



ADDIS ABABA UNIVERSITY
COLLEGE OF NATURAL AND COMPUTATIONAL SCIENCE
DEPARTMENT OF ZOOLOGICAL SCIENCE

Ethnobotanical Study on Traditional Medicinal Plants in Dera woreda, South Gondar
Amhara Region, Ethiopia

A Thesis submitted to the Department of Zoological Science in Partial Fulfillment of the
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GRADUATE PROGRAMES

This is to certify that the Thesis prepared by Kassa Belachew, entitled: *Ethnobotanical study of Medicinal Plants in Dera Wereda, South Gondar Zone, Amhara Regional State, Ethiopia* and submitted in Partial Fulfillment of the Requirements for the Degree of Master of Science in Biology complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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List of Abbreviations

WHO.....World Heath Organization

ILK.....Indigenous and Local Knowledge

DWADO.....Dera Woreda Agricultural and Developmental office

DWHO.....Dera Woreda Health Office

MP.....Medicinal Plants

Abstract

Ethno botanical study of medicinal plants was conducted to document and to understand mode of preparation and consumption of medicinal plants in Dera Woreda, South, Gondar, Amhara Regional State, Ethiopia. The district was rich in varieties of medicinal plant species. However, there was no research conducted on ethnobotanical medicinal plants in the area. A total of 60 informants between the age of 20-80 were selected to collect information on medicinal plants from 6 kebeles. Of these, 6 key informants were selected purposively based on recommendation by local elders and dwellers. From the total of 60 medicinal plant species, 57 genera and 40 families were collected and identified. Out of these, 54 species (90%) were used against human ailments, 6 species (10%) used to treat both human and livestock ailments. From the total medicinal plant species, 24(40%) were shrubs, followed by herbs 20 (33.4) 14 (23.3%) and 2 (3.3%) species of climbers. The most frequently used medicinal plant parts were leaves 32(53%) followed by fruits 7 (11.7%) seeds 6 (10%), roots 5 (8%), barks 4 (7%), pod 2 (3.3) and the least medicinal plants parts used was bulb 1(2%). The most popular methods of preparation were mixing and crushing 14 (14.2%) followed by drying, mixing and powdering 13 (13.3%), pounding and creaming 11(11.2%), and the least methods of preparation was inserting. The most common mode of application was drinking 34(35.4%) followed by eating 20 (20.8%), creaming 19 (19.8%), sniffing 7 (7.3%), dropping and rubbing as well as tying 4 (4.2%), and the least mode of application was washing 1(1.0%). The common route of administration recorded was oral way which is equal to 28(47%) followed by dermal 13(21%) nasal 6(10%) leg 5(8%) neck 4(6%), optical 3(5%) and the least was head 2(3%). *Allium sativum* was the most preferred species to treat malaria followed by *Corica papaya*. *Ocimum lamifolium* ranked at first having the highest fidelity level 95.4 From multipurpose use of plants *Cordia africana* ranked first was the most popular and used for various purposes ranked first Agricultural land expansion, deforestation, charcoal production and firewood collection were reported as major threats on medicinal plants of the study area. The woreda administration as well as stakeholders should work together on proper management and implement land policy on proper management and sustainable use of medicinal plants in the study area.

Key words: Ethnobotany, fidelity level, preference ranking

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CHAPTER ONE

1. INTRODUCTION

Ethiopia has a long history of traditional medicines and has developed ways to combat diseases through it gifted with a huge potential of medicinal plants and their uses that provide a wide contribution to the treatment of human ailments(Zemedede Asfaw, 2001). Ethnobotany is the systematic study of the relation among local people`s interactions how they classify, manage and use plants available around them (Seyum Getaneh, 2019). Over centuries indigenous knowledge on medicinal plant use, management, and conservation (Duguma and Mesele, 2019). About 80% of the human population and 90% of livestock is believed to be dependent on the traditional medicine and most of this comes from plants. Medicinal plants are very vital in their uses for medication, providing ecological, economic and cultural services. The world primary means of treating diseases and fighting against infections have been based on the use medicinal plants. According to world health organization (WHO), nearly 3.5 billion people in developing countries including Ethiopia believe in the efficiency of plants remedies and use them regularly.

However, medicinal plants have got little attention such as documentation of as well as mode of preparation, conservation measures in the study areas. Even though the price is very low, the trust and use of medicinal plants is getting lower due to the influence of culture and modernization in some communities around the study area. However, in low income communities as well as the rural people still there is an increasing demand of medicinal plants (Tilahun Teklehymanot, 2009). Medicinal plants make important contributions in the health care system of indigenous as the main source of medicine for the majority of the rural populations. Plants serve as food, medicines fuel fodder and construction materials as well as ritual and magical values (Abbink, 1995). Medicinal plants play a key role in the development of modern medicines (Pramonos, 2022). Plant diversity has an important role for human well-being and gives significant advantages of remedies required in the health care. According to Dawit Abebe (2001) ethnobotanical study was not given an attention in the past decades in Ethiopia. However, now adays many researchers focused on their studies how medicinal plants can be conserved, utilized, documented and localized name in addition to their scientific names. Medicinal plants play a vital role in fulfilling human and livestock health care needs of different communities in Ethiopia (Araya, 2015). Some traditional medicinal plants have to be conserved in-situ due to difficulty

for domestication and management (Zemedu Asfaw, 2001). Fassil Kibebew (2001) noted that about 75-90 % of the rural population in the world (excluding western countries) relies on traditional medicines as their only 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.

According to Dawit Abebe (2001) the most affordable and easily accessible source of treatment in the primary health care system of poor communities was traditional medicines. The local therapy by practitioner is used as means of medical treatment for local people. The value and role this traditional health care system will not diminish in the future because they are both culturally viable and expected to remain affordable while the modern health care service is both limited and expensive. As Endalew Amenu (2007) described, the majorities of Ethiopian people lack access to health care and where available the quality is largely below standard. Medicinal plants were easily available in their locality. However, modern medicines were dispensed in remote health institution (Endashaw Bekele, 2007).

In the natural habitat in situ conservation was very relevant for species conservation. Some plants fail to produce the desired amount and quality under cultivations out of their natural habitats (Niguse Amsalu, 2010). According to Behailu Etana (2010), medicinal plants also grown in special places in ex-situ conservation such as churches, river banks, fences of gardens, and field.

1.1 Objectives of the study

1.1.1 General Objectives

The general objective of the study was to:

- Document medicinal plants, mode of preparation and consumption as well as examine type of various human and livestock diseases treated using medicinal plants within the local people of Dera district South Gondar Amhara Region, Ethiopia Give emphasis management and conservation measures on traditional medicinal plants in the study area.

1.1.2. Specific Objectives

The specific objectives of the study were to:

- Identify and document the type of medicinal plants available and used to treat human and livestock health Document the plants parts used to treat human and livestock ailments as well as mode of preparation and consumption.
- Evaluate the role of local people in cultivating and conserving medicinal plants

1.2 Statement of the problems

Many hundred years ago Ethiopia was a country rich in different types of local (indigenous) plants and dense forests cover. However, now a day due to a number of factors natural and anthropogenic factors, the richness, abundance and distribution of plants have been gradually declined. The availabilities of medicinal plants in the area also decreased. As a medicinal plants become under risk due to deforestation and uncontrolled, exploitation of indigenous plant and replaced by exotic plant species. Unwise use of plants for construction, and source of energy as charcoal are some of the reason for the declining of the vegetation cover.. Medicinal plants are among others declined all over the country due to natural and human induced factors. Moreover, in Ethiopia in general and in the study area in particular, the indigenous knowledge transfer mechanism is oral for centuries as well as there is no research done related to medicinal plants and no identified and documented plant sources used to treat human and livestock ailments in Dera woreda or diseases. The main aim of this study was focused on documentation, preparation methods, mode of consumption of medicinal plants, as well as to recommend on conservation of medicinal plants in the study area. In addition to

this, the study helps to address on the relevant information about the medicinal plants for another investigators and stakeholders engaged on production on modern medicine.

