

Jimma University
College of Natural Sciences
Department of Biology



Medicinal Plants used among the People of Boji Chokorsa District,
West Wollega, Ethiopia.

BY: BENTI BIKILA

A thesis submitted to Department of Biology, College of Natural
Sciences, Jimma University For The Partial Fulfillment of Msc Degree
in General Biology

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Medicinal Plants Used by Indigenous People of Boji Chokorsa District, West
Wollega, Ethiopia

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JIMMA UNIVERSITY

COLLEGE OF NATURAL SCIENCES

DEPARTMENT OF BIOLOGY

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(Submission sheet-1)

This is to certify that the thesis entitled “MEDICINAL PLANTS USED BY INDIGENOUS PEOPLE OF BOJI COKORSA DISTRICT, WEST WOLLEGA, ETHIOPIA” Submitted in partial fulfillment of the requirements for the degree of Master's in Biology, the Graduate Program of the Department/School of Biology, and has been carried out by BENTI BIKILA, Id. No S30626/07, under my/our supervision. Therefore I/we recommend that the student has fulfilled the requirements and hence here by can submit the thesis to the department.

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Lastly, my acknowledgement also goes to the Department of Biology of Jimma University for financial assistance and the provision of opportunity to conduct this study.

DECLARATION

I, Benti Bikila, declare that this thesis is my original work and that all source of materials used for this thesis have been fully acknowledged. This thesis is submitted in partial fulfillment of the requirements for the degree of Master of Science in General Biology at the Jimma University.

I truly declare that this thesis is not submitted to any other University anywhere for the award of any academic degree.

Signature_____

Date_____

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Abstract

The study was conducted in Boji Chokorsa District, West Wollega Zone, Oromia Regional State aimed at assessing use and management and related knowledge of medicinal plants. Focus Group Discussion and interview were done to address details on the types and characteristics of plants, such as their preparation, method of application, dosage and threats . From the total of 23 Gand in the district 10 Ganda were purposely selected. From these Ganda , forty informants ,four from each Gand whose age was more than 30 were selected by the same technique. total of 89 medicinal plant species (64 from wild, 25 from homegardens) belonging to 28 families were collected. Among 89 species of medicinal plants recorded, 56 were used for human ailments, 18 for livestock and 15 species for both livestock and human ailments. The majority of the medicinal plants (72%) were collected from the wild and (28%) from homegardens. Herbaceous species constitute the largest number with 35(39%) species, followed by shrubs 27(30%) species. Fabaceae with nine species contributed the highest score. The most frequently harvested plant parts were leaves and roots with a proportion of 38(43%) and 26(29%) respectively. Most remedies were prepared from single plant (71%) and preparation from combined plant species was about 29% of these 64% were used in fresh. The widely used method of application was found to be internal scoring 67% in which oral application (56%) was the main route of administration. The major threats to medicinal plants in the study area were agricultural expansion, overgrazing, termite problem, urbanization, fire wood collection and cutting down trees for construction and furniture. Therefore, there is a need for appropriate in situ and ex situ conservation measures to be taken.

Key words: *Chokorsa, Ethnobotany, Indigenous knowledge, Informant consensus, Medicinal plant ,Preference ranking.*

1. INTRODUCTION

1.1 Background of the study

African people still rely on traditional medicine and traditional healers are often the first and last line of defense against most diseases such as headaches, coughs, diarrhoea, wound healing and skin diseases (Abebe Demissie, 2004). In Ethiopia, about 887 plant species are used to treat nearly 280 mental and physical disorders and (80%) of the people to treat ailments (Tesema Tanto *et.al*, 2002)

The local flora is used practically for many aspects such as medicines, foods, and clothing (Mirutse Giday *et al.*, 2009). Ethnobotany is the study of plants and their practical uses through indigenous knowledge of local people and culture (Mac Donald 2009). Investigating plants' use by indigenous societies is referred to as Ethnobotany (Posey, 1999). Quanaash (1998) define indigenous knowledge as the accumulation of knowledge, rule, standards, skills, and mental sets which are possessed by local people in a particular area. The daily dependence of local people on natural resources accumulates indigenous knowledge to help people to adapt and survive in the environment they live (Thomas, 1995). Indigenous knowledge is the main source of the all ethnobotanical investigation. According to Kargioglu *et al.* (2008) the continuation of this knowledge is endangered when transmission between the older and younger generation is no longer connected.

Traditional medicine is defined as the sum total of all knowledge, beliefs and practices that are used in diagnosis, prevention and elimination of physical, mental or social imbalance rely exclusively on practical experience and observation handed down from generation to generation (WHO, 1998).

The plant biodiversity of Ethiopia is on the process of being eradicated mainly due to human induced pressures (Tesfaye Awas, 2003). The habitat destruction, deforestation for commercial

timber, encroachment by agriculture and other land uses have resulted in the loss of some thousand hectares of forest that harbor useful medicinal plants, annually over the past several decades. Medicinal plants are considered to be at conservation risk due to over use and destructive harvesting of root and bark collection which may kill the plant (Zemedede Asfaw, 2001). In investigating medicinal plants and indigenous knowledge on sustainable use and management of plant resources, the lack of conservation actions and activities is observed in Boji Chokorsa district, which is similar to other areas in Ethiopia. The current plant use trend shows that the environment is facing problems of resource depletion and loss of indigenous knowledge like other areas of the country. Thus, the current study was initiated with attention to add new information concerning indigenous knowledge on use, threat and management of medicinal plants by people of Boji Choqorsa district.

1.2 Statement of the problem

Medicinal plants that play a vital role in treating various human and livestock ailments are under pressure due to anthropogenic and natural factors like environmental degradation, agricultural expansion, deforestation and urban development (Ensermu Kalbessa *et al.*, 1992). Indigenous knowledge is the main sources of all ethnobotanical investigations and is generally called as traditional ethnobotanical knowledge (TEK). However, the continuation of this knowledge is endangered because transfer of knowledge is not interrupted (Kargiogl *et al.*, 2008). Due to modernization and absence of stimulation to use traditional medicine knowledge of traditional medicine is getting to lost . In the study area, the youth have no awareness to know the use of medicinal plants and a lot of invaluable information could be lost whenever traditional medicinal practitioners die without sharing their knowledge to others. Besides, some religious beliefs had negative role on conserving medicinal plants as they link with evil work (Dawit Abebe, 2001). The study was conducted in view of bridging the knowledge gap between the elder and the younger generation.

1.3 Research Questions of the study

Based on the objectives of the study, the research finding was planned to answer the following questions:

- What are medicinal plants used to treat both human and livestock ailments in Boji Chokorsa district?
- How do the indigenous people of Boji Chokorsa district use and manage medicinal plants?
- What contributions are granted for sustainability of traditional ecological knowledge of medicinal plants in Boji Chokorsa district?

1.4 Objectives of the study

1.4.1 General Objective

To assess use and management of medicinal plants and associated indigenous knowledge plants in Boji Chokorsa District

1.4.2 Specific objectives

- To identify medicinal plants used for treatment of human and livestock ailments.
- To assess indigenous knowledge of the people on medicinal plant uses in the area
- To assess management and conservation measures practiced in the study area.

1.5 Significance of the study

The study on documentation, use and management of medicinal plants by indigenous people in Boji Chokorsa district may help people to act on problems associated to conservation of threatened medicinal plants. Moreover the documentation of the indigenous knowledge on medicinal plant might use as a source of information for further research in ethnobotany predominantly in etnomedicine.

2. LITERATURE REVIEW

2.1 Origin and development of ethnobotany

Ethnobotany is a broad term and defined as the study of direct relations between humans and plants (Martin, 1995; Balick and Cox, 1996). According to Cotton (1996) it involves an interdisciplinary approach encompassing the fields of botany, chemistry, pharmacology and anthropology. Posey (1999) explained indigenous knowledge on plants appeared when humans started and learned how to use plants. Indigenous people have developed their own local knowledge of medicinal plants (Ensermu Kalbessa *et al.*, 1992).. Mac Danald (2009) stated that the investigation of plants and their uses is one of the most primary human corners and has been practiced by all culture. The complex knowledge, beliefs and practices generally known as indigenous knowledge (IK) develops and changes with time and space, with change of resources and culture.

Ethnobotany investigation documents the knowledge on cultural interactions of people with plants. Balick and Cox (1996) tried to find out how local people have traditionally use plants for various purposes, and how they incorporated plants into their cultural tradition and religions. Therefore, traditional local communities worldwide have a great deal of knowledge about native plants on which they intimately depend (Zemedede Asfaw, 2001).

2.2 The traditional use of Medicinal plants

Traditional medicine was used practically for hundreds of years before the development of modern scientific medicine and is still in use today without much documented evidence of adverse effects (Okigbo and Mmeka, 2006). Sofowora (1993) explained in Africa, traditional medicine is a part of the people's culture despite the fact that this form of medicine is not as well organized as, other countries such as India and China. Practitioners include herbalists, bonesetters, village midwives or traditional birth attendants (TBAs), traditional psychiatrists, herb sellers, and other specialists.

Friis (2009) studied that the size of the Ethiopian flora is estimated at 6,000 taxa of vascular plants about 10% are believed to be endemic. Of these, about 1,000 species of plants are used in the traditional health care system to treat nearly 300 mental and physical disorders (Zemedu Asfaw, 2001)).

According to Dawit Abebe (2001), traditional remedies are the most important and sometimes the only source of therapeutics for nearly 80% of the population and 95% of traditional medicinal preparation in Ethiopia is of plant origin. According to Sofowora (1993), about 60-85% of the population in every country of the developing world has to rely on traditional medicine. The practice of traditional medicine is widespread in China, India, Japan, Pakistan, Sri-Lanka and Thailand. In china, about 40 % of the total medicinal consumption is attributed to traditional tribal medicines (Heinrich, 1998). Ethiopia is also a country, which uses traditional medicine. Plants have been used as a source of medicine in Ethiopia from time immemorial to treat different ailments due to its long history, and traditional medicine has in fact become an integral part of culture (Abbink, 1995). In Ethiopia, traditional medical practices and remedies are recorded in oral tradition and in early medico-religious manuscripts and traditional pharmacopoeias, which, according to the estimates of some historians, date back to the 15th century AD (WHO, 2001).

