 66.78, which is greater than the Zone's average of 47.15 persons per square kilometer. A total of 26,436 households were counted in this woreda, resulting in an average of 4.15 persons to a household, and 25,520 housing units.

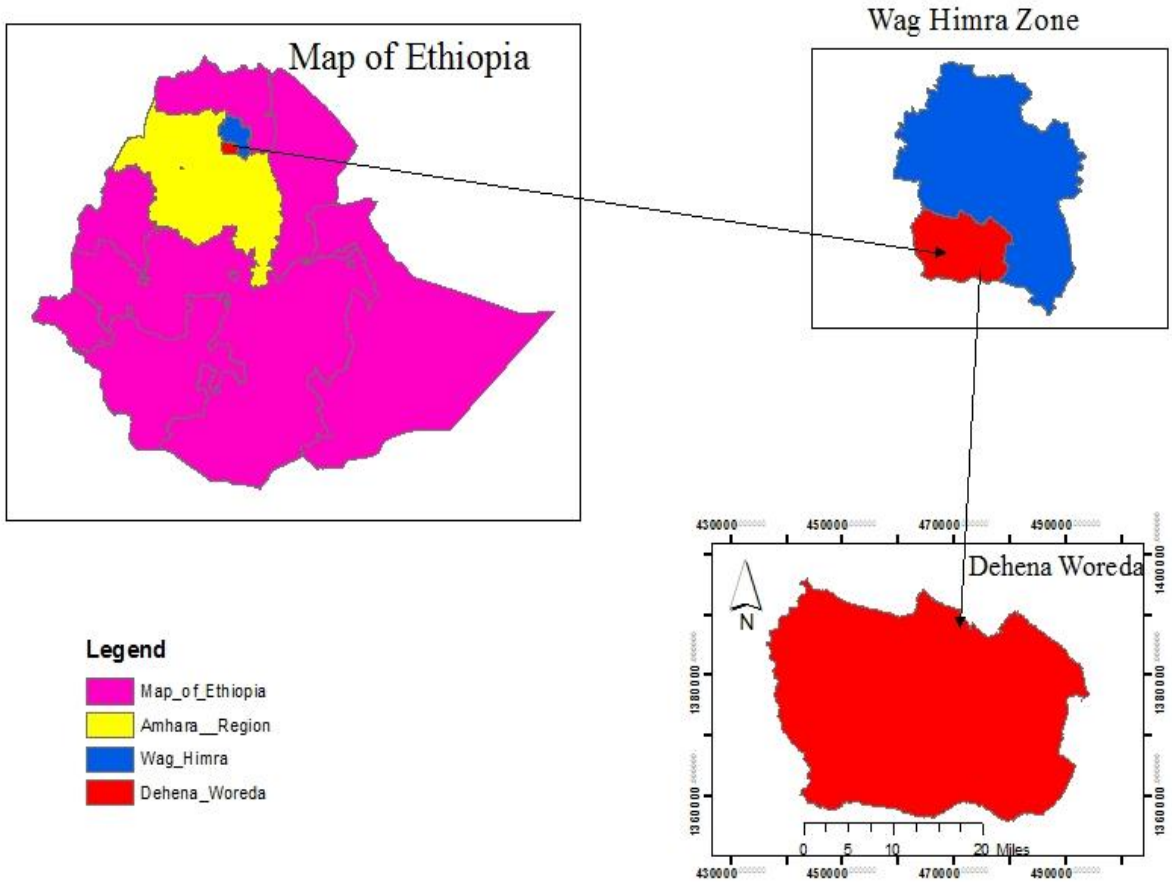


**Figure 1. Map of the study area**

## 3.2. Reconnaissance Survey and Ethnobotanical Data Collection

Reconnaissance survey was conducted to select 3 kebeles namely, *Chila*, *Ketema zuria* and *Libanos Amba.* These places were purposively selected because of their clear altitudinal variation and availability of traditional medicine practitioners. Before ethno-botanical data collection, respondents were selected from the selected kebeles In this study, totally, 100 respondents (aged ≥25), which were ordinary residents (non-traditional healers) and all available traditional healers as key informants were considered. Key informants were purposively selected based on the information gathered from the local people while other respondents were randomly selected. Data collection methods were through semi-structured interviews,