CHAPTER TWO

2. LITERATURE REVIEW

2.1 The concept of ethno botanical study

Ethnobotany is the multidisciplinary science involving on the traditional use of plants by human beings. It is the study of the relationship between plants and people (Balick, 1996). According to Martin (1995), ethnobotany means the local people interaction with their natural environment how they classify, manage and use of plant available around them. He also noticed that ethnobotany as the prefix “ethno” refers to the study of people or the way that other people look at the world while the word “botany” means the study of plants. The word ethno botany was the first time mentioned orally by John Hershberger in 1895 during the public lecture (Balick, 1996; Cotton; 1996; Hamilton *et al.*, 2003). Currently ethno botany has become a more diversified and multidisciplinary that the require expert in various field of academic study such as botany. Ethiopia is a rich source of medicinal plants. Plants are an integral part of many ethnic cultures the extent of which has not yet been studied in depth (Abbink, 1995). The common medicinal plant species used to treat shistosomiasis is *Phytolaca dodecandira* (endod) (Aklilu Lemma, 1984). Ethnobotany involves the indigenous knowledge of plant classification, cultivation and use as food, medicines and shelter. The most the early ethnobotanists studied plant used in culture other than the study of how other people uses plants. It is also not restricted to the study of medicinal plants by indigenous cultures (Maurce, 2002). Ethnobotany has also been widely used for the documentation of the indigenous knowledge on the use of plants from local flora in different countries Ethiopia. Indigenous and Local Knowledge (ILK) refers to understand skills and philosophies developed by local communities with long histories and experiences of interaction with their natural surrounding. According to Johnson (1992), indigenous knowledge is a body of knowledge built by a group of people in close contact with nature such as medicinal plants.

1.2. The historical background of traditional use of medicinal plants

Historical accounts traditionally used medicinal plants 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 (Derytal, 1999). In the ancient period of time indigenous knowledge was prioritized

concerning on the use of traditional medicinal plants for the humans in the different countries (Farns Worth, 1994).

According to Huffman and Wrangham (1994) evidence showed that different animals such as chimpanzees use various plant species for the medicinal purposes. Basically, indigenous knowledge is the crucial system that helps for humans to promote the using medicinal plants in protecting from number diseases. Many people depends on plants for food, but also medicinal values for preparation of different remedies and social life on the basis indigenous knowledge (Cotton, 1996). Ethnobotanical research document the knowledge on cultural interaction of people with plants how local people have use for various purposes and how they incorporate plants in to their cultural tradition and religion (Balick and Cox, 1996).

2.3 Medicinal plants and associated indigenous knowledge

From the beginning of the humanity, indigenous people have developed their own local specific knowledge on plant use, management and conservation. Cotton, (1996) noted on Knowledge, skills, and experiences about traditional medicines. It helps how traditional medicine has prepared, applied by traditional healers and other ordinary people lived in the area and to know what types of plants used to treat diseases of humans and animals in a given local communities. Moreover, indigenous knowledge is a key to promote and transfer traditional medicinal knowledge to the next of generations in a given community. The practice of traditional medicine is one of the extensively utilized indigenous knowledge systems in many nations. For instance ethnobotanical knowledge involved traditional diagnosis, collection of raw materials preparation of remedies and its prescription to the patients (Frans, 1994). Indigenous knowledge in many countries including Ethiopia pass from one generation to the other generation verbally with great secrecy (Jansen, 1981). So the secret and crude transfer of indigenous knowledge makes or ethnobotanical knowledge vulnerable to distortion and in most cases, some lore is lost at each point of transfer (Amare Getahun, 1976). An ethnobotanical research gives useful knowledge that researchers need for systematic documentation of traditional medicinal plants to solve many health problems of humans and live stokes. Like other areas of Ethiopia, the people in particular Dera district of South Gondar Zone. The traditional practices on how and what medicinal plants used to apply on human and livestock is common but accumulation and transferring knowledge for the next generation is specific. Human used different parts of plants to prepare remedies (root, bark leaves, seeds and other parts of plants. The elders, who know more about medicinal plants, may die

without sharing traditional knowledge to the young generation. Since, the knowledge of traditional medicines transferred orally from generation to generation, basic information may be lost. For instance, how to prepare the drug how to prepare and applied drugs, which parts of plants have used and other important information may discard due to lack of knowledge. As a result, documentation of medicinal plants and other indigenous knowledge could be the basis for invention of modern medicines or drugs and traditional medicines given by traditional healers. In most cases, traditional knowledge on medicinal plants passes down from generation to generation verbally and prone to loss if not documented (Jansen,1981). Moreover, due to ecological shifts environmental perturbations, plant resources are dwindling at an alarming rate suggesting the rapid loss of medicinal plants and their associate indigenous knowledge. Indigenous knowledge developed as a result of human interaction with their environment. For the purpose of conservation and community development, ethnobotanical knowledge about medicinal plants must be documented. The documentation of medicinal plants and related indigenous knowledge appears to be lacking despite the country's agro-ecological and cultural variety (Vechiato 1993; cited in Mesfin *et al.*, 2005).

2.4 Traditional medicines and the role of medicinal plants in human's health care system

Plants in general plays significant role to all life on earth particularly medicinal plants are the most important plant in caring human health. Plants have also contributed to modern medicine in providing ingredients for drugs and to discover drugs from various plants.

CHAPTER 3

3. MATERIALS AND METHODS

3.1 Description of the Study Area

3.1.1 Geographical Location

The study was conducted in Dera District, South Gondar Zone, Amhara Regional State (Figure 1).. The geographical location of the District is situated at 11° 42' N and 37° 38' E and elevation range from 1560m to 2600 m a.s.l. The capital city of Dera is Anbesame which located 535 km away from Addis Ababa. The total area of the district 159078 km² (159078 hectares) and the district consists 36 kebeles, 33 rural kebeles and 3 urban kebeles. Dera woreda bordered on the North Fogera wereda, on the south Andabet wereda, on the East Este wereda and on the west Lake Tana and Abay River.