Traditional medicine includes a diversity of health practices, knowledge, approaches, and beliefs incorporating plant, animals, mineral based medicines, manual techniques , spiritual therapies,

and exercise, applied singly or in combination to maintain well-being, as well as to treat, diagnosis, or prevent illness (WHO, 2001). In Ethiopia, plant remedies are still the most important and sometimes the only sources of therapeutics for nearly 80% of human and more than 90% of livestock population.

Traditional knowledge in Ethiopia is passed verbally from generation to generation and valuable information can be lost whenever a traditional medical practitioner passes without conveying his traditional medicinal plants knowledge (Hill, 2003). In addition, the loss of valuable medicinal plants due to population pressure, agricultural expansion and deforestation is widely reported by different scholars (Dawit Abebe, 2001; Debela Hunde *et al.*, 2004; Etana Tolessa, 2007). Hence there is a need for systematic documentation of such useful knowledge through ethnobotanical research.

2.3 Roles of Traditional medicine plants in and livestock health

Herbal remedies are part and parcel of the entire system of traditional medicine (Tesema Wondimu *et al.*, 2007). The use of plant extracts or active substance is generally believed to constitute the major part of the therapy in this system.

The majority of the traditional healers relies on traditional knowledge, practices and locally available materials (Mirutse Giday and Gobana Ameni, 2003) primarily medicinal plants to cure and prevent different diseases such as wound, rabies, abdominal pain, bleeding, leech infestation, skin diseases, lice infestation, ring worm and gastro intestinal parasites. This indicated that medicinal plants were widely used for the treatment of various diseases. In spite of its paramount important as livestock health care system, the various traditional veterinary practices remained undocumented in Africa in general as in Ethiopia in particular (Dawit Abebe and Ahadu Ayehu, 1993). Therefore, proper documentation and understanding of farmers' knowledge, attitude, and practices about the occurrence, cause, prevention and control of various ailments is important in designing and implementing successful livestock production (Tafesse Mesfin and Mekonnen Lemma, 2001)

2.4 Conservation and threats of Medicinal Plants

Mirutse Giday and Gobana Ameni (2003) studied that Ethiopia is one of the leading countries of Africa in livestock population, however, the poor health condition of the livestock has partially been responsible for the low productivity. Ethiopians traditional medicine as elsewhere in Africa is faced with problems of continuity and sustainability (Tesema Wondimu *et al.*, 2007). Among the 6000 plant species, about 800 species are employed in traditional health care system of the country, and 600 of them have been collected and identified. In Ethiopia as well as in other countries of Africa the existence of these indigenous resources are threatened. The loss of medicinal plants, loss of habitats of medicinal plants and loss of indigenous knowledge are the main cause of medicinal plants degradation (Konno, 2004). Ensermu Kelbesa *et al.* (1992) shows that there are two sources of threats to medicinal plants, man-made and natural causes. Rapid increase in production, the need for fuel, urbanization, timber production, over harvesting, destructive harvesting, invasive species, commercialization, honey cut, degradation, agricultural expansion and habitat destruction are human caused threats to indigenous plants. Likewise, natural causes include recurrent drought, bush fire, disease and pest outbreaks. According to Zemedu Asfaw (2001), medicinal plants are considered to be at conservation risk due to over use and destructive harvesting. Root and bark collection may kill the plant in harvest (Dawit Abebe and Ahadu Ayehu, 1993). Kebu Ballemie *et al.* (2004) studied the importance of the threat factors on medicinal plants firewood, charcoal, drought, agriculture, house use and trade.

Threat to indigenous knowledge on medicinal plants in the area is manifested not only due to loss of taxa. However, secrecy during collection, oral based knowledge transfer, impact of modernization, refusal from the younger generation to inherit the knowledge and unavailability of the species all resulted in accelerated rate of indigenous knowledge loss in the area. Supplementary difficulty is the system of verbal knowledge transfer dictating vernacular names of plant, mode of preparation, diseases treated and habit of the plant hardens the secrecy. Combined with these factors also age of the healers passing the knowledge i.e. old age healers provide the description with doubtful authenticity to the learners. Religious concerns also disregard traditional medicinal plants in the area, as if it is wrong fortune the healers portray to

gain business benefit. Thus, a number of combined conditions stated above resulted in overall loss of taxa and indigenous knowledge in the area. Evidently, more medicinal plants were used in the past than today (Kebu Ballemie *et al.*, 2004).

To preserve indigenous knowledge of plants use in general and of traditional medicine in particular, an ethnobotanical survey of lesser-studied socio-cultural groups is very crucial. However, in Ethiopia research and documentation on medicinal plants have been started only very recently (Ensermu Kelbessa *et al.*, 1992). When compared to the country's varied flora and the socio-cultural diversity, these studies are incomplete as medicinal plant healing systems differed from culture to culture. Hence, attention should be given to the field of ethnomedicine of the country with all necessary endeavors to have a full picture of the country's medicinal plants potentials.

It was asserted that modern education as having an impact on the medicinal plant knowledge. They pointed out students who attended modern schools are showing unwillingness to learn from their parents, which is an evidence for the gradually disappearing of traditional knowledge (Debela Hunde *et al.*, 2004). Acculturation of the young generation becomes a major threat to the continuation of traditional medicinal knowledge and practice. As elsewhere in Ethiopia, the problem is manifested in Boji Cokorsa district due to the above mentioned factors. It was pointed out that young generation has no interest to know about medicinal plants and efforts should be made to incorporate traditional medicine in school curricula so that younger people appreciate its usefulness (Mirutse Giday *et al.*, 2009).

2.5 Knowledgetransfer of medicinalplants

The most important way of transfer of indigenous knowledge on types of use of medicinal plants, mode of preparations, way of administration, traditional idea of illnesses, and methods of

diagnosis and treatment among indigenous herbal practitioners was by orally to a family member. The present knowledge transfer system followed the inheritance based transfer system where most traditional healers pass their knowledge to the elder/eldest/son/daughter (Debela Hunde *et al.*, 2006). The selection of the elect was based upon his/her good conduct and ability to keep the secret with regard to the ethnobotanical plant use knowledge (Zemedede Asfaw *et al.*, 2013). The knowledge transfer system is bounded by traditional rules and can only happen through cultural formal procedure. Most of the healers confirmed that, during transfer of the knowledge, they also received commitment. Similarly, at family level, it is restricted to the elders (men and women), followed by elder son or daughter or their trustworthy person when the mother or the father is getting old or near to die

3. MATERIALS AND METHODS

3.1 Description of the study area

The study was carried out in Boji Chokorsa district, West Wollega Zone, Oromia Region State which lies between 9° 22' N latitudes and 35° 30' E longitude. Boji Chokorsa district has 21 rural Ganga and 2 urban administrations. The district is located at 524 km from Finfinne and 83 km from Gimbi town (Zonal capital) and bounded by Boji Dermeji in north, Guliso in south, Lalo Asabi in East and Najo and Jarso districts in west (Figure 1). Boji Chokorsa district has a total land area of 34,343 ha, out of which, 71.3% is cultivated, 4.3% is grazing land, 8% is uncultivated, 5.8% is settlement area and 10.6% is the area covered by forest (Boji Chokorsa District Agricultural Office 2017)

3.1.1 Climates

The study area has the maximum, average and minimum temperature of the district is 24°C, 21°C and 18°C respectively. It has an average of 7 Months of rainfall lasting from April to November. The district has an average rainfall of 1,900mm, with actual distribution ranging from 1,800 to 2,000mm(Boji Chokorsa District Agricultural office 2017).