group discussions, and guided field walks with key informants for field observations. Key informants were first interviewed individually to mention about the local names of the plants they use to treat diseases, diseases treated, parts of plants used, methods of preparation of remedies, route of application of the remedies and dosage. Similar procedure was also applied with randomly selected non-practitioners of traditional medicine. Further group discussions were made with key informants on the entire mentioned medicinal plants and field visit was made with them for onsite observation of the plants. Voucher specimens were collected, pressed, and dried for identification. For some species, preliminary identification was done in the field using illustrations. In addition, further identification of all specimens was done by comparison with authentic specimens, illustrations and taxonomic keys from Flora of Ethiopia and Eritrea, and with the assistance of experts at Haramaya University Herbarium. The identified specimens were deposited in Haramaya University Herbarium.

## 3.3 Data Analysis

A descriptive statistical method (e.g., percentage and/or frequency) was employed to summarize ethnobotanical data. Jaccard's similarity index was calculated to compare similarity of medicinal plant knowledge between kebeles of different altitude (Table 4). For this, presence of a given plant species and its utility as medicine or its absence is used as data set.

$$JI = \frac{c}{a + b + c}$$

*Where* JI is the Jaccard similarity index, 'c' is the number of species shared by the study sites, 'a' is the number of species in study site A only and 'b' is the number of species in study site B only. The JI values range between 0 and 1, whereby a value of 1 indicates complete similarity.

**Informant consensus factor (ICF)** were calculated for categories of ailments to identify the agreements of the informants on the reported cures using the formula used by Rodrigo et al. (2005) and Teklehaymanot and Giday (2007).

$$\text{ICF} = \frac{\text{Nuc} - \text{Ns}}{\text{Nuc} - 1}$$

*Where*, Nuc is the number of use citations in each illness category and Ns is the total number of species used by all informants for this illness category. The ICF values ranges from 0 to 1, with high values (i.e. close to 1) indicating that relatively few plants are used by a large proportion of informants, while low values (< 0.5) indicate that informants do not agree on the plant species to be used to treat a category of ailments (Table 5).

**Fidelity Level index (FL)** was calculated using the following formula indicated in Alexiades (1996) as follows.

$$\textbf{FL (\%)} = \frac{\textbf{IP}}{\textbf{IU}} \times \textbf{100}$$

Where, IP is the number of informants independently suggested the use of a species to treat a particular disease category and IU is the total number of informants mentioned the plant for any major disease. FL is used to quantify the importance of a given species for a particular purpose in a given cultural group (Ermias *et al*., 2013; Mulugeta, 2014) (Table 6).

**Preference ranking (PR)** was conducted for those plant species more frequently mentioned to treat most commonly Rabies disease. In ranking exercise, 10 key informants were randomly selected and asked to rank plants based on their perceived effectiveness to cure the disease by assigning the highest value 5 for the most efficacious plant and lowest value (1) for the least efficacious plant (Mulugeta, 2014)(Table 7).

# 4. Results and Discussion

## 4.1. Medicinal Plants of the Study Area

In this study 52 plant species distributed in 51 genera and 41 families were recorded (Appendix Table 1). These medicinal plants are used to treat 35 different human and livestock diseases. Of these medicinal plants, 33(63.46% ) of them were reported for use to treat human ailments, 5 (9.62%) were for livestock ailments and 14(26.92%) species were reported to treat both humans and livestock ailments .This considerable number of traditional medicine practice suggests that people of the study area depend on traditional medicine of plant origin apart from their use of modern medication system. Family Euphorbiaceae was the most dominant family represented by 5 spp. Followed by Asteraceae, Cucurbitaceae and Lamiaceae each represented by 3 spp., whereas the rest of families were represented by one or two spp. each (Appendix Table 1). Medicinal plants were collected from different habitats. Mainly collection was made from home gardens followed by wild areas in the forest, grazing field, river side and road side (Table 1). Result show that home garden practice appear to be very common in the study area, and this is a promising way for conservation of the rare medicinal plant for their sustainable use.