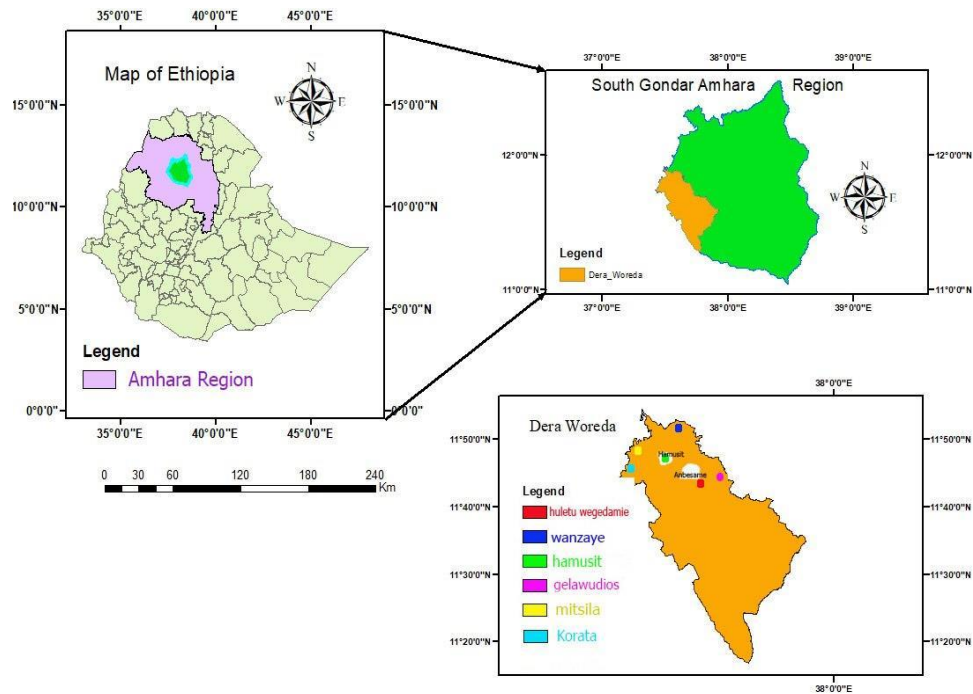


Figure 1 Location map of the study area

3.1.2 Topography and climate

The topographical division of the district is 35% plain (flat), 20% mountain, 18% gorges (valley) and 27% undulating (elevated area). Dera district also agro ecologically classified in to 15% high land (dega), and 85% middle land (weina dega). The mean annual temperature of district is about 23⁰C and its average annual rain fall ranges from 1000 to 1500mm (Dera Woreda Administration Office).

3.1.3 Soil and land use system

The dominant soil types in the district were 4% black soil, 35% red soil, 20.5% brown soil, 18% gray and 22.5% clay soil. According to Dera woreda Agricultural and rural development office, from the total area of the woreda 159,078 ha cultivating on progress 15104.992 ha, cultivating in the future 61197 ha, the area covered by forest 13220.649 ha, shrubs and herbaceous land 15372 hectares, land used for building 15513 ha water bodies 7201 ha, and others 9163.779 ha (Dera Woreda Administration Office). There are about eight main rivers in the Dera district. These are Gumara, Gebete, Geldanawjo, Shina gidib, Tabik, Alata, Fogeda, and Ankata. Of the total area of the district, the 18% of the area covered by such and other types of water bodies. Among these rivers, Gumara is the most important river that people utilized for agricultural irrigation and other activities (Dera Woreda Administration Office).

3.1.4 Dominant vegetation description in the study area

Vegetation of Dera district as described and visualized mostly remnant (small) and large trees in agricultural areas in the form of bush, shrubs, and forests (such as Weletepetros monastery in korata kebele) the common plant species in the area include *Hagenia abyssinica* (koso), *Vernonia amygdolina* (Girawa), *Eucalyptus globulus* (Nech bahirzaf), *Podocarpus falcatus* (zigiba), *Bersama abyssinica* (azamir), *Cordia africana* (Wanza).

3.1.5 Population and health care status

Based on the 2007 National Housing and Population Census, the district has an estimated total population of 320,320 of these 163,678 been men and 156,642 were women. Of which 21,622 or 6.75% were urban inhabitants and the rest 319978 (83.25%). Amharic is spoken as the first language by 99.82% the remaining 0.18% of the population speak all other languages reported. In this district about 95.35% of the population practices the religion of Ethiopian orthodox Christianity, 3.25% Muslims and 1.4% protestant. According to the report of Dera Woreda Health office (DWHO, 2013),

the diseases mostly affect the people living in the district are malaria, internal parasites, diarrhea, eye diseases, tonsillitis, skin diseases, wound, gastritis.

3.1.6 Agriculture and livestock

The district has a high potential agro-ecology for agricultural activities such as crop production, livestock rearing and to cultivate annual and perennial plants. The major food crops and vegetables grown in the study area includes: maize, teff, wheat, Rice, Guaya, tomato, cabbage, garlic, shallot or key shnkurt, orange), mango, papaya, lemon, avocado, sugar beet or key sir, potato, carrot and sweet potato), Stimulant items: For instance, coffee which was mostly grown in almost all kebeles of the study area and chat usually grown around Hamusit town and Gelda river. The common livestock that most people have in the district was cow, ox, goat, sheep, donkey, horse, hen (Source: DWADO, 2013)

3.2 Selection of the study sites and informants

In the study area, 6 kebeles were selected purposively for ethnobotanical data collection considering the climatic zones, vegetation distribution, altitudinal range, availability of traditional healers, and suitability of the area for data collection. The 6 selected kebeles namely were korata Gelawdiwos, Mstili, Wanzaye, Huletu wegedame, and Agar which covered two agro-climatic zones (Weina dega and kola). To get reliable information, a total of 60 informants were selected (48 males and 12 females) were selected between the age of 20 -80 were selected from six Kebeles.. From these informants 10 key informants we purposively selected based on local administrators, people are long lived, have knowledge about medicinal plants and then 2-3 key informants were selected per each kebeles.

3.3 Data collection Method and Informant's consensus

Ethno botanical data and general information in the district were collected from September up to January 2023. The data were collected using semi structured questionnaires, field observation, group discussions and market surveys. The method of data collection were carried out in Amharic language regarding on the general information of informants, study area, medicinal plants (parts used, habits, method of preparation, disease treated, routs of application, adverse effect and management of conservation methods) were also recorded. The check list of questionnaires was prepared to carry out interviews and discussions with informants and key informants in a selected place and time. The

collected data was analyzed using Microsoft word and Micro soft excel tool expressed in percentage, frequency and interpreted by using tables, graphs and figure (pie chart).

Informant's consensus also incorporated during data collection. The willingness of the informants were being considered before starting the data collection. So, the researcher was contacted to each informants and talk politely to gather reliable data regarding to general information on medicinal plants and other issues. There should be awareness creation for informants by describing the future the significant of research people in the study area as well as the country.

3.3.1 Individual interview and group discussion

Individual and group discussion were made regarding on medicinal plants (such as local name of plants, medicinal uses, method of preparation, mode of administration, disease conditions, threats of plants, indigenous knowledge, conservation and management on medicinal plants and related data (Figure 2)



Figure 2 Individual and group interview

Photo by Kassa Belachew, 2023

3.3.2 Field Observation

The researcher was carried out direct observation and field walk to collect the medicinal plants in the wild (field) and cultivated plants (Homegarden). During field walk observation, the researcher and informant went together on the field to observe and to collect valuable data (such as habitat, habit, medicinal plant abundance, medicinal plant value, and their distribution were recorded) (see Figure2,3&4)



Figure 3 Medicinal Plant shown by informant

Photo by: Kassa Belachew,2023



Figure: 4 Specimen of medicinal plant collection by researcher
Photo by: Adimasu Arega,2023

3.3.3 Market Survey

Market survey was conducted at the local market such as Hamusit Anbesame town that were center to the study area and suitable for ethno botanical data collection. Semi structured interview were made with medicinal plant sellers to assess the varieties of medicinal plants available in the study area. We identified, gathered and recorded the types of medicinal plants sold and bought as well marketability of medicinal plants from the market survey.



Figure: 5 Market survey

3.4 Data Analysis

According to Martin (1995) Cotton (1996) the gathered data were computed and analyzed using descriptive statistical methods, preference, ranking, paired comparison, and direct matrix ranking.

3.4.1 Descriptive Statistics

The percentage and frequency were employed to analyze and to summarize the data on medicinal plants and other associated information.

3.4.2 Preference ranking

Preference ranking was performed to compare the most important medicinal plants and effect and to cure particular diseases. Based on their healing power of medicinal plants, six most effective medicinal plants were chosen and preferentially ranked. The value of 1 to 5 were used to rank, the highest value (6) was assigned the best plant to heal diseases and the lowest value (1) was assigned for the least preferred plant that was lower healing power compare to other medicinal plants ranked.