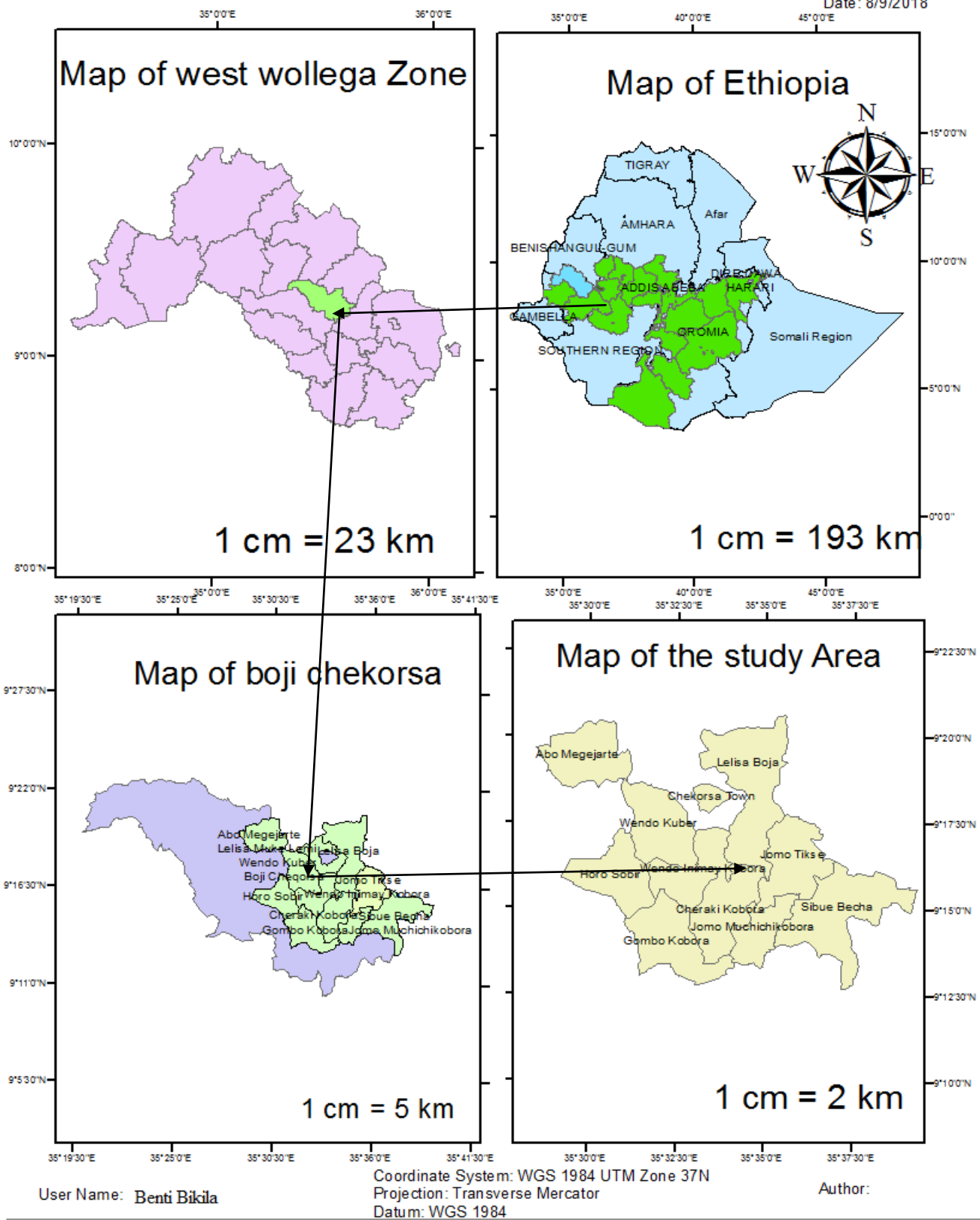


Figure :1 The map of the sdudy area

3.1.2 The status of population and disease

The total population of the study area in the year 2007 was 77,046. From this, 42,256 (54.8%) were male and 34,790 (45.2%) were female. In the area, there are about 8,223 total agricultural households of which 7,144(86.8%) are male headed and 1,076 (13.2%) are female headed (CSA, 2007). Mixed agriculture is the dominant agricultural practice in the study area. Crop production, livestock rearing, coffee production and honey production are among the most commonly used means of livelihood in the district (Boji Chokorsa District Agricultural office 2017).

The ten major diseases of the study area were Rheumatoid arthritis, gastritis, acute febrile illnesses (AFI), Tonsillitis, Typhoid Fever, Intestinal Parasites, Upper respiratory tract infection (URTI), Pneumonia, Hypertension and malaria(Chokorsa district's health office 2017).The common diseases of children under five years are Acute febrile illnesses (AFI), Tonsillitis, upper respiratory tract infection (URTI), Pneumonia and Diarrhea. Due to the cost of modern drugs the societies use traditional medicinal plants as a means of health treatment(Chokorsa district's health office 2017).

3.1.3 Livestock

Boji Chokorsa district possesses: 70,202 Cattle; 16,383 Sheep; 3,249 Goats; 61,496 Hen; 7,592 Donkey; 607 Mule; 153 Horses and 40,702 Swarm of Bees. In the district there are problems like shortage of grazing and browsing land adequate health services and facilities. Due to the cost of modern drugs the societies use traditional medicine to support this vast population of livestock, ethnoveterinary medicine. The main outbreak diseases in the study areas were Pasteurellosis, Anthrax, Blackleg, Internal parasites, seasonal internal Diseases, Foll Typhoid and Canal parasite(Chokorsa district's animal health office 2017).

3.2 Materials and Methods

3.2.1 Selection of study sites and sample

From twenty three study sites in the district ten Ganda were selected purposely based on the presence of traditional healers.

3.3 Methods

3.3.1 Field survey

Four traditional healers (from each Ganda) and totally 40 were selected using purposive sampling technique, based on the availability of practice of traditional medicine and the recommendation of knowledgeable elders and local authorities. During field survey the location and the informants were identified.

Direct personal interview was carried in January 2018 to July 2018 at ten study sites: Muki Lemi, Lalisa Boji, Wando Manajarte, Horo Sobiri, Sibub Ebicha, Jamo Tikse, Wando Kubur, Igu Kobara, Gombo Kobara and Abo Manajarte. Field surveys were performed with the help of local guiders.

3.3.2 Focus Group Discussions

From the 10 study sites 40 informants were selected, 4 individual from each sites. Informants were purposively selected based on the recommendation of knowledgeable elders, local authorities and development agents. Forty informants from different Ganda are combined and 5 groups with 8 members were formed. During discussion session with informants; the concept on conservation of medicinal plants, the preservation of the indigenous knowledge on medicinal plants, and medicinal plants use values, application, methods of preparation, diseases treated, dosage, parts used and habit were given attention.

3.3.3 Semi-structured interview

A total of 40 informants (30 males and 10 females) comprising of 4 individuals from each study sites aged between 30-90 were purposely selected from Ganda. Simple random sampling technique was used to select 15 key informants (10 males and 5 females) from the total 40 informants. Interviews and focus group discussions were taken based on check list of questions prepared beforehand in English translated to official language of the region (Afaan Oromoo). During an interview, local name of medicinal plants, parts used, disease treated, dosage, methods of preparation, adverse effects and conservation methods were recorded.

3.4 Specimen collection and identification

Medicinal plants were collected from wild and home garden. During collection time the healers showed the medicinal plant they use and gave full information about the plants including its local name. Materials such as pens, note book, knife, bags, news paper, rope, pressing wood were used to dry and preserve the specimens. The local names, habits and habitats were recorded. Preliminary identification was done in the field and the collected voucher specimens were taken to the Jimma University Herbarium. Specimen identification and confirmation were undertaken with expert by using taxonomic keys and various (1-8) volumes of the Flora of Ethiopia and Eritrea (Hedberg *et al.*, 2006; Gilbert, 1996; Friis, 1995).

3.5 Data analyses

All the analyses of collected ethnobotanical data were entered in to Excel spreadsheet 2007 and summarized using tables and bar graphs.

3.5.1 Informant consensus

In order to evaluate the reliability of information recorded during the interview, informants were contacted at least two times for the same idea and the validity of the information was proved and recorded. Consequently, if the informant deviates from the original information, it was rejected

since it was considered irrelevant information. Only the relevant ones were taken into account and statistically analyzed (Alexiades, 1996).

3.5.2 Informants consensus factor (ICF)

ICF was calculated for each category to identify the agreements of the informants on reported cures for the group of ailments.

The ICF was calculated as follows (Heinric *et al.*, 1998).

$$\text{ICF} = (\text{Nur}-\text{Nt})/(\text{Nur}-1)$$

Where: ICF = Informant Consensus Factor,

Nur = number of use citations and

Nt = number of species used.

3. 5.3 Preference ranking

Preference ranking was conducted following Martin (1995) for most important medicinal plants used in treating diseases. Fifteen informants were selected to identify the best preferred medicinal plants species used to treat diseases of humans and livestock. By clustering the response of 15 individuals, the information obtained was described.

3.5.4 Paired comparison

Paired comparison was used for evaluating the degree of preferences or levels of importance of certain selected plants/parts of plants. A list of the pairs of selected items with all possible combinations were made and sequence of the pairs and the order within each pair was randomized before every pair were presented to select unformulated and their responses recorded and total value were summarized.

3.6 Ethical Issue

All data collections were done with special care on the base of the cultural view of the local communities in the study area. Informants were informed with the purpose of the study and if any value will be obtained from the research result it will benefit the community. As a rule indigenous knowledge should be protected and a part the value generated should be transferred to the next generation. So agreement was reached on these issues and accepted by informants.

4. RESULTS

Totally 89 medicinal plant species belonging to 82 Genera and 28 families were recorded from the study area.. Most of the medicinal plants were herbs 35 (39%), followed by shrubs 27 (30%), (Table 1;Fig.2).

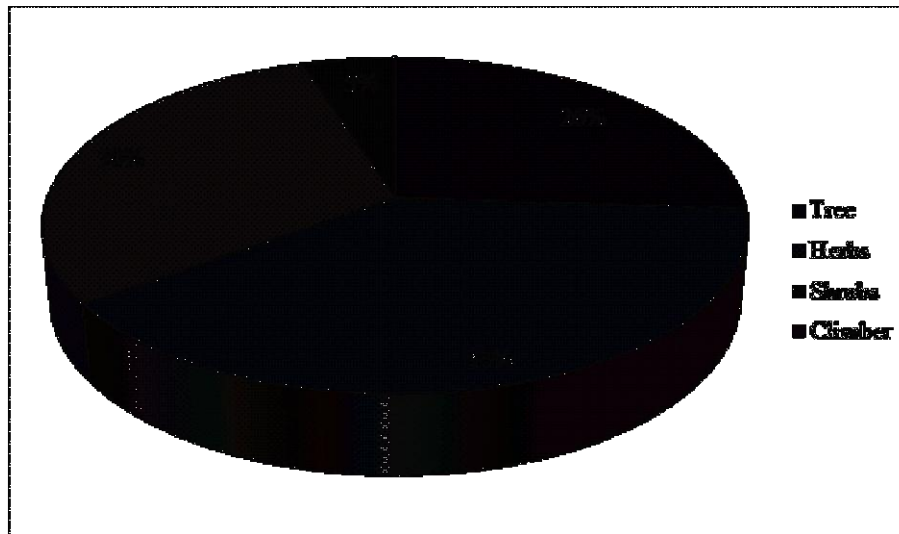


Figure :2 Growth forms of medicinal plants

4.1 Habits and habitats of Medicinal plants

Most of the medicinal plant species were collected from the wild when Compared to home gardens (Table 1; see Appendix 5).

Table 1: Habits and habitats of Medicinal plants collected from the study area

Habit	Habitat		Total
	home garden	Wild	
Tree	2	21	23
Herbs	17	18	35
Shrubs	4	23	27
Climber	2	2	4
Total	25	64	89

4.2 Families and number of Medicinal Plants

Of the species rich Fabaceae was the most abundant family followed by Asteraceae of the medicinal plant collected (Table2).

