



**ADAMA SCIENCE AND TECHNOLOGY UNIVERSITY
OFFICE OF GRADUATE STUDIES**

**THE USE AND MANAGEMENT OF MEDICINAL PLANTS BY
INDIGENOUS PEOPLE OF SEWENA DISTRICT, BALE ZONE,
OROMIA REGION, ETHIOPIA**

A Thesis

Submitted to the Department of Applied Biology

School of Applied Natural science

**In partial Fulfillment of the Requirement for the Degree of Master's in
Biology**

BY

GETU BIRU TESSEMA

Adama, Ethiopia

September 2017

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Adama, Ethiopia

September 2017

Approval of Board of Examiners

We, the undersigned, members of the Board of Examiners of the final open defense by Getu Biru Tessema have read and evaluated his/her thesis entitled “**The Use and Management of Medicinal Plants by Indigenous People of Sewena District in East Bale Zone, Oromia Region, Ethiopia**” and examined the candidate. This is, therefore, to certify that the thesis has been accepted in partial fulfillment of the requirement of the Degree of Master’s of science in Biology

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Acronyms and Abbreviations

ASTU	Adama science and technology university
BC	Before Christ
Fic	Factor of informant's consensus
FLI	Fidelity level index
IK	Indigenous knowledge
SDAO	Sewena District Agricultural office
SDHO	Sewena District Health office
TM	Traditional Medicine
TMPs	Traditional medicinal plant species
WHO	World Health Organization

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Abstract

An ethnomedicinal study of medicinal plants used by local people of Sewena district was conducted from September 2016 to June 2017. The study focused on determination and documentation of the traditional medicinal uses and management of various plants, of the study area. The data were gathered from indigenous people, local healers and knowledgeable elders of the study area. Ninety-three informants (80 males and 13 females) aged above 20 years were randomly selected from four field areas. Ethnobotanical data were collected by using semi-structured interview, field observation and focus group discussion. Preference ranking, direct matrix ranking and fidelity level index were used for data analysis. Forty two medicinal plants were collected and studied for their medicinal uses, identified and distributed in 39 genera and 29 families. Fabaceae, Solanaceae and Asteraceae were recorded 4 species each. A large number 27 (64.28) of medicinal plants was collected from wild whereas from 13 (30.95%) cultivated area and 2 (4.76%) occur both in the home gardens and wild. About 27 (64.28 %) of medicinal plants were reported for treatment of human ailments, 5 (11.9 %) livestock ailments and 10 (23.8 %) both human and livestock ailments. In the study area, leaves 14 (33.3%) and roots 9 (21.42%) were the two frequently utilized plant parts for preparation of remedies. The most widely used method of preparation was crushing which accounted for 15 (35.7%) of traditional medicine in the study area. The large numbers of the medicinal plants, 30 (71.42%), were cited to be used in fresh form, few were used in dry. The most common mode of administration was found to be oral 21 (50 %) and dermal 17(41%) respectively. Analysis of preference ranking showed, *Allium sativum* was the most preferred medicinal plant by people of the study area to treat gastrointestinal problem. Some medicinal plants are popular than others in treating various diseases. Concerning informant consensus factor, the highest Fic values were linked to problems associated with Malaria and Headache (0.875), followed by gastrointestinal disorder (0.79) and animal poisonous (0.76). The lowest Fic value was linked with respiratory tract infection (0.44). Drought, overgrazing and deforestation were reported to be the major threats to medicinal plants. The success of conservation and sustainable use of resources largely depends up on the understanding of local people and accepting of the concept, hence local community must be taught and, involved in conservation and management of plant resources.

Keywords: Indigenous knowledge, Medicinal plants, Traditional medicine, Sewena district

1. INTRODUCTION

1.1 Background of the study

A medicinal plant is any plant, which, in one or more of its organs, contains substances that can be used for therapeutic, pharmaceutical, cosmetic and nutritional application which include foods, drinks and spices. They have been indispensable sources of both preventive and curative traditional medicine preparations for human beings and livestock. Traditional medicine is the sum total of knowledge, skills and practices based on the theories, beliefs and experiences indigenous to different cultures, that used to maintain health, as well as to prevent, diagnose, improve or treat physical and mental illnesses (WHO, 2010).

Over centuries, indigenous people have developed their own local and specific knowledge on plant use, management and conservation (Cotton, 1996). The utilization of plants in the health care system was established as the principal means of treating various illnesses before the development of modern drugs (Dawit Abebe, 2001). According to WHO (2010), report nearly 70-80% of the world population depends on herbal medicine. Especially in developing countries like Asia, Africa and Latin America, about 80% of the human population and 90% of livestock rely on traditional medication. However, the traditional medical systems are characterized by variations in ecological difference of the countries' biodiversity, socio cultural backgrounds of different ethnic groups and historical developments that related to migration, introduction of foreign culture and religion (Balick and Cox, 1997). It is practiced throughout the world, and depends on locally availability natural resources and indigenous knowledge (Tesfaye Awas and Sebsebe Damissew, 2009).