3.4.3 Direct Matrix Ranking

According to Cotton and Martin (1995) direct matrix ranking was used to apply for estimating the relative advantages of multipurpose medicinal plant species. Accordingly, eight multipurpose medicinal plants were selected. Then, eight key informants were chosen to assign use value for each attribute from 0-5 (i.e. 5=Excellent, 4=very good, 3=good, 2= less good 1=least good,0=not used). The eight multipurpose plant species were expressed in eight use categories (values) such as plants for food, medicinal values, fencing, fire wood, charcoal, furniture, construction. Finally the average values of each categories of species were taken sum up and ranked

3.4.4 Fidelity Level

The fidelity level (FL), is the percentage of informants claiming the use of certain plants for the same major purpose to treat ailments or diseases. Fidelity level was calculated using the following equation:

$$FL = \frac{NP}{P} \times 100 \dots \dots \dots (1)$$

Where NP: is the number of informants that claim the use of plant species to treat a particular diseases and N is the number of informants that use plants as medicine to treat the diseases. On the basis of this equation FL index was calculated for medicinal plants used to treat certain diseases.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 RESULT

4.1.1 General information of the informant

4.1.1.1. Age

As the result indicated (Table 1), the majority age distributions of the informants were elders having knowledge about traditionally used medicinal plants and their age classes were between 61-70.

Table 1 Age of informants in the study area

Age categories of informants	Number of informants			Informants (%)
	Male	Female	Total	
30-40	4	3	7	12
41-50	8	2	10	16.7
51-60	12	3	15	25
61-70	20	6	26	43
71-80	2	0	2	3
Total	46	14	60	100

4.1.1.2 Marital status

From The total informants, 52 (86.7%) were married and 5 (8.3%) of the informants were unmarried or single and 3 (5%) were divorced .

4.1.1.3 The educational status

The educational status of the informants were described as from the total informants non literate 18 (30%), who can write and read were 31 (52%), the grade level from 6-12 were 8 (13%) and the grade level above 12 were 3 (5%). In the case of occupation, numbers and percentages of the informants were participated during data collection, farmers, 30 (50%), civil servants, 21(35%) and others were 9 (15%).

4.1.3 Diversified medicinal plant habitats and habits in the study area

A total of 60 medicinal plants were collected and identified, most of the species were collected from wild habitats. (Table2).

The number of families, genera, and species among the collected medicinal plants were 40, 57, and 60, respectively (Table 2).

Table 2: Name of families, number of genera, number of species and their percentage

Name of families	Number of genera	%	Number of species	Proportion (%)
Brassicaceae	2	3.5	2	3.3
Rutaceae	1	1.8	2	3.3
Solanaceae	4	7.0	4	6.6
Asteraceae	4	7.0	4	6.6
Euphorbiaceae	2	3.5	3	5
Lamiaceae	2	6.8	3	5
Fabaceae	4	7.0	4	6.6
Myrtaceae	3	5.2	3	5
Oleaceae	2	3.5	2	3.3
Cucurbitaceae	2	3.5	2	3.3
Total	26	45.6	29	48.3
Others	31	54.4	31	51.7

As indicated in the table below from the total of 60 species documented in the study area 25 species (41.7%) were collected from wild habitat 20 (33.3%), whereas those species collected from homegarden and the remaining 15 (25%) species were collected from both homegarden and wild habitats (Table 3).

Table 3: Habitats of medicinal plants in the study area

Habitat	Number of habitats	Habitats (%)
Homegarden	20	33.3
Wild)	25	41.7
Wild and homegarded	15	25
Total	60	100

From the total of sixty medicinal plants the habit were shrub , 24 (40%), herbs 20 (33.4%), the least number remaining were trees with 14 (23.3) followed by climbers 2 (3.3%) (Fig.3). Therefore,

medicinal plants mostly used by the people were obtained in the form of shrubs. Diversified medicinal plants and their parts available in the study area play a greater role and having highly relevant to a number of remedies for human and livestock ailments.

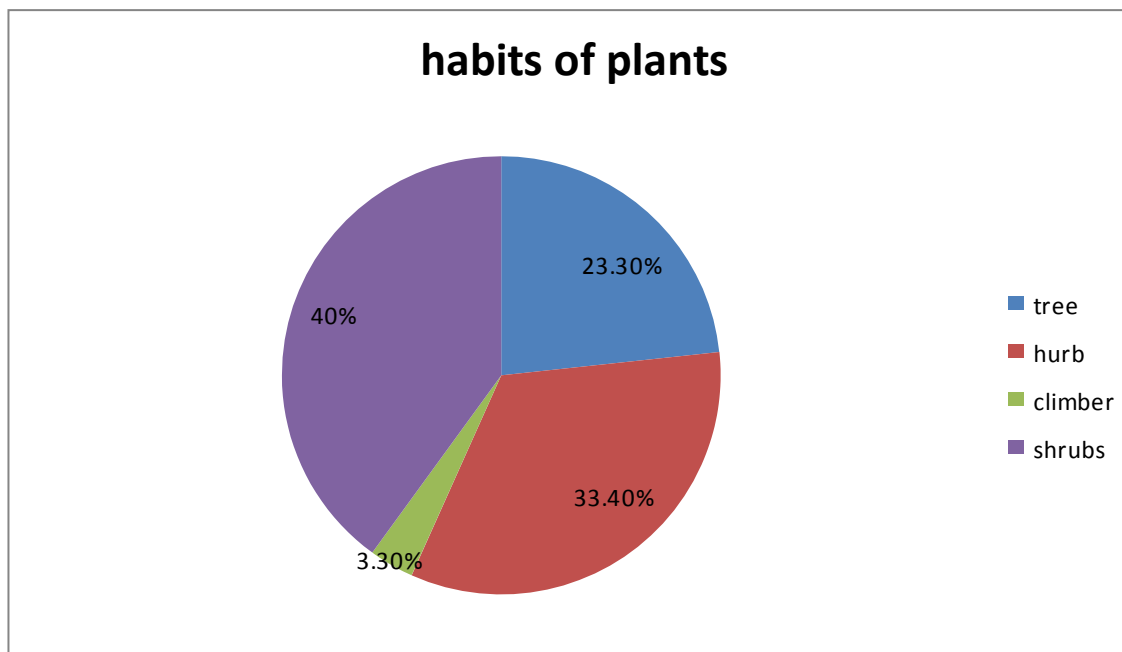


Figure 6: Habits of medicinal plants

As the result of the study shown in the table below that leaves 32 (53%) were the most frequently used parts followed by fruits (11.7%), seeds (10%), roots (8%), rhizoid (5%) bulb (7%), bark 3.3% and the least percentage plant parts that was used to prepare medicines at home for human.

Table 4: Parts of medicinal plants used to treat human and ailment in the district

	Medicinal plant parts							
	Leaves	roots	Seeds	Pods	bark	bulb	rhizoid	fruits
Number	32	5	6	4	2	1	3	7
Percentage	53	8	10	7	3.3	2	5	11.7

4.1.4 Methods of Preparation, routs of administration and mode of application

4.1.4.1 Methods of preparation

The preparation mechanisms of medicinal plants were based on the availabilities of medicinal plant parts that would be prepared and given various remedies to individual who was victim or affected by diseases or ailments or any sudden conditions occurred. In the study area, local people involved various methods of preparation of medicinal plants for different types of ailments. As shown in the table below, the most common and significant way of plant part remedy preparation forms were mixing and crushing 14 (14.2% followed by drying, mixing and pounding and powdering 13 (13.3%), the least condition of preparation method was inserting 1 (1.02%) (Table: 5).