Table 2: Families and number of medicinal plants in the study area

Family	Number of Species	Family	Number of species
Fabaceae	9	Araceae	2
Asteraceae	7	<i>Zingiberaceae</i>	1
Cucurbitaceae	5	<i>Rhamnaceae</i>	1
Poaceae	4	<i>Plantaginaceae</i>	1
<i>Rutaceae</i>	4	<i>Alliaceae</i>	1
Rosaceae	4	<i>Laniaceae</i>	1
Boraginaceae	3	<i>Ranunculaceae</i>	1
Phytolaccaceae	2	<i>Resedaceae</i>	1
Combretaceae	2	Aloaceae	1
<i>Brassicaceae</i>	2	<i>Polygonaceae</i>	1
Verbenaceae	1	<i>Moraceae</i>	1
Anacardaceae	1	<i>Caricaceae</i>	1
Apocynaceae	1	Euphorbiaceae	1
Musaceae	1		

4.3 Plant parts used for remedies

Leaves and roots were the most commonly used plant parts in the preparation of remedies of the total medicinal plants (Figure 3)

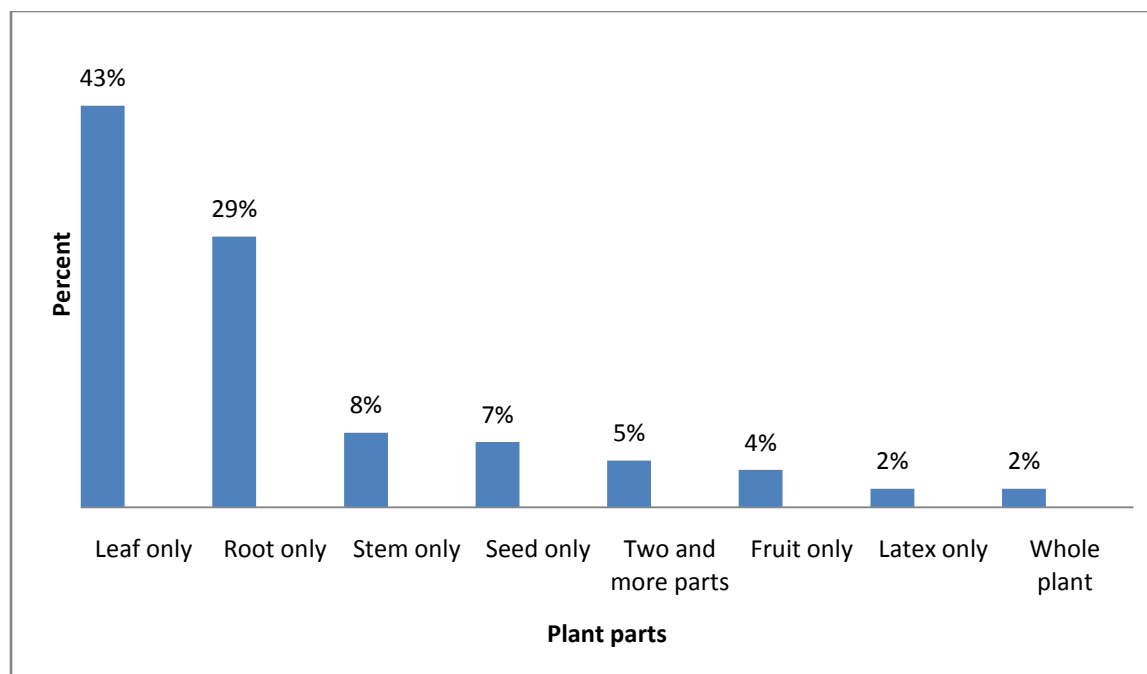


Figure: 3 Plant parts used in preparation of remedies

The result indicated that most remedies were prepared from single plant 63 (71%) and preparation from combined plant species was about 26 (29%). The result in used indicated that most of the plant part used(64%) were used in fresh form where as some plant parts were used both in a fresh and dried forms .

4.4 Remedies preparation, dosage, administration and preservation ,methods

4.4.1 Methodsof medicinal preservation

After preparation, the remedies were either used soon or preserved for later use in different types of materials (Table 3).

Table 3: Materials used to preserve remedies for latter uses

Materials	Informants	%
Dry clean container	6	15
Plastic bags	5	13
Sheet of clothes	4	11
Seal in bottles	3	7
Total	18	46

4.4.2 Remedies dosage

Concerning, the dosage of traditional medicine given in the study are were different depends on age, sex, physical strength and health condition of the user. The healers use local units such as pinch (for powdered plant medicine), finger length (for stem, bark&root) and number of latex were used to estimate and fix the amount of medicine. The healers never administer treatments that are taken internally to pregnant women and babies.

4.4.3 Remedies administration

The major route of administration of traditional medicine in the study area was taken internally and oral application was leading route followed by applying externally of which to put the medicine on dermis was common (Table 4).

Table 4: Route of administration and number of application of herbal medicine in the study area

Route of administration	Total application	%
Internal	60	67
Oral	50	56
Nasal	6	7
Eye	1	1
Ear	1	1
Anal	2	2
External	29	33
Putting (Creaming)	14	16
Washing	5	6
Rubbing	5	6
Brushing	3	3
Smoking	2	2
Total	89	100

4.4.4 Methods of medicinal preparation

The most frequently used methods of traditional medicine preparation in the study area was grinding, crashing and mixing with water (Table5). According to responses from most informants, pounding and powdering as approach permit to preserve the plant materials that were not available both in dry and rain season.

Tale 5: Methods of preparation of traditional medicine in the study area

Methods of preparation	Total preparation	% of preparation
Crushing, pounding, mixing with water	25	28
Powder vegetable drug	14	16
Chewing	12	14
Warming before fire	9	10
Boiling and inhaling its smoke	8	9
Cooked with bean	5	6
Sap collection	4	5
Latex collection	4	4
Crushing and smocked	3	3
Others	3	3
Pasting	2	2
Total	89	100

4.5 Informant consensus

Medicinal plants cited by five or more informant consensus were described. Accordingly, plant species *Allium sativum* and *Zingiber officinale* were scored by highest number of informants (Figure 4)

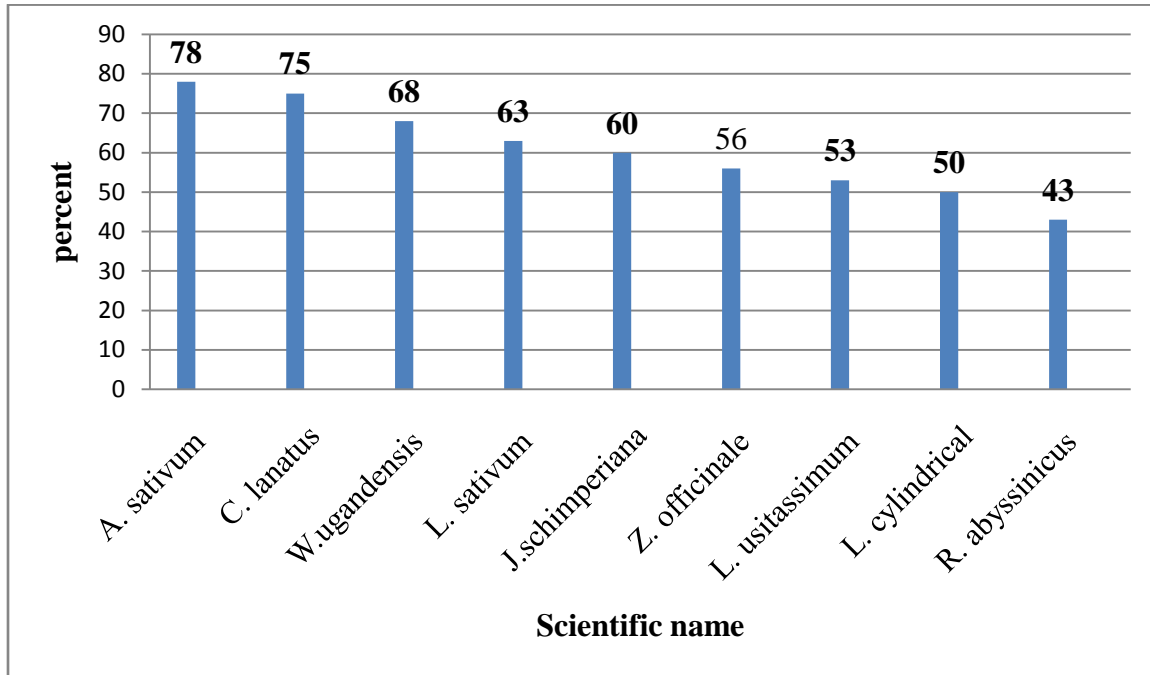


Figure:4 Informants' consensus score

4.6 Medicinal plants used to treat humans,livestock and both humans, livestock

4.6.1 Medicinal plants used to treat human ailments

In terms of plant families, the family indicated with highest number of species in treating health problem in humans was *Fabaceae* (8 species).This study showed that 56(63%) species identified were used to treat human ailments (Appendix: 7)

4.6.2 Medicinal plants used to treat livestock ailments

The plant family indicated with highest number of species in treating health problem in livestock were *Solanaceae* and *Rutaceae* (2 species) for each families. In this study 18(20%) species were identified to treat livestock ailments (Appendix 8)

4.6.3 Medicinal plants used to treat both human and livestock

All identified plant families which were used to treat health problem of both human and livestock contain single species. This study indicated that 15(17%) species identified were used to treat both human and livestock ailments Appendix 9)

4.7 Preference ranking of medicinal plants

The study showed that, *Allium sativum* to *Warburgia ugandensis* were frequently preferred by people in treating malaria (Table 6)

Table 6: Preference ranking of medicinal plants used to treat malaria.

Medicinal plant	Respondents A-H								Total	Rank
	A	B	C	D	E	F	G	H		
<i>Allium sativum</i>	5	3	2	3	5	2	1	1	21	1
<i>Zingiber officinale</i>	1	2	1	2	1	1	1	1	10	2
<i>Warburgia ugandensis</i>	2	2	1	3	4	1	1	1	15	3
<i>Carica papaya</i>	1	1	2	1	1	1	2	0	9	4
<i>Withania somnifera</i>	1	0	0	2	1	1	1	1	8	5
<i>Brucea antidysenterica</i>	2	0	1	1	1	1	0	1	7	6
<i>Entada abyssinica</i>	1	1	1	0	0	2	0	0	5	7

4.8 Medicinal plant knowledge

The result of this study indicated that 90% of informants have acquired the traditional knowledge on medicinal plants and traditional medicine from their parents and /or close relatives, while 10% have reported that they have gained the knowledge by giving certain incentives, and favors to the healers and referring written materials of traditional medicine.