**Table 1.Distribution of medicinal plants in different habitat**

| Habitat type | No. of medicinal plants | Percentage |
|---|---|---|
| Home garden | 14 | 26.92 |
| Forest | 12 | 23.013 |
| Grazing land | 11 | 21.15 |
| Around river | 10 | 19.307 |
| Roadside | 4 | 7.69 |
| On tree | 1 | 1.92 |
| **Total** | **52** | **100** |

Of all cited plant species, some plants were reported more frequently than other for their medicinal values. For example, *Croton macrostchyus* is cited by 73.1% of the informants to treat

various ailments (malaria, rabies, gonorrhoea, wound, ascariasis and internal worm) followed by *Cordia africana* was cited by 69.23% of informants to treat Amoebiasis, stomach ache, Diarrhea and Liver disease; Aloe sp. cited by 61.54 % to treat Malaria, Diarrhoea, Rabies and Diabetes; *Brucea antidysenterica* cited by 53.85 % to treat Evil eye,mich and Epilesy; *Cynoglossum coeruleum* cited by 42.31 % to treat Mich, Amoeba and Tooth ache; *Capparis tomentosa* cited by 32.69 % *to treat* Bleeding after delivery and Epilepsy; *Allium sativum* cited by 23.08% informants for mich and stomach ache and *Lepidium sativum* cited by 17.31 % informants for Stomach ache. (Table 2).

**Table 2.Some of medicinal plants cited most by informants**

| **Scientific name** | **No. of Informants** | **Percentage %** |
|---|---|---|
| *Croton macrostchyus* | 38 | 73.077 |
| *Cordia* africana | 36 | 69.23 |
| *Aloe sp.* | 32 | 61.54 |
| *Brucea antidysenterica* | 28 | 53.85 |
| *Cynoglossum coeruleum* | 22 | 42.31 |
| *Capparis tomentosa* | 17 | 32.69 |
| *Allium sativum* | 12 | 23.08 |
| *Lepidium sativum* | 9 | 17.31 |

## 4.2 Plant habit, Part(s) used and Preparations of remedies, and their dosage

Majority (36.53 %) of the collected medicinal plants were herbaceous followed by shrubs (32.69 %) trees (25%) and climbers (5.77%) (Fig.2)