Table 5: Method of preparations of traditional medicines in the study area

Methods of preparation	Number	Percentage (%)
Chewing	9	9.2
Drying, mixing and powdering	13	13.3
Mixing, pounding and Creaming	11	11.2
Boiling	9	9.2
Pounding and creaming	12	12.2
Chewing and swallowing	4	4.1
Pounding and filtering	3	3.1
Crushing, mixing and Boiling	5	5.1
Macerating	2	2.04
Crushing and creaming	8	8.1
Sniffing	5	5.1
Pounding and roasting	2	2.04
Mixing & crushing	14	14.2
Inserting	1	1.02

4.1.4.2 Routes of administration of traditional medicines

The local people in the study area applied different routes of application when they want to use medicinal plant remedies. The routes administration skin (dermal) oral, nasal neck, leg, head, and optical. From the total analyzed data of the routes of administration, the result obtained that the medicinal remedies were mostly applied orally in the study area. Oral was the most widely used rout of administration. Therefore, the majority of medicinal plant remedies prepared were taken through oral 28 (47%) and the others were skin (dermal) 13 (21%),optical and nasal 6 (10%) each, leg 5 (8%), head 2 (3%),optical 3 (5%) and neck 4 (6%) Table:6)

Table 6: Routes of administration of medicinal remedies

Routes of application	Number of remedies	Percentage
Skin (dermal)	13	21
Oral	28	47
Nasal	6	10
Neck	4	6
Leg	5	8
Head	2	3
Optical	3	5

4.1.4.3 Mode of application of medicinal plant remedies

The mode of traditional medicines consumption also different for different diseases. The result showed that drinking (35.4%) was the highest and the most common mode of consumption following by eating 20.8% and the least mode of consumption was washing (1%).consumption su by Table:7). Mostly drinking and eating were commonly used to treat internal parasites such as stomach ache and creaming usually also applied when skin infection is occurred. Swollen part of body was treated using tying mode. Dropping and sniffing technique also used during certain medicinal plant parts or products applied on eye to treat eye infection and nasal infection, respectively.

Table : 7 Mode of application of medicinal plant remedies

Mode of application	Number	Percentage
1.Eating	20	20.8
2.Drinking	34	35.4
3.Sniffing	7	7.3
4.Rubbing	4	4.2
5.Tying	4	4.2
6.Washing	1	1.0
7.Droping	4	4.2
8.Smoking	3	3.1
9.Creaming	19	19.8

4.1.5 Dosage of traditional medicines

In Ethiopia particularly, in Dera woreda, majorities of Traditional healers usually provide traditional medicines to people simply by estimating and by using their own traditional measuring methods and habits. So that after traditional medicines have been given, to some extent side effect will be occurred due to the dosage were not precise and accurate. According to Sofowara (1982) and Dawit Abebe (1986) lack of precision and standardization as one draw back for the recognition of traditional health care system.

4.1.6 Ranking of Medicinal plants in the study area

4.1.6.1 Preference ranking of the most effective medicinal plants

Allium sativum ranked first indicated that it is the most preferred and effective plant to treat against malaria followed by *Zingiber officinale* ranked second and *Corica papaya* ranked third then at the end *Artemisia abyssinica* became the least medicinal plant treating against malaria disease (Table 8).

Table 8: Preference ranking of medicinal plants used for treating malaria.

Name of Species	Number of informants from I1--I10										Total	Rank
	I ₁	I ₂	I ₃	I ₄	I ₅	I ₆	I ₇	I ₈	I ₉	I ₁₀		
<i>Corica papaya</i>	4	5	5	3	5	4	6	5	5	3	45	3 rd
<i>Allium sativum</i>	6	5	7	6	6	7	4	5	5	6	57	1 st
<i>Moringa oleifera</i>	4	4	4	4	2	4	3	7	5	6	43	5 th
<i>Artemisia abyssinica</i>	5	3	3	4	4	3	3	7	5	5	42	6 th
<i>Lepidium sativum</i>	5	3	5	3	4	6	6	4	4	4	44	4 th
<i>Zingiber officinale</i>	4	4	4	5	6	6	5	5	4	5	48	2 nd

4.1.6.2 Direct matrix ranking

Direct matrix is one of the techniques used to determine the multipurpose of selected medicinal plants based on their use values. The use values include food, furniture, medicines, charcoal, firewood, fencing, agricultural tools, and ornamental purpose. From this study, the result indicated in (Table 9), the first and top ranked multipurpose tree was *Cordia africana*.

Table 9: Direct matrix ranking for 9 medicinal plant species with their multipurpose use

Multipurpose use										Rank
	Food	Furniture	Medicines	Charcoal	Fire wood	Fencing	Agricultural tools	Ornamental purpose	Total	
<i>Hagenia abyssinica</i>	3	0	4	1	4	4	4	2	22	3 rd
<i>Eucalptus globulus</i>	0	1	1	5	5	4	3	0	19	4 th
<i>Juniperus procera</i>	0	4	1	4	3	3	3	5	23	2 nd
<i>Eucalptus camaldulensis</i>	0	1	0	5	5	5	3	0	18	6 th
<i>Coffee arabica</i>	5	0	5	0	1	0	0	5	16	7 th
<i>Vernonia amygdalina</i>	0	0	5	0	0	1	0	1	7	8 th
<i>Cordia africana</i>	5	5	4	5	5	5	5	1	35	1 st
<i>Mangifera indica</i>	2	0	5	0	1	1	0	4	13	5 th

<i>Acacia abyssinica</i>	0	1	1	5	5	5	5	1
Total	15	12	26	25	29	28	23	19
Rank	8 th	7 th	3 rd	4 th	1 st	2 nd	5 th	6 th

4.1.6.3 Fidelity Level (FL)

Fidelity level is one of the analysis methods used to determine the highest fidelity level for specific medicinal values in treating human ailments and indicated the healing capacity of medicinal plants as described below. The highest fidelity level of *Ocimum lamifolium* 95.4 followed by *Rumex nervusus* 91.3 (Table 10). The medicinal plants that are widely used by the local people to treat one or very few ailments have higher FL values than those that are less popular (Mirutse Giday, 2007 and Mulugeta, 2014).

Table 10: Fidelity level index(FL) values of medicinal plants to treat human ailments

Name of species	Types of ailments	NP	NU	Fidelity level index (NP/NU)
<i>Ocimum lamifolium</i> (Damakese)	Headache and febrile illness	21	22	95.4
<i>Hagenia abyssinica</i> (Koso)	Tape worm	23	26	88.4
<i>Moringa oleifera</i> (Shiferaw)	Hypertension & cough	18	21	85.7
<i>Allium sativum</i> (Nech shinkurt)	Evil eye	17	19	89
<i>Ginger officinale</i> (Zingibl)	Stomachache	16	18	88.9
<i>Rumex nervusus</i> (Embacho)	Evil eye	21	23	91.3

4.1.8 Management and conservation of medicinal plants

Medicinal plants grown in the study area needs a significant conservation and management practices. Plants in general play a very significant role for, fire wood, charcoal, furniture, fencing, and so on not only these, plants also used for traditional medicine. People usually had a strong belief in protecting and conserving plants that mostly grown in different religious institutions. Many plants can be grown

by local people managed and conserve. However, still there a limitation in conservation of medicinal plants that are utilized for various purpose..

4.2 Discussion

A total of sixty species of medicinal plants were identified and documented of which 46 species were used to treat different health problems of human. The the remaining nine species were reported to treat livestock and 5 species were identified for both human and livestock ailments. This study indicated that majority of medicinal plant remedies were given for human than livestock. The people in the study area have relatively more of indigenous knowledge about medicinal plants for human than livestock. From the identified and documented species of medicinal plants species, 57 were genera, and 40 were family. From the total number of medicinal plants greater number of species 24 (40%) were collected and identified from wild habitats available in the form of shrubs followed by 20 (33.4%), trees with 14 (23.3%), and the least number of climber was 2 (3.3%) was recorded. Leaves with 32 (53%) commonly used to treat human and livestock ailments among other parts of medicinal plants following fruit 7 (11.7%), seed 6 (10) %, roots 5 (8%) pods pods 4 (7%), rhizoid 3 bark 2 (3.3%) and the least medicinal parts used was pod with 1(2%)%. Similar result was reported by Haile Yineger (2005) and Endalew Amenu (2007)..