4.9 Informant consensus factor(ICF)

The result of this study showed that, diseases that are frequent in the study area had higher informant consensus factor. Malaria, skin disease and stomach ache had highest ICF value (0.8) due to the occurrence of the disease in the area (Table 7)

Table 7: Informant consensus factor by category of diseases

Category	No, of spp.	No, of use citation	ICF
Malaria, skin disease, stomach ache	9	41	0.8
Tonsillitis, tooth ache, Abdominal pain, diarrhea	7	25	0.75
Wound, body itch	11	28	0.69
Common cold, hypertension	10	30	0.69
Ear and eye disease	7	19	0.67
Trypanosomiasis, internal parasite and Gonorrhoea	9	24	0.65
Anthrax, blackleg and leech bloating	13	35	0.65
Rabies, spider poison and bat poison	5	11	0.55

4.10 Priority ranking factors of threatened medicinal plants

As the information obtained from respondents in this study agricultural expansion(75%), over grazing (69%), charcoal production(63%) were the highest destructive effects (table 9): Priority ranking factors perceived as threats to medicinal plants based on their level of destructive effects: Priority ranking factors perceived as threats to medicinal plants based on their level of

destructive effects (Value 1-5) were given 1 is least destructive threat, and 5 is the most destructive threaten(Table 8)

Table 8: Priority ranking factors based on their level of destructive effects

Respondents (R ₁ - R ₁₅)	Factors									
	Agriculture expansion	Overgrazing	Charcoal production	Fire wood collection	Termite problem	Urbanization	House hold materials	Extended dry season	Medicinal plant trade	
R ₁	5	4	4	3	4	4	3	2	1	
R ₂	5	4	5	4	4	3	2	1	2	
R ₃	5	4	5	4	3	4	3	2	1	
R ₄	5	4	5	3	3	3	2	2	1	
R ₅	5	4	3	4	3	3	2	3	1	
R ₆	5	4	4	4	5	3	1	1	2	
R ₇	5	4	4	4	4	2	1	2	1	
R ₈	5	4	4	5	3	4	3	2	1	
R ₉	5	4	5	3	3	2	1	1	2	
R ₁₀	5	5	4	4	3	2	1	2	1	
R ₁₁	5	4	5	4	3	4	3	3	1	
R ₁₂	5	4	5	3	4	3	2	1	1	
R ₁₃	5	4	4	4	4	4	3	2	1	
R ₁₄	5	4	5	3	4	3	3	2	2	
R ₁₅	5	4	4	3	5	4	4	1	1	
Total	75	69	63	58	51	48	34	29	19	
Rank	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th	

5. DISCUSSIONS

In this study, a total of 89 plant species which categorize under 28 families were identified and documented during the study time. Like other parts of Africa and Ethiopia, the medicinal plants in the district are also used as remedies . This study showed that medicinal plants cure and prevent different types of diseases such as malaria, skin disease, stomach ache, tonsillitis, tooth ache, abdominal pain, and diarrhea, wound, bat poison, rabies, spider poison and evil eyes . This study is in agreement with the findings of Abebe Demissie (2004), Mirutse Giday and Gobana Ameni (2003) and Debela Hundie (2001).

. Herbaceous medicinal plant species harvested from the wild were the the dominant ones (ca. 39%), while the smallest number were climbers (ca.2.5%).The current finding is in line with the work of Etana Tolessa (2007) . From the collected medicinal plants families, the species rich families were Fabaceae (32%) and Asteraceae 7(25%). Most of the families were represented by a single species (Table 2).

Among 89 species of medicinal plants recorded, 56 species of the were used to treat human ailments while 18 speciesfor livestock and 15 species used to treat both livestock and human ailments. This finding is similar with the findings of Tafesse Mesfin and Mekonnen Lemma (2001). The study showed that, the local people reported preference for *Allium sativum* to *Warburgia ugandensis*in treating malaria (Table 6).

In the current study, different forms of preparation were investigated. Crushing, grinding and homogenizing in water takes 25(28%). This work is in agreement with the findings of Kebu .Balemie *et al.* (2004). This study indicated that most remedies were prepared from single plant 63 and preparation from combined plant species was about 26. This result was in agreement with the findings of Dawit Abebe (2001), Etana Tolessa (2007) and Debela Hundie (2001), in which

the single plant preparations were reported to be high. Leaves and the roots were the most commonly used plant parts in the preparation of remedies accounting for 38(43%) and 26(29%) respectively. The current finding is in line with the works of Mirutse Giday (1999). In the preparation of remedies most of the (64%) were used were used in fresh . Some plants could be used in both fresh and dried forms to solve problems of using the medicinal plants under different seasons . This study showed that this finding in agreement with the study of Mirutse Giday and Gobana Amani (2003) and Debela Hunde *et al* (2006)

The dosage given depends on age, sex, physical strength and health condition of the user. As it was reported, local healers use local units such as pinch (for powdered plant medicine), finger length (for stem, bark, root) and number of latex were used to estimate and fix the amount of medicine. The healers never administer treatments that are taken internally to pregnant women and babies. This study agrees with the findings of Abebe Demissie (2004), Okigbo and Mmeka (2006), Tafesse Mesfin and Mekonnen Lemma (2001).

A large amount of the plant remedies were administered internally (67%) of which an oral application was primary route (56%) or applied externally (33%), of which putting the medicine on dermal (14%) was the most. This result was in agreement with the findings of Tafesse Mesfin and Mekonnen Lemma (2001) and Zemedede Asfaw(2001) which stated that internal administration was the main way of remedies application than external application.

Most informants about (78%) prefer *Allium sativum* and *Zingiber officinale* to treat various human health problems in the study area (Figure 4). The result of this study showed that, diseases that are frequent in the study area had higher informant consensus factor. Malaria, skin disease and stomach ache had highest informant consensus factor due to the occurrence of the disease in the area. This agrees with the findings of Etana Tolessa (2007) and Friis (2009)

Medicinal plants are considered to be at conservation risk due to over use and destructive harvesting methods. The main factors on medicinal plants destruction are agricultural expansion, over grazing, firewood collection, termite problem, urbanization, charcoal production, and house use materials. The agricultural expansion was the major medicinal plant threats followed by over grazing in the study area that is in line with the work of Mirutse Giday (2001), Mathia (1996),Kebu Ballemie *et al.*(2004).

The majority of the traditional healers in this study were elder whose age group (about 35%) were 85 years old and 3% were 31 years in average. This shows that less medicinal knowledge is documented in young generation compared with those with old age. The transfer of knowledge of medicinal plants from generation to generation for selective family members is in oral and is with great secret.

From focus group discussion most informants reported that, they preserve the dried parts of the plants that used for medicinal purpose which cannot find during dry season. Also they reported that the new generations were not worry about traditional medicine and its uses.

6. CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

The number of reported medicinal plants and their uses by the local people of the Chokorsa District indicates the depth of the local knowledge on medicinal plants and their application. Age is an important factor responsible for ethnomedicinal knowledge variations with older people being more knowledgeable. Abundance of medicinal plant is declining because of anthropogenic and natural factors. The main threats to these resources emanates from agricultural expansion, overgrazing, wood extraction, termite mound and recurrent drought.

Knowledge of medicinal plants use is probably declining through failure to transfer from the elderly to the young due to information linkage among the young. Traditional medicine was preferred to modern medical systems in treating skin disease, stomach ache, Tonsillitis, diarrhea, spider poison, tooth ache, bat poison, Abdominal pain, evil eye, rabies and anthrax .

Modernization and modification of culture in the area have played an immense role on changing the attitude of younger generation to ignore the use of traditional knowledge on medicinal plants. The documented medicinal knowledge serves as a basis for future investigation of modern drug. The existence of diverse cultural traditions and belief system were found to have positive impacts on medicinal plants. For instance, some of these beliefs contribute to medicinal plant conservation as they reduce the rate of harvesting of the medicinal plants. However, they have negative impact to the regulation of indigenous knowledge of the area. Hence, currently it is vital to document, foster and augments traditional ecological knowledge and draw the attention of scientists for further scientific research in this line.

6.2 Recommendations

The donation of Ethiopian medicinal plant are lost as a result of natural resource degradation and biodiversity erosion. The resources of the traditional medicinal plants need to be conserved and transferred to the coming generation without forming a gap between the present and next generation. Based on the current finding of this study in which less medicinal knowledge were recorded in young generation the following points are suggested:

- Strengthening the capacity of the Ethiopia institution which concerned with the natural resources and Biodiversity of the country consequently medicinal plants are conserved together.
- Giving recognition to the indigenous knowledge of the people on medicinal plants, as well as traditional healers who exercise the use of plant medicine.
- The indigenous people should exercise conserving medicinal plants of the wild as well as the home garden to continue the use of these plants without declining the number of their species.
- Traditional medicinal plants are central to the indigenous cultures and material needs. So, formal and non-formal education systems should be designed to create positive attitude among the young by integrating biodiversity conservation in to the curricula.
- Establishing conservation strategies to ensure the sustainability of medicinal plants at district level.
- Training the concerning body including the local people and agricultural agents, on resource use value, management and conservation at kebele or district level by agricultural experts.
- Encouraging people to grow medicinal plants in the home gardens, mixing with crops on farm lands and live fences.
- In-situ and ex-situ conservation activities should be practiced in the district through training of farmers to ensure the continuity of medicinal plants in wild and farm land.

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APPENDICE

Appendix 1: Check list of questions or items used for semi-structured interview.

1. General information of counterpart or respondent

Sex.....Age.....Kebele.....Occupation.....

Educational status.....Religion.....

1. Do you use plants to treat disease x in your locality? _____

A/ Name of the plant.....

B/ Habitat of the plant.....

C/ Habit of the plant.....

D/ Part of the plant used.....

E/ Preparation methods.....

F/ Amount used (dose).....

G/ Application method.....

H/ Method of conservation of the plant.....

2. How do you treat human health problems? _____

3. How do you treat livestock problems? _____

4. Which plants do you use for treating those particular disease? _____

5. Used alone, mixed with other materials, concoction /decoction others _____

6. Preparation for medicinal use: crushed/ crushed and powdered/crushed pounded/ extract with cold water / boiled/ juice/latex/: other _____

Appendix 2: Check list of questions or items used for focus group discussion

1. What are the main human health problems in your locality or kebele? _____
2. What are the main livestock health problems or disease? _____
3. Does the dose differ among males, females, children, elders? _____
4. How do you preserve traditional medicines? _____
5. How do you conserve traditional medicinal plants? _____
6. How is the knowledge of traditional medicine passed to a family member/ younger generation? _____
7. How does modernization interfere with traditional medicine application and use?