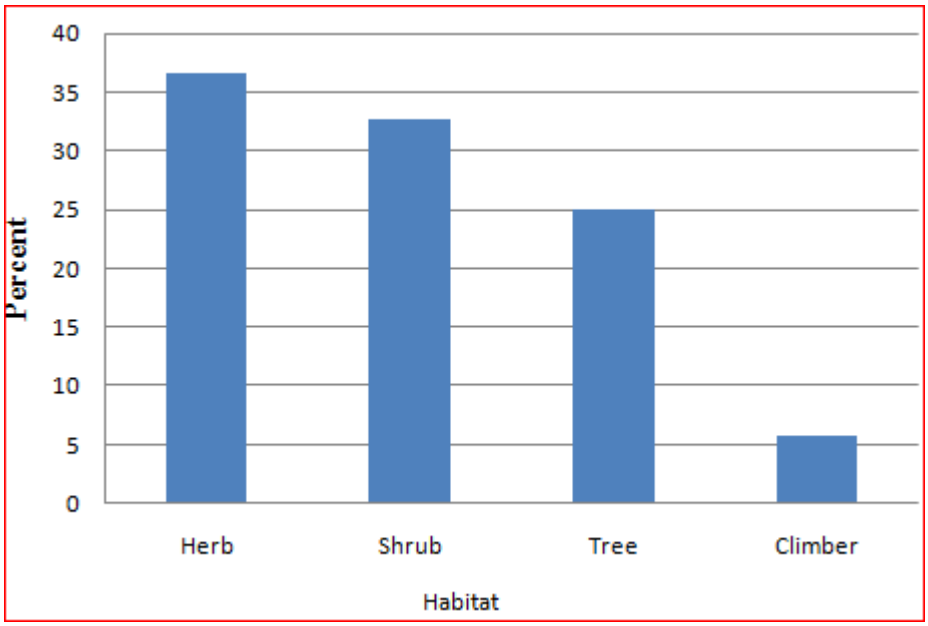


**Figure 2. Habitat distribution of medicinal plants of the district**

Leaves are the most used plant part for remedy preparation followed by root and seeds (Table 3). Plant parts such as stem, bark, flower, fruit, etc. were also reported (Table 3). This result accords with some previous studies conducted in different parts of the country (for example, Bayafers, 2000; Endalew, 2007). According to Dawit & Ahadu (1993), herbal preparation that involves roots, rhizomes, bulbs, barks, stems or whole parts will have negative effects on the survival of the mother plants. In this study, collection of sensitive organs such as roots and organs of regeneration such as seeds may pose great threat to the survival of plants. Therefore great care should be taken not loss individuals from the local environment.

**Table 3.Plant part used for traditional medicine preparation in the District**

| Plant parts | Total responses | % of total |
|---|---|---|
| Whole parts | 2 | 3.85 |
| other parts | 2 | 3.85 |
| Fruit | 2 | 3.85 |
| stem | 3 | 5.76 |
| Latex/Sap | 5 | 9.61 |
| Seed | 8 | 15.38 |
| Root | 10 | 19.23 |
| Leaf | 20 | 38.47 |
| Total | 52 | 100 |

Remedy preparations may involve using a single plant part or mixtures of different organs of the same plant or mixture of organs from different plants. Concerning the preparation methods, local people employ various approaches. The preparations vary based on the type of disease treated and the actual site of the ailment. The principal method of traditional medicine preparation reported was crushing (pounding) which will then be concocted or decocted for use internally by drinking or eating or external application by creaming on the skin. During preparations of the remedies, the local people also use some non-plant additives such as spices, condiments, milk, lemon juice, alcohol and honey so as to improve the flavor while taking. These additives were also reported by some previous researchers (Endalew, 2007; Bayafers, 2000). The major shortcomings of traditional medication are lack of precise dosage. Like any other parts of the country, local people of this study area use rough estimation of the amount of medicine to be administered. Mainly, practitioners use age and physical condition of the patient when prescribing the remedies.

## 4.3 Jaccard' similarity Index(JI)

In this study,Jaccard's similarity index was calculated to compare similarity of medicinal plant knowledge between sampled kebeles of different altitude the value of Jaccard's similari-

ty Index ranges between 0 and 1,where 1 indicates complete similarity while 0 indicates no similarity. The report between sampled kebeles of Chila, K.zurya (0.83), Chila, Libanos Amba (0.80) and K.zurya, Libanos Amba (0.84) which showed that people living in the sampled kebeles had similar medicinal knowledge (Table 4.).

**Table 4.Jaccard's similarity index of Dehana people on selected kebeles**

| **Sampled kebeles** | **Chila** | **K.zurya** | **Libanos Amba** |
|---|---|---|---|
| **Chila** | 1 | 0.83 | 0.80 |
| **K. Zurya** | | 1 | 0.84 |
| **Libanos Amba** | | | 1 |

## 4.4. Informant consensus factor and fidelity level

In this study, all human diseases which are cited by informants were grouped into 6 categories (Table 5). Snake bite, Rabies and malaria had high ICF value followed by Febrile illness, Cough and Common cold; Diarrhea, Gardiasis and Stomach ache, Swelling, Wound and Hemorrhoid; Urine retention, Tape worms and Ascariasis, According to Tilahun and Mirutse,(2007), medicinal plants that are presumed to be effective in treating a certain disease will have higher ICF values. A high ICF value (value close to 1 ) indicates that the informants rely most on the same taxa to manage specific disease conditions, while a low value (close to 0) indicates that the informants disagree on the taxa to be used in the treatment of a given ailments.