The result indicated that many medicinal plants was collected from wild habitats, 25 (41.7%) were higher compared to those collected from cultivated or grown in the homegarden 20 (33.3%) and that of wild 15 (25%). This finding was corroborated to the study by Behailu Etana (2010). The finding of this report was more of similar to the study in other study sites of Ethiopia by Tesfaye Awas and Sebsebe Demissew (2009); Mirutse Giday et al., (2009); Moa Megersa, (2010). Although people have different indigenous knowledge and practice on traditional medicinal plants preparation and consumption as well as method transferring indigenous knowledge of medicinal plants by traditional healers were limited, sometimes they are not willing to transfer except to their children or close relatives.

The oral means of routes of administration accounts higher percentage in the study area. The report indicated by Niguse Amsalu (2010) in some in Farta district of Ethiopia. There are medicinal plants prepared and taken with certain additives such as coffee, Tella, tea, water, honey, sugar and so on. The method of preparation that people usually practice in the study area were mixing and crushing 14 (14.2%) drying, mixing and powdering 13 (13.3%) and the least method was inserting 1 (1.02%). Most of the time, fresh leaves have taken by users and they simply mixing with the other additives. As Emiru Berhanu *et al.*, (2011) report indicated crushing was the most frequently used methods of

preparation. On the other hand, once the medicinal plants prepared, traditional medicines have been giving through oral which accounted 28 (47%) following taken on skin or dermal and the others were, nasal 6 (10%), tie on the legs or feet 5 (8%), ti on the neck 4 (6%), optical 3 (5%) and the least methods were taken for diseases or infections occurred on head. This finding is agreed with the other ethno botanical studies of Behailu Etana (2010), Demeku Wale (2014) and Etana Tolosa (2007) reported that leaves were the most cited plant parts in the preparation of remedy. However, Fiseha Mesfin (2007) was reported roots were the highest number recorded in the result. In preference ranking technique, *Allium sativum* ranked first and it is the most effective to treat malaria than the others. From higher percentage of multipurpose use categories of medicinal plants *Cordia africana* was the most preferred species among others. As a result, *Cordia africana* become the most vulnerable and threatened tree species due to its multifunctionality.. From total medicinal plants, six species were taken as the best MPs for its healing efficacy from the fidelity level index, because of this the highest percentage fidelity level index of species was *Ocimum lamifolium* (95.4%), followed by *Rumex nervusus* (91.3%).

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 Conclusion

The total of 60 species of medicinal plants were identified and recorded in ethno botanical studies of medicinal plants in the study area of which 46 species were noted to treat human ailments while 9 species were documented to treat livestock ailments and 5 species were reported to be used to treat both livestock and human ailments. As the result reported before many of medicinal plant species were recorded from the wild (41.7%), this number was relatively greater than medicinal plants which was cultivated homegarden (i.e. 33.3%) and 25% from both. Among the total number of medicinal plants 40% of species were shrubs following herbs with 33.3% and the least number of habit that medicinal plants were climbers, 3.3%. Therefore, people used traditional medicinal plants available broadly from wild. Most of the plants parts used were leaves followed by fruits. Most of the root administration was oral taking was very common. In preference ranking method the most common species to treat malaria ranked first was *Allium sativum*, second *Zingiber officinale* and the least *Artemisia abyssinica*. In the study area the major threatening factors for decreasing common medicinal plants were agricultural expansion, deforestation, construction, and expansion of urbanization. On the other hand, transfer of knowledge from traditional healers and from elders to youngsters were secretly, oral, sometimes unwillingness as well as unavailability of medicinal plants and influence of modern education and limitation of awareness on medicinal plant cultivation and conservation were the major factors. So, medicinal plant indigenous knowledge can be sustainably used and continued if there are enough awareness creation to the society to improve local community's knowledge on the importance, cultivation, conservation and management of medicinal plants.

5.2 Recommendation

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

- People in the study area should participate in cultivating; conserving, managing and caring medicinal plants and other useful plant resources.
- The indigenous knowledge and skill of traditional medicine trainers should be encouraged by steck holders and government bodies
- People should be trained by the agricultural experts in the woreda in cultivating medicinal plants in their homegarden.
- The Woreda Administration and Woreda Health Office have to encourage the local herbal medicine practitioners to enhance the use of traditional medicine through licensing and other incentives.
- The Government and health office should give attention so as to standardize measurements and maintain hygiene of the medicines made from plants by training both the healers and other members of the local community.

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Appendice

Appendix 1:

Identified and documented medicinal plants in Dera Woreda Amhara Region Ethiopia

List of traditional medicinal plants used for treating human and livestock ailments in the study area with scientific names, family names, local names, habitat, parts used, methods of preparation, disease treated, routes of administration, used for.

Key:H(herb),Sh(shrubs),Cl(climber),T(tree),Fr(fruit),B(botanicalgarden),Wb (wild&botanical),bb(bulb),Or(oral),Hu(human), ca (cattle),L(leaf),Sk(skin),Se(seed).

Scientific Name	Family Name	Local Name	Habitat	Parts Used	Habitat	Preparation and Application	Disease Treated	Route of Application	Used for	Collection number
<i>Carica papaya</i>	Cariaceae	Papaya	T	Fr	B	Roasted with barely seeds and eat chewed and Swallowed the liquid. fruit is eaten, leaf crushed, mixed with honey and drunk with two cup of tea.	amoebiasis	Or	Hu	KB01

<i>Allium Sativum</i>	Alia ceae	Nec h Shin kurt	H	bb	WB	Fresh bulb of allium Sativum is crushed with Ginger (Zingibl)and mixed with honey and token with two cup of tea	Malaria and Abortion	Or	Hu	KB02
<i>Aloe vera</i>	Aloa cace ae	eret	H	L	W	Fresh Latex is painted in the wound, leaf crushed and mixed with cooled water and taken with two cup of Tella	Fire burn, Ring worm Anthrax	Sk Or Or	Hu Ca	KB03
<i>Asparagus africaness</i>	Aspa raga eae	Yesi et Qest	Cl	R	W	Fresh root is pounded ,boiled and mixed with water and honey then drunk.	Retained placenta	Or	Hu	KB04
<i>Brasica Carinata</i>	Bras icace ae	Gom enze r	H	Se	WB	Seed is crushed and eaten with allium sativum The seed mixed with Ricinnus Communis crushed powdered andmixed with honey then creamed on affected part Seed crushed and mixed with cooled water the given	Stomach ache cancer Stomach bloating	Or Hu Or	Hu Cattle	KB05
<i>Citrus lemon</i>	Ruta ceae	Lom mi	Sh	L Fu	WB	The leaf crushed, powdered mixed with milk boiled with sugar then drunk when feeling pain Fruits of Citrus lemon is squeezed and creamed continuously until recovery Fruit squeezed and juice drunk	Cough Athlete's foot and scabies (itches) and skin rash	Or Sk Or	Hu Hu Hu	KB06