10. Preference ranking _____
11. Paired comparison _____

Appendix 3: List of Medicinal plants collected from home garden & diseases treated of the study area and disease.

Code	Vernacular name	Scientific name	Family	Habit	Disease treated
BB01	Goomana.	<i>Brassica carinata</i> A.Br	Brassicaceae	H	Common cold
BB02	Paappayaa	<i>Carica papaya</i> L.	<i>Caricaceae</i>	T	Malaria
BB03	Buna	<i>Coffea arabica</i> L.	<i>Rubiaceae</i>	S	Diarrhae
BB04	Kookii	<i>Prunis persica</i> (L.) Batsch.	<i>Rosaceae</i>	T	Toothache
BB05	Qoboo	<i>Ricinus communis</i> L.	<i>Euphorbiaceae</i>	H	Rabies
BB06	Qullubbii adii	<i>Allium sativum</i> L.	<i>Alliaceae</i>	H	Malaria
BB07	Arkisa	<i>Aloe macrocarpa</i> Tod.	Aloaceae	H	Fire burn
BB08	Ancootee	<i>Coccinia abyssinica</i> (Lam.) cogn.	<i>Cucurbitaceae</i>	H	Tuber closes
BB9	Godarree	<i>Colocasia esculentun</i> (L) schott.	<i>Araceae</i>	H	Tubercloses
BB10	Reencii	<i>Caylusea abyssinica</i> (Fresen.) Fisch. & Mey	<i>Resedaceae</i>	H	Scabies (cito)
BB11	Eebicha	<i>Vernonia amygdalina</i> Del.	<i>Asteraceae</i>	S	Flariasis
BB12	Eephoo	<i>Vigna unguiculata</i> L.	<i>Fabaceae</i>	Cl	Head fungus
BB13	Jijinbila	<i>Zingiber officinale</i> Roscoe	<i>Zingiberaceae</i>	H	Influenza,Internal Parasite,treatment Malaria
BB14	Marga	<i>Cymbopogon</i>	<i>Poaceae</i>	H	Stomachach

	citaa	<i>citrates</i> (DC.)stapf.			
BB15	Geeshoo	<i>Rhamnus prinoides</i> L. Herit.	<i>Rhamnaceae</i>	S	Tonsillitis
BB16	Cilaattama	<i>Ruta chalepensis</i> L.	Rutaceae	H	Stomacache
BB17	Loomii	<i>Citrus limon</i> (L.) Burm.f.	<i>Rutaceae</i>	S	Wound
BB18	Nuugii	<i>Guizotia abyssinica</i> Lf.) class	<i>Asteraceae</i>	H	Swelling
BB19	Dhummugaa	<i>Justica schimperiana</i> (Hochst. Ex Nees) T. Anders	<i>Acanthaceae</i>	S	Headache
BB20	Shinfii	<i>Lepidum sativum</i> L.	<i>Brassicaceae</i>	H	Malaria
BB21	Qoricha mataa Bowwu	<i>Cynoglossum amplifolium</i> hochst. Ex.Dc	<i>Boraginaceae</i>	H	Head ache
BB22	Talbaa	<i>Linum usitassimum</i> L.	<i>Linaceae</i>	H	Breastulcer
BB23	Hadhoftuu	<i>Luffa cylindrical</i> (L.) Roem	<i>Cucurbitaceae</i>	Cl	Rabies
BB24	Tamboonyataa	<i>Nicotiana tabacum</i> L.	<i>Solanaceae</i>	H	Snakebite , Leech
BB59	Akakiltii adii	<i>Eucalyptus globules</i> Labill.	<i>Myrtaceae</i>	T	Influenza

Key: BB=Benti Bikila ; C=Climber; H=Herb; T=Tree ;S=Shrub

Appendix 4: List of Medicinal plants collected from wild & diseases treated

Code	Vernacular name	Scientific name	Family	Habit	Disease treated
BB25	Roqaa	<i>Psidium guajava</i> L.	<i>Myrtaceae</i>	S	Hemorrhoid
BB26	Hambaa'oo	<i>Momordica foetida</i> schumach & Thonn.	<i>Cucurbitaceae</i>	Cl	Kidneyproblem
BB27	Adaamii	<i>Euphorbia candelabrum</i> kostshy.	<i>Euphorbiaceae</i>	T	gastro-intestinal, Ascaris, Gonorrhoea
BB28	Qilxuu	<i>Ficus lutea</i> .	<i>Moraceae</i>	T	Snakebite
BB29	Asangira	<i>Datura stramonium</i> L.	<i>Solanaceae</i>	H	Wart Tooth ache
BB30	Fiitii	<i>Clematis simensis</i> Fresen.	<i>Ranunculaceae</i>	Cl	Malaria,
BB31	Ulagaa	<i>Ehretia cymosa</i> Thonn.	<i>Boraginaceae</i>	T	Toothache
BB32	Ancabbii	<i>Ocimum gratissimum</i> L.	<i>Lamiaceae</i>	S	Head ache
BB33	Qorxobbii	<i>Plantago lanceolata</i> L.	<i>Plantaginaceae</i>	H	Skin cut
BB34	Dhangaggoo	<i>Rumex abyssinicus</i> jacq.	<i>Polygonaceae</i>	H	Scabies
BB35	Hiddii saree	<i>Solanum giganteum</i> Jacq.	<i>Solanaceae</i>	H	Rabies
BB36	Reejjii	<i>Vernonia auriculifera</i> Hiern.	<i>Asteraceae</i>	S	Skin cut
BB37	Urgeessaa	<i>Premna schimperi</i> Engl.	<i>Lamiaceae</i>	S	Ectoparasite
BB38	Hoomii	<i>Prunus africana</i> (Hook.f.) Kalkam	<i>Rosaceae</i>	T	Giardiasis
BB39	Ambaltaa	<i>Entada abyssinica</i> (Steud. Ex A. Rich.)Gilb and Bort.	<i>Fabaceae</i>	T	Malaria
BB40	Baddeessaa	<i>Syzygium guineense</i> (wild.)DC.	<i>Myrtaceae</i>	T	Tooth ache
BB41	Gurra hantuutaa	<i>Vigna Vevillata</i> L.A.Rich.	<i>Fabaceae</i>	H	Spiderpoison
BB42	Biiftii	<i>Warburgia Ugandensis</i> Sprague	<i>Canellaceae</i>	T	Malaria, Stomach ache,

					Tonsilitis
BB43	Botoroo	<i>Stereospermum kunthianum</i> Cham.	<i>Bignoniaceae</i>	T	Evileye
BB44	Alaltuu	<i>Salix subserrata</i> Willd.	<i>Salicaceae</i>	T	Joint dislocation
BB45	Hadheessa	<i>Teclea nobilis</i> Del.	<i>Rutaceae</i>	T	Anthrax
BB46	Kalaalaa	<i>Stephania abyssinica</i>	<i>Menispermaceae</i>	H	Commoncold
BB47	Hiddii Sawwaa	<i>Solanum incanum</i> L.	<i>Solanaceae</i>	S	Wound
BB48	Andoodee	<i>Phytolacca dodecandra</i> L.Herit	<i>Phytolaccaceae</i>	S	Gonorrhoea
BB49	Abbayyii	<i>Maesa lanceolata</i> Forssk.	<i>Myrsinaceae</i>	S	Externalparasite
BB50	Qoricha dhibee saree	<i>Gloriosa Superba</i> L.	<i>Colchicaceae</i>	H	Rabies
BB51	Dhoqonuu	<i>Grewia ferruginea</i> Hochst.	<i>Tiliaceae</i>	S	Red hair
BB52	Somboo	<i>Ekeberiga capensis</i> sparm.	<i>Meliaceae</i>	T	Trypsis
BB53	Hanquu	<i>Embelia schimperi</i> Vatke.	<i>Myrsinaceae</i>	S	Tapeworm
BB54	Baggii	<i>Combretum paniculatum</i> Vent.	<i>Combretaceae</i>	S	Ringworm
BB55	Bakkanniisa	<i>Craton macrastachyus</i> Del.	<i>Euphorbiaceae</i>	T	Dermal
BB56	Coqorsa	<i>Cynodon dactylon</i> (L.) Pers.	<i>Poaceae</i>	H	Tonsillitis, Fresh wound
BB57	Mixoo	<i>Rytigynia neglecta</i> (Hiern.) Robyns	<i>Rubiaceae</i>	S	Baturine
BB58	Baaqelaa	<i>Vicia faba</i> L.	<i>Fabaceae</i>	H	Gastric
BB60	Qabarichoo	<i>Cartha lanatus</i>	<i>Asteraceae</i>	H	Headache, Vomiting
BB61	Faca'aa	<i>Cucumisficifolius</i> A.Rich	<i>Cucurbitaceae</i>	H	Trypsis

					(Gandi), Blackleg
BB62	Laaftoo	<i>Acacia abyssinica</i> hochstex.Benth.	Fabaceae	T	Goiter
BB63	Ceeqaa	<i>Calpurnia auria.</i>	Fabaceae	S	Skin diseases
BB64	Adaa	<i>Guizotia scabra</i> (Vis.) Chiov	Asteraceae	S	Wound
BB65	Qomonyo	<i>Brucea antdysentrica</i> Fresen	Simarobouceae	S	External parasite
BB66	Arbuu	<i>Ritchiea albersii</i> Gilg	Capparidaceae	T	Cough
BB67	Damakase	<i>Ocimum gratissimum</i> L.	Lamiaceae	S	Pain, head
BB68	Hanfaaree	<i>Buddleja polystachya</i> Fresen.	Loganiaceae	S	Eye disease
BB69	Hincinii	<i>Pavonia urens</i> Cav	Malvaceae	H	Wound
BB70	Araba Dubarti	<i>Carduus leptacanthus</i> Fresen.	Asteraceae	H	Blackleg
BB71	Qicuu	<i>Amorphophallus abyssinicus</i>	Araceae	H	Diarrhoea
BB72	Ulee foonii	<i>Hypericum revolutusam</i>	Euphorbiaceae	S	Toothache
BB73	Baala Warkee	<i>Ensete ventricosum</i> Cheesman	Musaceae	H	Stomachach
BB74	Shonkoraa	<i>Saccharum officinarum</i> L	Poaceae	S	Common cold
BB75	Kosoruu	<i>Acanthus polystachius</i> Delile	Achantaceae	S	Wound
BB76	Andoodee	<i>Phytolacca dodecandra</i> L'Herit	Phytolaccaceae	S	Herpes zoster
BB77	Kusaayee	<i>Lipia javanica</i> Burm.f.	Verbenaceae	H	Mosquito Control
BB78	Sotalloo	<i>Millettia ferruginea</i> (Hochst.)Bak.	Fabaceae	T	Tetanus
BB79	Agamsa	<i>Carissa spinarum</i> L.	Apocynaceae	S	Ascaris
BB80	Heexoo	<i>Hageniaabyssinica</i> (Brace)	Rosaceae	T	Tapeworm