**Table 5. Informant Consensus Factor**

| Disease Categories | ns | Nuc | ICF |
|---|---|---|---|
| Tape worms and Ascariasis | 13 | 39 | 0.68 |
| Urine retention | 9 | 52 | 0.84 |
| Swelling, Wound and Hemorrhoid | 12 | 80 | 0.86 |
| Diarrhea, Gardiasis and Stomach ache | 7 | 48 | 0.87 |
| Febrile illness, Cough and Common cold | 10 | 78 | 0.88 |
| Snake bite, Rabies and malaria | 4 | 42 | 0.92 |

Fidelity level (FL) values were calculated for some commonly used medicinal plants against the some commonly reported ailments: for instance *Foeniculum vulgare* (for Urine retention), *Ocimum lamiifolium* (for Stomach ache), *Acmella caulirhiza* (against Mich), *Premna schimperi* (for Rabies), *Datura stramonium* (for Tooth ache) and *Croton macrostachyus* (against Tonsillitis) (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 others (Tilahun and Mirutse, 2007). Results of this study showed that Datura *stramonium* was reported by many informants to treat Tooth ache and had the highest (96%) FL. High FL could also be an indication of efficiency of the reported plant to cure a specific disease.

**Table 6.Fidelity level Index of medicinal plants**

| Scientific name | Examples of ailment treated | IP | IU | FL | FL% |
|---|---|---|---|---|---|
| *Datura stramonium* | Tooth ache | 24 | 25 | 0.96 | 96 |
| *Premna schimperi* | Rabies | 19 | 23 | 0.82 | 82 |
| *Ocimum lamiifolium* | Stomach ache | 16 | 21 | 0.76 | 76 |
| *Foeniculum vulgare* | Urine retention | 15 | 20 | 0.75 | 75 |
| *Croton macrostachyus* | Tonsillitis | 14 | 20 | 0.70 | 70 |

## 4.5. Preference Ranking of Medicinal Plants Used to Treat Rabies

The same health problem are prescribed by different species, respondents show preference of one over the other. In this study, some cited human diseases were reported to be treated by multiple plant species. Of these diseases, rabies is one of communicable disease reported to be treated by 5 plant species. Therefore, preference ranking of these 5 medicinal plant species that were reported as effective for treating rabies was conducted after selecting 10 key informants. The informants were asked to compare the given medicinal plants based on their efficacy, and to give the highest number (5) for the medicinal plant, which they thought most effective in treating rabies and the lowest number (1) for the least effective plant in treating rabies.

*Jatropha curcas* L ranked first among the five plant species, followed by *Crotonmacrostachyus*, *Aloe* sp, *Euphorbia ampliphylla* Pax *Ficus* sp respectively, (Table 7.)

**Table 7.Preference Ranking of medicinal plants to treat Rabies**

| **Species** | **Respondents(R1 –R10)** | | | | | | | | | | **Total** | **Rank** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **R1** | **R2** | **R3** | **R4** | **R5** | **R6** | **R7** | **R8** | **R9** | **R10** | | |
| *Jatropha curcas* | 4 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 5 | 5 | 45 | **1st** |
| *Croton macrostachyus* | 5 | 5 | 4 | 5 | 4 | 3 | 5 | 5 | 3 | 5 | 44 | **2nd** |
| *Aloe* sp. | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 5 | 4 | 4 | 43 | **3rd** |
| *Euphorbia ampliphylla* | 4 | 4 | 2 | 4 | 5 | 5 | 3 | 2 | 5 | 5 | 39 | **4th** |
| *Ficus* sp. | 5 | 2 | 4 | 1 | 4 | 3 | 5 | 5 | 4 | 5 | 38 | **5th** |

# 5. SUMMARY, CONCLUSION AND RECCOMENDATION

## 5.1. Summary and Conclusions

Ethnomedicinal study was conducted in Dahana Woreda, Amhara Region, Ethiopia with the objective of collecting, identifying and documenting of traditional medicinal plants and local people's knowledge on medicinal plants use. Various ethnomedicinal techniques was used to collected and analyzed the data: semi- structured interviews, observation, group discussion and guided field walk, preference ranking , informants consensus factor and fidelity level combined with descriptive statistical analysis were done. The overall project activity was taken between January to July 2018.