							Stomach ache and to Stop sickening effects(vomiting)			
<i>Datura stramonium</i>	Solanaceae	Asteraceae	H	L	B	Leaf crushed with leaf of myrtus communis and powdered is rubbed on head after hair have cut	Dandruff	He	Hu	KB07
				R		The roots mixed with Osimum Gratimum and taken	Headache	Nas	Hu	
				Fr		About 3-4 spoons of powdered fruit of Datura stramonium, mixed and creamed with butter The fresh leaf of datra stramonium is squeezed and creamed on the wounded part of the body.	Itches Wound and Hemorrhoid(Kintarot)	Sk	Hu	
<i>Echinops qebercho</i>	Asteraceae	Kebercho	H	R	WB	Roots mixed leaf of Artemisiaabussinica is added on burning fire then smoked to patient Root and bark of crotonus macrotachys mixed and powdered together with honey then drunk for about four days.	Evil eye Tetanus and internal parasite	nas Or	Hu Hu	KB08
<i>Hagenia abyssinica</i>	Rosaceae	Kosoro	T	Fr Se	WB	Fresh fruit is crushed, squeezed and the juice is mixed with Tella then	Stomach ache tape	Or Or	Hu	KB09

						drunk Dried seed powdered with Tella and	worm Venereal disease	Sk	Hu	
<i>ca</i>						drunk for patient The pounded seed is mixed with butter then creamed on affected body	Eczema(c hife)		Hu	
<i>Justicaschim perina</i>	Aca ntac eae	Simi za	Sh	L	WB	The leaf crushed and mixed to water and decanted then injera is soaked with solution and given	cocoidiosi s	Or	Hen	KB10
						Leaf and root are pounded with water and mixed with water then given.	Black leg	Or Nose	Ca	
						Rub and wash the body of cattle leaf until removed	Lic anddandr uf	Sk	Ca	
						Fresh leaf heated with fire and adding salt then tied on leg	Leg swelling	Leg	Hu	
<i>.Kalanchoe petitiana</i>	Eup horb iacea e	Enda wula	H	L	WB	Cut fresh leaf and heated on fire and squeezed then juice was dropped on wounded body part	wound	Sk	Hu	KB11
<i>.Melia azedarach</i>	Mali acea e	Nim	Sh	L L	WB	Cut fresh leaf and chewing then swallowing Cut fresh leaf and then stay kept on teeth for about 20 minutes	malaria toothache	or or	Hu Hu	KB12

<i>Ocimum lamifolium</i>	Lamiaceae	Damake	Sh	L	WB	<p>Cut fresh and mix with Eucalyptus globulus then pound with water then drunk and inhale the vapour the boiled mixture.</p> <p>Fresh leaf was cut massaged, macerated in cold water and sniffed as well as creamed all body parts at night.</p> <p>In addition the massaged and squeezed leaf boiled then drunk with tea</p>	<p>Febrile illness</p> <p>Mich(Am) Headache</p>	<p>Or and Nas Sk Or</p>	<p>Hu</p> <p>Hu</p> <p>Hu</p>	KB13
<i>Pterobium stelatum</i>	Fabaceae	Kentefa	Sh	L	W	Dried and crushed leaves then mix with butter finally tie with string on the neck.	Goiter	Nk	Hu	KB14
				L		Fresh leaf taken and mix with water and drunk one cup of coffee	Evil eye	Or	Hu	
<i>Rumex nervus</i>	Polygonaceae	Embacho	Sh	L	W	Fresh leaf crushed or chewed in teeth then swallowed	Snake bite	Or	Hu	KB15
<i>Vernonia amygdolina</i>	Asteraceae	Gerawa	T	L	WB	Crushed leaves of Gerawa mixed with cold water then drunk for 3 days continuously.	malaria	or	Hu	KB16
						Fresh leaves squeezed and mixed with water then given to cattle	bloating	or	Cattle	

						The leaves crushed and ponded then the body of infected person and livestock washed with this plant	Skin infection	Sk	Both	
						The young shoots of Gerawa pestle and squeezed then drunk the juice	Stomachache and worms(as caris)	or	Hu	
<i>Eucalyptus globulus</i>	Myrtaceae	Nec h bahir zaf	T	L	WB	Cut fresh leaves and chew then swallowed	Stomachache	or	Hu	KB17
						Rub fresh leaves on affected skin	fever	Sk	Hu	
						The mixed Damakese and Eucalyptus boiled in water then inhaled and fumigate	Common cold and fibril illness	Or	Human	
<i>Linum usitatisimum</i>	linaceae	Telba	Sh	S	B	The seeds soaked(mixed) in water then drunk	Gastritis, constipation and cough	or	Hu	KB18
						Dried seeds put on eye	To remove dust particles enter in	ey	Hu	

							eye			
<i>Milletia feruginia</i>	Faba ceae	Birbi ra	Sh	pod	WB	The pod mixed or macerated with water then drunk	abortion	or	Hu	KB19
<i>Musa acuminate</i>	Mus cace ae	Muz e	T	L	B	The juice of broken petiole dropped to wound	Stop wound bleeding	Sk	Hu	KB20
<i>Nigella sativa</i>	Ran umc ulac eae	Tkur azm ud	H	S	B	The seed chewed and swallowed Wrap in small leaf stick up nose	Asthma Running nose and common cold	or Nas	Hu HU	KB21
						Washed seeds crushed and chewed	Abdomina l pain and headache	or	Hu	
<i>Urtica pilulifera</i>	Uriti cace ae	Sam a	H	L	W	Fresh leaves of <i>Urtica pilulifera</i> crushed and eat Creamed fresh pounded leaf on the affected (fire burn) body	Hemorrhoid, rheumatism and heart disease	or	Hu	KB22
						wound	Sk	Hu		

<i>Persea americana</i>	lauraceae	Avocado	T	Fr	B	Apply squeezed fresh fruit on wounded body and scalp(skin of head)	Bleeding and dandruff	Sk	Hu	KB23
<i>Ruta chalpensis</i>	Rutaceae	Tenadama	Sh	L	B	Fresh leaves macerated in cold water and is drunk	Stomach ache	or	Hu	KB24
						Crushed leaves and mixed with root of <i>Phytolaca dodecandra</i> is inhaled then bandage on neck.	Evil eye	Ne	Hu	
						Fresh leaves boiled with tea then drunk	Common cold	or	Hu	
<i>Zingiber officinale</i>	Zingiberaceae	Zingiber	Sh	R(rhizome)	B	The roots or rhizoid chewed then swallowed	Stomachache, Tonsillitis, cough, Diarrhea common cold	or	Hu	KB25
<i>Bersama abyssinica</i>	Francosaceae	Azadirachta	Sh	Ba	W	Dry bark is ground and drunk with water	Breast cancer	or	Hu	KB26
<i>Tymus schymperi</i>	Lamiaceae	Tosign	H	L	W	Dry leaves are decocted and mixed with water then drunk	Breast cancer	or	Hu	KB27
<i>Dodonaea angustifolia</i>	Sapotaceae	Kitki	T	R	W	Roots dried, grounded and mixed with honey applied and drunk it.	Breast skin and cervical	or	Hu	KB28

							problem			
<i>Brucea antidysenterica</i> (Fresen)	Simarubaceae	Abalo(wagino se)	T	L	W	Dried leaves, ground, pasted to cold water then creamed on affected body part	Skin cancer Diarrhea, itch	Sk	Hu	KB29
<i>Moringa oleifera</i>	Moringaceae	Shiferaw	T	L	B	Fresh leaves boiled then drink	Common cold	or	Hu	KB30
						Dried and crushed leaves mixed with water is drunk	Hypertension and cough	or	Hu	
						Cut fresh leaves chewing and ate	Diarrhea	or	Hu	
				L		Leaves crushed or grind, and boiled by mixing with tea eventually drunk.	Diabetes	or	Hu	
				F		Grind the dried fruits of Moringa and mix with water then applied on the infected part of the body	Skin disease	Sk	Hu	
<i>Calotropis procera</i>	Asclepiadaceae	Tobias	Sh	L	W	Crush or ground and paint	Wound and hemorrhoid	Sk	Both	KB31
<i>Artemisia absinthium</i>	Asteraceae	Natras	H	L	B	Rub leaf and sniff	Evil eye	Nas	Hu	KB32