BB81	Dabaqaa	<i>Combretum molle</i> R.Br.ex.G.Don	Combretaceae	T	Tongueinfection
BB82	Keelloo	<i>Bidensma pestinaria</i>	Asteraceae	H	Athletesfoot
BB83	Muka arbaa	<i>Albizia gummifera</i>	Fabaceae	T	Toothach
BB84	<i>Buqqee</i>	<i>Cucurpita pepus</i>	Cucurbitaceae	H	Tinea corporis
BB85	<i>Ulmaayii</i>	<i>Clausena anisata</i>	<i>Rutaceae</i>	S	Snakebite
BB86	Waddeessa	<i>Cordia africana</i>	Boraginaceae	T	Spiderpoiso
BB87	Xaaxessa	<i>Rhus ruspolii</i> Engl.	Anacardaceae	T	Hyena bite
BB88	Garbuu	<i>Hordeum vulgare</i> L.	Poaceae	H	Swelling
BB89	Heennaa	<i>Indigofera arrecta</i> Hochst.exA.Rich	Fabaceae	H	Spiderpoison

Key: BB=Benti Bikila ;C=Climber; H=Herb; T=Tree ;S=Shrub

Appendix 5: List of Medicinal plants in homegardens of the study area (C = Climber; H = Herb; T = Tree; S = Shrub)

Scientific name	Family	Vernacular name	Habit
<i>Brassica carinata</i> A.Br	<i>Brassicaceae</i>	Goomana.	H
<i>Carica papaya</i> L.	<i>Caricaceae</i>	Paappayaa	T
<i>Coffea arabica</i> L.	<i>Rubiaceae</i>	Buna	S
<i>Prunus persica</i> (L.) Batsch.	<i>Rosaceae</i>	Kookii	T
<i>Ricinus communis</i> L.	<i>Euphorbiaceae</i>	Qoboo	H
<i>Allium sativum</i> L.	<i>Alliaceae</i>	Qullubbii adii	H
<i>Aloe macrocarpa</i> Tod.	<i>Aloaceae</i>	Arkisa	H
<i>Coccinia abyssinica</i> (Lam.) cogn.	<i>Cucurbitaceae</i>	Ancootee	H
<i>Colocasia esculenta</i> (L) Schott.	<i>Araceae</i>	Godarree	H
<i>Caylusea abyssinica</i> (Fresen.) Fisch. & Mey	<i>Resedaceae</i>	Reencii	H
<i>Vernonia amygdalina</i> Del.	<i>Asteraceae</i>	Eebicha	S
<i>Vigna Ungiculata</i> L.	<i>Fabaceae</i>	Eephoo	Cl
<i>Zingiber officinale</i> Roscoe	<i>Zingiberaceae</i>	Jijinbila	H
<i>Cymbopogon citratus</i> (DC.) Stapf.	<i>Poaceae</i>	Marga citaa	H
<i>Rhamnus prinoides</i> L. Herit.	<i>Rhamnaceae</i>	Geeshoo	S
<i>Ruta chalepensis</i> L.	<i>Rutaceae</i>	Cilaattama	H
<i>Citrus limon</i> (L.) Burm.f.	<i>Rutaceae</i>	Loomii	S
<i>Guizotia abyssinica</i> Lf.) class	<i>Asteraceae</i>	Nuugii	H
<i>Justica schimperiana</i> (Hochst. Ex Nees) T. Anders	<i>Acanthaceae</i>	Dhummugaa	S
<i>Lepidum sativum</i> L.	<i>Brassicaceae</i>	Shinfii	H
<i>Cynoglossum amplifolium</i> hochst. Ex.Dc	<i>Boraginaceae</i>	Qoricha mataa Bowwuu	H
<i>Linum usitatissimum</i> L.	<i>Linaceae</i>	Talbaa	H
<i>Luffa cylindrica</i> (L.) Roem	<i>Cucurbitaceae</i>	Hadhoftuu	Cl

<i>Nicotiana tabacum</i> L.	<i>Solanaceae</i>	Tamboonyaataa	H
<i>Vicia faba</i> L	<i>Fabaceae</i>	Baaqelaa	H
<i>Cucurbita pepo</i>	<i>Cucurbitaceae</i>	<i>Buqqee</i>	H
<i>Hordeum vulgare</i> L	<i>Poaceae</i>	Garbuu	H
<i>Eucalyptus globulus</i> Labill	<i>Myrtaceae</i>	Akakiltii adii	T

Appendix 6: List of Medicinal plants collected from the wild (C = Climber; H = Herb; T = Tree; S = Shrub)

Scientific name	Family	Vernacular name	Habit
<i>Psidium guajava</i> L.	<i>Myrtaceae</i>	Roqaa	S
<i>Momordica foetida</i> schumach & Thonn.	<i>Cucurbitaceae</i>	Hambaa'oo	Cl
<i>Euphorbia candelabrum</i> kostshy.	<i>Euphorbiaceae</i>	Adaamii	T
<i>Ficus lutea</i> .	<i>Moraceae</i>	Qilxuu	T
<i>Datura stramonium</i> L.	<i>Solanaceae</i>	Asangira	H
<i>Clematis simensis</i> Fresen.	<i>Ranunculaceae</i>	Fiitii	Cl
<i>Ehretia cymosa</i> Thonn.	<i>Boraginaceae</i>	Ulagaa	T
<i>Ocimum gratissimum</i> L.	<i>Lamiaceae</i>	Ancabbii	S
<i>Plantago lanceolata</i> L.	<i>Plantaginaceae</i>	Qorxobbii	H
<i>Rumex abyssinicus</i> Jacq.	<i>Polygonaceae</i>	Dhangaggoo	H
<i>Solanum anguivi</i> Lam.	<i>Solanaceae</i>	Hiddii saree	H
<i>Vernonia auriculifera</i> Hiern.	<i>Asteraceae</i>	Reejjii	S
<i>Premna schimperi</i> Engl.	<i>Lamiaceae</i>	Urgeessaa	S
<i>Prunus africana</i> (Hook.f.) Kalkam	<i>Rosaceae</i>	Hoomii	T
<i>Entada abyssinica</i> (Steud. Ex A. Rich.)Gilb and Bort.	<i>Fabaceae</i>	Ambaltaa	T
<i>Syzygium guineense</i> (wild.)DC.	<i>Myrtaceae</i>	Baddeessaa	T
<i>Vigna Vexillata</i> L.A.Rich.	<i>Fabaceae</i>	Gurra hantuutaa	H
<i>Warburgia Ugandensis</i> Sprague	<i>Canellaceae</i>	Biiftii	T
<i>Stereospermum kunthianum</i> cham.	<i>Bignoniaceae</i>	Botoroo	T
<i>Salix subserrata</i> Willd.	<i>Salicaceae</i>	Alaltuu	T
<i>Teclea nobilis</i> Del.	<i>Rutaceae</i>	Hadheessa	T
<i>Stephania abyssinica</i>	<i>Mensipermaceae</i>	Kalaalaa	H
<i>Solanum incanum</i> L.	<i>Solanaceae</i>	Hiddii	S

		Sawwaa	
<i>Phytolacca dodecandra</i> L.Herit	<i>Phytolaccaceae</i>	Andoodee	S
<i>Maesa lanceolata</i> Forssk.	<i>Myrsinaceae</i>	Abbayyii	S
<i>Gloriosa superba</i> L.	<i>Colchicaceae</i>	Qoricha dhibee saree	H
<i>Grewia ferruginea</i> Hochst.	<i>Tiliaceae</i>	Dhoqonuu	S
<i>Ekebergia capensis</i> sparm.	<i>Meliaceae</i>	Somboo	T
<i>Embelia schimperi</i> Vatke.	<i>Myrsinaceae</i>	Hanquu	S
<i>Combretum paniculatum</i> Vent.	<i>Combretaceae</i>	Baggii	S
<i>Craton macrastachyus</i> Del.	<i>Euphorbiaceae</i>	Bakkanniisa	T
<i>Cynodon dactylon</i> (L.) Pers.	<i>Poaceae</i>	Coqorsa	H
<i>Rytigynia neglecta</i> (Hiern.) Robyns	<i>Rubiaceae</i>	Mixoo	S
<i>Carthamus lanatus</i>	<i>Asteraceae</i>	Qabarichoo	H
<i>Cucumis ficifolius</i> A.Rich	<i>Cucurbitaceae</i>	Faca'aa	H
<i>Acacia abyssinica</i> hochstex.Benth.	<i>Fabaceae</i>	Laaftoo	T
<i>Calpurnia aurea</i> .	<i>Fabaceae</i>	Ceeqaa	S
<i>Guizotia scabra</i> (Vis.) Chiov	<i>Asteraceae</i>	Adaa	S
<i>Brucea antidysenterica</i> Fresen	<i>Simaroubaceae</i>	Qomonyo	S
<i>Ritchiea albersii</i> Gilg	<i>Capparidaceae</i>	Arbuu	T
<i>Ocimum gratissimum</i> L.	<i>Lamiaceae</i>	Damakase	S
<i>Buddleja polystachya</i> Fresen.	<i>Loganiaceae</i>	Hanfaaree	S
<i>Pavonia urens</i> Cav	<i>Malvaceae</i>	Hincinii	H
<i>Carduus leptacanthus</i> Fresen.	<i>Asteraceae</i>	Araba Dubarti	H
<i>Amorphophallus abyssinicus</i>	<i>Araceae</i>	Qicuu	H
<i>Hypericum revolutum</i>	<i>Hypericaceae</i>	Ulee foonii	S
<i>Ensete ventricosum</i> Cheesman	<i>Musaceae</i>	Baala Warkee	H
<i>Saccharum officinarum</i> L	<i>Poaceae</i>	Shonkoraa	S
<i>Acanthus polystachius</i> Delile	<i>Achantaceae</i>	Kosoruu	S
<i>Phytolacca dodecandra</i> L'Herit	<i>Phytolaccaceae</i>	Andoodee	S
<i>Lipia javanica</i> Burm.f.	<i>Verbenaceae</i>	Kusaayee	H

<i>Millettia ferruginea</i> (Hochst.)Bak.	Fabaceae	Sotalloo	T
<i>Carissa spinarum</i> L.	Apocynaceae	Agamsa	S
<i>Hagenia abyssinica</i> (Brace)J.F.Gmel	Rosaceae	Heexoo	T
<i>Combretum molle</i> R.Br.ex.G.Don	Combretaceae	Dabaqaa	T
<i>Bidens pestinaria</i>	Asteraceae	Keelloo	H
<i>Albizia gummifera</i>	Fabaceae	Muka arbaa	T
<i>Clausena anisata</i> (Wild.)Benth	<i>Rutaceae</i>	<i>Ulmaayii</i>	S
<i>Cordia Africana</i>	Boraginaceae	Waddeessa	T
<i>Rhus ruspoli</i> Engl.	Anacardaceae	Xaaxessa	T
<i>Indigofera arrecta</i> Hochst .ex A.Rich	Fabaceae	Heennaa	H

Appendix 7: List of plant species used to treat health problems of humans in the study area.