In the study area, totally 52 medicinal plants distributed in 51 genera and 41 families were recorded. Of these, 33 and 5 species were recorded to treat human and livestock ailments, respectively, but 14 species were recorded to treat both livestock and human ailments. The medicinal plant species collected and identified were largely from the forest and home gardens. Herbaceous spp. were reported as the main medicinal plants followed by shrub and trees species. Leaves were found to be the most frequently used plant parts followed by roots for preparation of human and livestock remedies. Traditional medicine preparation mostly involved single plant. Route of administration was mainly internal in which oral administration is the common route followed by dermal.

## 5.2. Recommendations

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

- ✓ The local people need to be encouraged and supported on how to conserve and manage the medicinal plant species found in their area;
- ✓ Local people need to work on growing medicinal plants in home gardens mixing with crops in the farm lands and live fences;
- ✓ 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.

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# 7.APPENDIX

## Appendix .1

### Table 1 Medicinal plants of Dehana people

| No | Scientific and | family name | Local name/ growth form | Plant part used | Disease treated | Administra-tion route | Preparation method |
|---|---|---|---|---|---|---|---|
| *1* | *Acanthus polystachyus* Delile, A | Acanthaceae | Dendero / H | R | Intestinal worms, Malar-ia, | Oral | Grinding . |
| *2* | *Calpurnia aurea* (Ait.) Benth | Fabaceae | Digita/ T | R | Amoebiasis, | Oral | Grinding |
| *3* | *Aloe* sp. | Aloaceae | Eret / Sh | La | Malaria Diar-rhea, rabies and diabetes | Oral | Taking latex/sap from Leaf |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| *4* | *Capparis tomentosa* Lam. | Capparidaceae | Gumoro/ Sh | R | Bleeding after delivery<br><br>Seitan | Fumigation | Dry and burn it to smoke |
| *5* | *Carica papaya* L. | Caricaceae. | Papaya /T | L/R | Malaria | Oral | Crushing and Grinding |
| *6* | *Brucea antidysenterica* J.F.Mill. | Simaroubiaceae | Abalo /Sh | R<br>L,<br>R | Evil eye<br>Mich<br><br>Epilepsy | Fumigation | Grinding<br><br>Boiling and smoking<br>Grinding |
| *8* | *Clematis hirsuta* Guill. & Perr. DG-58 | Ranunculaceae | Azo-hareg /Cl | L | Trachoma El-ephantiasis | Eye<br>Skin | Squeezing and apply on area to be treated |
| *9* | *Clerodendrum myri-coides* (Hochst.) R.Br. ex Vatke | Lamiaceae | Misrich/ Sh | | Tooth bleeding | Gum | Brushing with stem of it |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| *10* | *Cordia africana* Lam | Boraginaceae | Wanza/ T | L, R<br><br>R | Liver disease Stomach ache,<br>diarrhea Am-oebiasis | Oral | Crushing/ grinding |
| *11* | *Coriandrum sativum* L. | Apiaceae | Dimbilal /H | F | Ascariasis | Oral | Grinding |
| *12* | *Croton macrostachyus* Hochst. ex<br>Del. | Euphorbiaceae | Bisana /T | L,bark<br>R bark<br>L<br>L/S<br>R | Malaria<br>Rabies Gonor-rhoea Wound<br>Malaria<br>Ascariasis<br>Internal worms | Oral<br>Oral<br>Oral<br>Skin<br>Oral<br>Oral<br>Oral | Squeezing<br>Crushing<br>Crushing<br>Squeezing<br>Crushing /grinding<br>Grinding |
| *13* | *Embelia schimperi* Vatke | Myrsinaceae | Inkoko /H | F | Tapeworm | Oral | Drink it after crushing |
| *14* | *Euphorbia ampliphylla* Pax | Euphorbiaceae | Kulkul/ T | La | Rabies | Oral | Squeeze and drink the sap |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| *15* | *Ficus* sp. | Moraceae | Warka /T | S,<br>La<br>Ba,<br>L | Rabies<br><br><br>Tonsillitis | Oral<br><br><br>Oral | Grind and drink<br><br><br>Crushing and drink |
| *16* | *Foeniculum vulgare* Miller | Apiaceae | Inslal/ H | L/R | Gonorrhoea | Oral | Crushing /grinding |
| *17* | *Galisoga parviflora* Cav | Asteraceae. | Akenchira / H | L | Haemorrhoids | Anal | Crushing |
| *18* | *Jatropha curcas* L. | Euphorbiaceae. | Yesudan-gulo/ S | Se | Rabies | Oral | Grinding |
| *19* | *Juniperus procera* Hochst. ex Engl | Cupressaceae | Tid / T | L | Vomiting | Oral | Squeezing |
| *20* | *Justicia schimperiana* T.Anders. | Acanthaceae | Smiza /Sh | L | Skin lesion | Skin | Crushing |
| *21* | *Kalanchoe* sp | Crassulaceae | Indahula / H | Tu | Headache | Oral | chopped |
| *22* | *Kanahia laniflora* (Forssk.) R.Br. | Asclepiadaceae | Tifrena /H | L | Ear infection | Ear | Crushing |
| *23* | *Lagenaria siceraria* (Molina) Standl | Cucurbitaceae | Qil/ Cl | R | Wound | skin | Grinding |