	ae									
<i>Eclea racemosa</i>	Ebenaceae	Dedeho	Sh	L	W	Leaves squeezed then drink with honey	Dysuria(diarrhea)	or	Hu	KB33
.				R		Crushed root then pint with butter on infected part	Dandruff	Sk	Hu	
<i>Ximeria americana</i>	Oleaceae	Enkoy	Sh	L	W	Leaf chewed,mix with honey and swallowed	Swollen body, snake bite and stomach ache	Sk	Hu	KB34
<i>Phytolaca dodecandra</i>	Phytolacaceae	Mehand	T	R	W	Grind and drunk with water	Rabbis, Aorshucariasis, Malaria, Liver problem	or	Hu	KB35
<i>Grewia feruginea</i>	Tiliaceae	Lenkuata	Sh	R/B	W	Grind, powdered and mix with honey and butter then drink	Asthma and stomach ache	or	Hu	KB36
<i>Artemisia afra</i>	Asteraceae	Chikugn	H	L	WB	The leaves squeezed, mixed and sniffed wth garlic	Common cold and devil	or	Hu	KB37

<i>Brasica carinata</i>	Brassicaceae	Senafich	H	S	B	Ground seeds and mix with garlic	Common cold	or	Hu	KB38
<i>Carissa spp</i>	Apocynaceae	Agam	T	R	W	Fresh root ground and mix with honey then taken	Gonorea	or	Hu	KB39
<i>Comberetum collinum</i>	Comberetaceae	Tinjut	Sh	L	W	Smoking on fire	Mich, Devil, and evil eye	Nas	Hu	KB40
<i>Citrus ourantitolia</i>	Rufaceae	Bertukan	T	F	B	Fruit squeezed and drunk juice	Constipation	Or	Hu	KB41
<i>Coriandrum sativum</i>	Apiaceae	Dinbala	sh	S	B	Seed grind or crush with water then drunk	Stomach ache and Snake bite	or	Hu	KB42
<i>Cocurbita pepo</i>	Cucurbitaceae	Duba	Cl	F	B	Seed dried crushed then eat	Tape worm	or	Hu	KB43
<i>Myrtus communis</i>	Myrtaceae	Ades	H	L	B	Creamed the mixture of crushed leaves on affected body	Dandruff and mich	Sk	Hu	KB44
<i>Nicotina tobacum</i>	Solanaceae	Tinbaho	Sh	L	B	Squeezed tobacco mixed with water	leech	Nas	Hu	KB45
<i>Caparis tumentosa</i>	Solanaceae	Gimero	Sh	R	WB	Put on fire and sniffing(fumigate)	Evil eye and devil	Nas	Hu	KB46

	ae									
<i>Euphorbia tirukali</i>	Euphorbiaceae	Kinohib	Sh	Ba	W	The bark mixed with tenadam then smoke or inhaled	Evil eye and epilepsy	Nas	Hu	KB47
<i>Lycopersicon esculentum</i>	Solanaceae	Timatim	H	F	B	Fruit taken, squeezed and creamed	Spider poison	Sk	Hu	KB48
<i>Jasmininum abyssinicum</i>	Oleaceae	Tenbelel	H	L	W	The leaf is being crushed and eat	Amoeba and Fumer	Or	Hu	KB49
						Fresh leaves rubbed then creamed	Bloating	Sk	hu	
<i>Cucumis ficifolius</i>	Cucurbitaceae	Ymdir embuay	H	R	W	Crushed roots mixed with water and taken by one cup of coffee.	Retained placenta and gonorrhoea	Or	Hu	KB50
<i>Trigonella foenum</i>	Fabaceae	Abish	Sh	S	B	Seed crushed, powdered and boiled with water	Spinal pain and tonsil	Or	Hu	KB51
						Seed is being crushed, powdered, mixed and boil with honey then eaten	Body swelling	Or	Hu	
<i>Dovialis</i>	Flac	Kos	Sh	F	W	Fresh fruits taken and eat before	Internal	Or	Hu	KB52

<i>abyssinica</i>	ourta ceae	him				every breakfast at morning	parasite			
<i>Embelia schimperina</i>	Myr sinac eae	Enk oko	Sh	S	W	Dried seed crushed, powdered, and mixed with water then drunk before every meal	Tape worm	Or	Hu	KB 53
<i>Euphorbia abyssinica</i>	Eup horb iaceae	Kulk ual	T	pod	W	Young or fresh flower is squeezed and creamed on the infected part of the body	wound	Sk	Hu	KB 54
<i>Ocimum basilicum</i>	Lam iaceae	Zika kibe	H	L	B	The leaf crushed and sniffed The leaf chewed and swallowed when feeling pain	headache Sudden sickness	Nas Or	Hu	KB 55
<i>Plantago lanceolata</i>	Plant agin aceae	Wen beret (wer teb)	H	L	W	Fresh crushed leaves mixed with Allium sativum then creamed. Leaves squeezed and rubbed on the infected body	Skin cut Fibril illness and wound	Sk	Hu	KB 56
<i>Syzgium aromaticum</i>	Myrt aceae	Krin fude	T	F	B	Fruit dried ,crushed and boil then drunk	Impotancy,s tomach ache vomit	Or	Hu	KB 57
<i>Vicia faba</i>	Faba ceae	Bake la	H	S	B	Dried seed crushed mixed to Lepidium sativum and salt placed on wound until swelling is recovered.	Biguinge(A m)	Sk	Hu	K0 58
<i>Chamnus prinoidus</i>	Oad mna ceae	Gesh o	Sh	L	WB	The leaf pounded,powdered and mixed with honey eaten for 2 days before meal	Liver problems	Or	Hu	KB 59

						Fresh leaves pounded and squeezed then added through nose	Leech	Nas	Hu	
<i>Cymprogon</i> <i>citratu</i>	poac eae	Teje sar	H	L	B	Fresh grasses(leaf) mixed with water salt and boil then filterate is drunk	Stomach ache	Or	Hu	KB 60

APPENDIX II

Checklist of semi-structured interview questions for collecting ethno botanical data

Semi structured interview and questionnaires

Date_____Kebele_____

Sex; Male _____Female_____Age_____

Occupation _____Religion_____Educational status_____

1. What are the most common medicinal plants used to treat human health and livestock problems in your area?
2. How can
3. How is the indigenous knowledge about medicinal plants used for traditional medicines passed from elders to young generation in your area
4. Can you list medicinal plants used to treat human and livestock ailments?Describe in terms of scientific name; family; local name; habit; parts used; disease treated; methods of preparation with dosage used and route of application?
5. Do you think medicinal plants are accessible?
7. How do you conserve medicinal plant?

8. Have you ever cultivate medicinal plants in your home garden? what kind of medicinal plants do you have.
9. What are the multipurpose use of medicinal plants beyond the mdicinal values.
- 7.How can medicinal plants collected?

APPENDIX III: Images of Collected medicinal plants in parcial



Milletia ferruginea



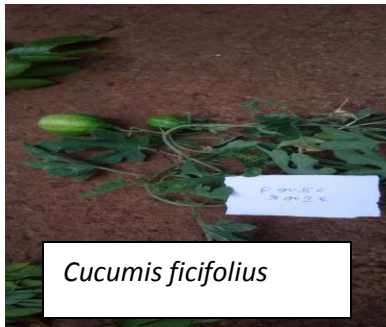
Ocimum lamiifolium



Rumex venosus



Plantago lanceolata



Cucumis ficifolius



Coffea arabica



Euphorbia abyssinica



Musa acuminata



Grewia ferruginea

Photo by: Kassa Belachew, 2023