Scientific name	Vernacular name	Route of application	Disease treated
<i>Brassica carinata</i> A.Br	Goomana	Oral	Common cold
<i>Carica papaya</i> L.	Paappayaa	Nasal	Malaria
<i>Coffea arabica</i> L.	Buna	Oral	Diarrhoe
<i>Prunus persica</i> (L.) Batsch.	Kookii	External	Toothache
<i>Allium sativum</i> L.	Qullubbii adii	Oral	Malaria
<i>Coccinia abyssinica</i> (Lam.) Cogn.	Ancootee	Oral	Tubercloses
<i>Colocasia esculenta</i> (L.) Schott.	Godarree	Oral, Nasal	Tubercloses
<i>Vernonia amygdalina</i> Del.	Eebicha	External	Flariasis
<i>Vigna unguiculata</i> L.	Eephoo	Dermal	Head fungus
<i>Rhamnus prinoides</i> L. Herit.	Geeshoo	Oral	Tonsillitis
<i>Ruta chalepensis</i> L.	Cilaattama	Oral	Stomach ache
<i>Citrus limon</i> (L.) Burm.f.	Loomii	Oral	Wound
<i>Justica schimperiana</i> (Hochst. Ex Nees) T. Anders	Dhummugaa	Oral	Headache
<i>Cynoglossum amplifolium</i> Hochst. Ex.Dc	Qoricha mataa Bowwu	Nasal	Headache
<i>Psidium guajava</i> L.	Roqaa	Dermal	Hemorrhoid
<i>Datura stramonium</i> L.	Asangira	Dermal	Toothache
<i>Clematis simensis</i> Fresen.	Fiitii	Oral	Malaria,
<i>Ehretia cymosa</i> Thonn.	Ulagaa	Oral	Toothache
<i>Ocimum gratissimum</i> L.	Ancabbii	Nasal	Headache
<i>Momordica foetida</i> Schumacher & Thonn.	Hambaa'oo	Oral	Kidney problem
<i>Cordia Africana</i>	Waddeessa	Dermal	Spider poison
<i>Combretum molle</i> R.Br.ex.G.Don	Dabaqaa	External	Tongue infection
<i>Bidens pestinaria</i>	Keelloo	External	Athletes foot
<i>Albizia gummifera</i>	Muka arbaa	Oral	Toothach

<i>Cucurbita pepo</i>	<i>Buqqee</i>	Dermal	Tinea corporis
<i>Lippia javanica</i> Burm.f.	Kusaayee	External	Mosquito Control
<i>Millettia ferruginea</i> (Hochst.)Bak.	Sotalloo	External	Tetanus
<i>Carissa spinarum</i> L.	Agamsa	Oral	Ascaris
<i>Hypericum revolutum</i>	Ulee foonii	External	Toothache
<i>Ensete ventricosum</i> Cheesman	Baala Warkee	Oral	Stomachach
<i>Saccharum officinarum</i> L	Shonkoraa	Oral	Common cold
<i>Acanthus polystachius</i> Delile	Kosoruu	Oral	Wound
<i>Acacia abyssinica</i> Hochstex.Benth.	Laaftoo	Oral	Goiter
<i>Calpurnia aurea.</i>	Ceeqaa	Dermal	Skin diseases
<i>Guizotia scabra</i> (Vis.) Chiov	Adaa	Dermal	Wound
<i>Brucea antidysenterica</i> Fresen	Qomonyo	Dermal	External parasite
<i>Ritchiea albersii</i> Gilg	Arbuu	Oral	Cough
<i>Ocimum gratissimum</i> L.	Damakase	Oral, Nasal, Dermal	Pain, headach
<i>Pavonia urens</i> Cav	Hincinii	External	Wound
<i>Combretum paniculatum</i> Vent.	Baggii	Dermal	Ringworm
<i>Craton macrastachyus</i> Del.	Bakkanniisa	Dermal	Skin cut
<i>Cynodon dactylon</i> (L.) Pers.	Coqorsa	Oral	Tonsillitis, Fresh wound
<i>Rytigynia neglecta</i> (Hiern.) Robyns	Mixoo	Nasal	Bat urine
<i>Vicia faba</i> L	Baaqelaa	Oral	Gastric
<i>Eucalyptus globulus</i> Hook.	Akakiltii adii	Nasal	Influenza
<i>Carthamus lanatus</i>	Qabarichoo	Oral	Headache, Vomiting
<i>Vernonia auriculifera</i> Hiern.	Reejjii	Derml	Skin cut
<i>Entada abyssinica</i> (Steud. Ex A. Rich.)Gilb and Bort.	Ambaltaa	Oral	Malaria
<i>Syzygium guineense</i> (wild.)DC.	Baddeessaa	External	Toothache

<i>Vigna vexillata</i> L.A.Rich.	Gurra hantuutaa	Oral	Spider poison
<i>Warburgia ugandensis</i> Sprague	Biiftii	Oral	Malaria, Stomach ache, Tonsilitis
<i>Stereospermum kunthianum</i>	Botoroo	External	Evil eye
<i>Stephania abyssinica</i>	Kalaalaa	Nasal	Common cold
<i>Phytolacca dodecandra</i>	Andoodee	Oral	Gonorrhoea
<i>Grewia ferruginea</i>	Dhoqonuu	External	Red hair
<i>Solanum anguivi</i>	Hiddii saree	Oral	Rabies

Appendix 8: List of plant species used to treat health problems in livestock

Scientific name	Vernacular name	Rout of application	Disease treated
<i>Cymbopogon citrates.</i>	Marga citaa	Oral	Stomach ach
<i>Luffa cylindrical</i>	Hadhoftuu	Oral	Rabies
<i>Euphorbia candelabrum</i>	Adaamii	Oral	gastro-intestinal, Ascaris, Gonohhorea
<i>Ficus lutea.</i>	Qilxuu	Oral	Snake bite
<i>Plantago lanceolata</i>	Qorxobbii	External	Skin cut
<i>Prunus africana</i>	Hoomii	External	Giardiasis
<i>Teclea nobilis</i>	Hadheessa	Oral	Anthrax
<i>Solanum incanum</i>	Hiddii Sawwaa	External	Wound
<i>Maesa lanceolata</i>	Abbayyii	External	External parasite
<i>Gloriosa superba</i>	Qoricha dhibee saree	Oral	Rabies
<i>Ekebergia capensis</i>	Somboo	Oral	Trypsis
<i>Cucumis ficifolius</i>	Faca'aa	Oral	Trypsis (Gandi), Blackleg
<i>Buddleja polystachya</i>	Hanfaaree	Optical	Eye disease
<i>Carduus leptacanthus</i>	Araba Dubarti	Oral	Blackleg
<i>Amorphophallus abyssinicus</i>	Qicuu	Oral	Diarrhoea
<i>Phytolacca dodecandra</i> L'Herit	Andoodee	Oral	Herpes zoster
<i>Clausena anisata</i> (Wild.)Benth	Ulmaayii	Oral	Snakebite
<i>Salix subserrata</i> Willd.	Alaltuu	Oral	Joint dislocation

Appendix 9: List of Plant species used to both human and livestock ailments.

Scientific name	Vernacular name	Rout of application	Disease treated
<i>Rhus ruspolii</i> Engl.	Xaaxessa	External	Hyena bite
<i>Hordeum vulgare</i> L	Garbuu	Oral	Swelling
<i>Indigofera arrecta</i> Hochst.exA.Rich	Heennaa	Dermal	Spider poison
<i>Premna schimperi</i> Engl.	Urgeessaa	External	Ecto parasite
<i>Hagenia abyssinica</i> (Brace)J.F.Gmel	Heexoo	Oral	Tapeworm
<i>Embelia schimperi</i> Vatke.	Hanquu	Oral	Tapeworm
<i>Rumex abyssinicus</i> Jacq.	Dhangaggoo	Dermal	Scabies
<i>Nicotiana tabacum</i> L.	Tamboonyaataa	Oral	Snakebite , Leech
<i>Guizotia abyssinica</i> (Lf.) class	Nuugii	Oral	Swelling
<i>Lepidum sativum</i> L.	Shinfii	Oral	Malaria
<i>Linum usitatissimum</i> L.	Talbaa	Oral	Breast ulcer
<i>Ricinus communis</i> L.	Qoboo	Oral, External	Rabies
<i>Aloe macrocarpa</i> Tod.	Arkisa	Dermal	Fire burn
<i>Caylusea abyssinica</i> (Fresen.)	Reencii	Dermal/External	Scabies (cito)
<i>Zingiber officinale</i> Roscoe	Jijinbila	Oral, Nasal	Influenza, Internal Parasite, Malaria

Appendix 10: The images of medicinal plants used by most healers



Fig 6: *Allium sativum*



Fig 7: *Zingiber officinale*