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|---|---|---|---|---|---|---|---|
| *24* | *Lens culinaris* Medik. | Fabaceae | Misir /H | Se | Diabetes | Oral | Grinding |
| *25* | *Lepidium sativum* L. | Brassicaceae | Feto/ H | Fr | Stomach ache | Oral | Grinding |
| *26* | *Lobelia* sp | Lobelliaceae | Jibira /Sh | R | Malaria | Oral | Boiling |
| *27* | *Nigella sativa* L. | Ranunculaceae | Tiqur-azmud/ H | Se | Skin fungus | Skin | Grinding |
| *28* | *Ocimum lamiifolium* Hochst. exBenth. | Lamiaceae | Yemich-medhanit/ H | L | 'Mich' | Skin | Squeezing |
| *29* | Rumex Nepalensis Spreng | Polygonaceae. | Tulet /H | R | Colic (Yehod himem | Oral | Grinding |
| *30* | *Tragia pungens* (Forssk.)M¨ull.Arg. | Euphorbiaceae | Ablalit/ Cl | R | Generalized ache | Oral | Grinding |
| *31* | *Zingiber officinale* Roscoe | Zingiberaceae | Zingibil /H | Rh | Bone tuberculosis | Oral | Grinding |
| 32 | *Buddlejia polystachya Fresen* | Baddlejiaceae | Anfar/ H | L | Leech (Alekit) | oral | Crushing |

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|---|---|---|---|---|---|---|---|
| 33 | *Eleusine floccifolia* | Poaceae | Akerma /H | L | Snake bit | skin | Crushing |
| 34 | Ficus sur *Forssk.* | Moraceae | Sholla /T | La | Wart on hand(Kintarot) | Skin | Drop the white sap on target |
| 35 | *Grewia ferruginea Hochst ex. A . Rich.* | Tiliaceae | Lenquata/ H | Ba | Taeniasis (Kosso) | Oral | Squeezing |
| 36 | *Guizotia scabra* (Vis) Chiov. | Asteraceae | Mech/ H | R | Epilospy (Yemitel be-shita) | Oral | Burn and smoke |
| 37 | *Jasminum grandiflorum* | Oleaceae | Tembelel /T | R<br>St | Evil eye<br>Toothache | Fumigation<br>Oral | Burning and smoke<br>Brushing tooth |
| 38 | *Ricinus communis* L. | Euphorbiaceae | Gulo /T | Fr /L | Dandruff (Fo-rofor) | Head<br>Skin | Grinding /Crushing then washing head with it |
| 39 | *Otostegia integri* folia Benth | Lamiaceae | Tungit/ Sh | L | Malaria | Oral | Burning and Smoking |
| *40* | *Schinus molle* L. | Anacardiaceae | Qundo ber-bere/ T | Se | Malaria | Oral | Crushing |
| 41 | *Zehneria scabra*(L.f) | Curcurbitaceae | Hareg –resa /Cl | L | Mich,<br>anaemia | Oral | Squeezing and drinking |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 42 | Artemisia sp. L. | Asteraceae | Ariti /Sh | L | Megagna | Nose | Squeezing |
| *43* | *Cucumis ficifolius A.Rich* | Cucurbitaceae | Yemidir – embuay/ Cl | Fr | Animal cough | Oral | Crushing |
| 44 | *Eucalyptus globulus* Labill | Myrtaceae | Nech behar-zaf /T | L | Common cold | Oral | Boling &In haled the steam |
| *45* | *Allium sativum* | Alliaceae | Nech shinkurt/ H | Bulb | stomach ache | Oral | Chewing the bulb |
| *46* | *Capsicum annuum* L. | Solanaceae | Mitmita /H | Fr | Malaria | Oral | Crushing |
| *47* | *Calotropis procera* (Ait.) Ait.f. | Asclepiadaceae | Qimbo/ T | La | Haemorrhoids | Anal | Squeezing |
| *48* | *Carissa spinarum* L. | Apocynaceae | Agam /Sh | R | Bleeding after delivery | Fumigation | Pounding |
| *49* | *Cybopogon* sp | Poaceae | Serdo/ Gr | L | Ascariasis | Oral | Pounding |
| *50* | *Datura stramonium* L. | Solanaceae | Astenagir/ H | L | Haemorrhoids | Anal | Squeezing |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| *51* | *Dodonaea angustifolia* | Sapindaceae | Kitkita /T | L | Repairing | skin | Apply on the repairing part |
| *52* | *Cynoglossum coerule-um* Steud ex DC.<br>. | Boraginaceae | Shimgigit/ H | L | Mich,<br>Amoeba and toothache | Skin/oral<br>Oral<br>oral hold<br>between teeth | Squeezing<br>Chewing |

**NB :_ R root, Ba bark, L Leaf , St stem , Se seed , F Fruit, T tree, Cl climber, Sh shrub, H herb , Gr grass, La latex**

**Appendix 2**

**Interview questions for respondents**

**Semi-structured interviews was 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 disease in your locality?

2. What are the main or most common animal( livestock) diseases?

3. List plant species used to treat human disease only?

4.List plant species used to treat livestock disease only?

5. List plants used to treat both human and livestock diseases?

6. Which plant do you use to treat that particular health problem/disease?

7. For what other purposes do you use the medicinal plants?

8. How is the part(s) gathered? (Including the collected time)_____

9. How do traditional healers transfer their knowledge to next generation? _____

10. How do you conserve medicinal plants?_____

**2: Observation Check List**

1.What are the main human problems in your locality?_____

2.What are the main livestock health problems or disease?_____

3.Which type is used as a treatment for many diseases?

4.Do you use plants to treat disease in your locality? if yes

a) Name of the plant_____
b) Habitat of the plant_____
c) Parts of the plant used_____
d) Preparation methods_____
e) Amount used_____
f) Treats to the above plant_____
g) Other use of the plant_____

5. Does the dose differ among males, females, children, elders and pregnant?

6. How do you conserve traditional medicinal plants?

7. How do traditional healers transfer their knowledge to next generation ?