In Africa including Ethiopia, using traditional medicinal plants is common and forms the backbone of traditional medicine. The majority of Ethiopians still depend on traditional medicine; this is due to incomplete coverage of modern medical system, shortage of pharmaceuticals and unaffordable prices of modern drugs. The problem of ensuring the equitable distribution of modern healthcare has become more serious, as the gap between supply and demand has continued to widen (Pankhurst, 2001).

Ethiopia, is a country characterized by a wide range of climate and ecological conditions, possesses enormous diversity of fauna and flora (Pankhurst, 2001). The country possesses a wide range of potentially useful medicinal plants, more extensive indeed than available in many other parts of the

world. There are a huge number of medicinal plants in Ethiopia; the size of the Ethiopian flora is estimated at 6500-7000 of vascular plants of which about 10% are believed to be endemic (Friis, 2009). Of these, about 1000 identified medicinal plant species are reported in the Ethiopian Flora, however, many others are not yet identified.

According to Ermias lulekal *et al.* (2008), there is a considerable global interest in tapping the accumulated knowledge of traditional medicine Ethiopia, and therefore, researches are being carried out in many countries with the aim of increasing the use of traditional medicine to the welfare of the human population. The knowledge of medicinal plants is normally passed orally from one generation to the next. Thus, concerted ethnobotanical research plays a vital role to draw information on plants and related indigenous knowledge for conservation and sustainable utilization. In order to pass the knowledge to the next generation the medicinal plants and the indigenous knowledge can be the basis for the invention of modern drugs.

Recently, some studies on ethnobotany and ethnomedicine were done on some localities of Ethiopia (Tesfaye Awas and Sebsebe Damissew, 2009). Nevertheless, no study was done to include medicinal plants and indigenous knowledge of the local communities of Sewena district. Among rural communities of Sewena as would be the case elsewhere, traditional medication is believed to be an important health care system, which mainly involves the use of locally available medicinal plants. However, such knowledge and practices, and plant resources may be threatened due to anthropogenic and other natural factors. Similar to other parts of Ethiopia, conservation and management practice appears to be poor. Therefore, the aim of this study was to document indigenous knowledge on the use and management as well as to investigate the threats to traditional medicinal resources of Sewena district.

1.2 Statement of the Problem

Medicinal plants have got recognition and gained a lot of acceptance worldwide due to their high therapeutic worth, fewer side effects, and economic value (Gupta *et al.*, 2010). Some current research paper revealed that a large number of these plants have long been in use by local people in Ethiopia; however, many of them are lacking modern scientific investigations. It has been widely claimed that about 80% of Ethiopian population rely on traditional medicine (Geleta Bekele *et al.*, 2015). The importance of medicinal plants and traditional health systems in solving the health care problems of the world is gaining increasing attention. Hence, the focus of this study is determining and documenting the use and management of various traditional plants that are used by Sewena district local communities.

1.3 Objectives of the study

1.3.1 General Objective

To determine and document the indigenous knowledge of Sewena district local people on medicinal plant species.

1.3.2 Specific objectives

The specific objectives of the study are to:

- Collect, identify, and document the major traditional medicinal plants used to treat human and livestock health problems.
- Identify plant part(s) used for medicinal purposes, their methods of preparation and their ways of administration.
- Identify threat to medicinal plant species
- Investigate challenges of the medicinal plant species in conservation and management within the study area.
- Assess the role of local people in conservation of medicinal plants.

1.4 Research questions

The finding of the study tries to answer the following research questions.

- What are medically important plant species used by indigenous people of sewena district?

- Which parts of the plants are used?
- What types of diseases are common and treated by these plant species?
- How does the community obtain and use the plant species to treat their own health problems and livestock ailments?
- What are the major threats of medicinal plants in Sewena district?
- What are the challenges of medicinal plants conservation in the Sewena district?
- How is the status of the medicinal plants in Sewena district?

1.5. Scope of the study

This study was carried out to determine and document the use and management of traditional medicinal plants, which are used by the local people in Sewena district, Bale zone of Oromia Regional State. Since it was difficult to cover the whole aspect of the study area with the available time, transport and resources, the study was limited to only to Ardagelma, Adele, Cophi and Micha kebele administration in the district.

1.6. Limitation of the study

In this study, it was difficult to get basic information easily during data gathering. Because informants refused to provide any information, even though a great effort was made to convince the importance of this documentation especially at the beginning. The main reasons of refusal of informants were lack of confidence on investigators and insufficient reward for share of their knowledge. The lack of internet access and transportation was another major challenging problem.

1.7 Significance of the study

Recently, some studies were conducted on some localities of Ethiopia. Nevertheless, no study was conducted to include medicinal plants and indigenous knowledge of the local communities of Sewena district. The finding of this study is help people of the study area to be aware of problems associated with medicinal plants and gives attention for the threatened medicinal plants. In addition, little information on the documentation of the indigenous knowledge on medicinal plants can be available part of the information source for those who want to conduct further research in ethnomedicine of the district.

2. LITERATURE REVIEW

2.1. History of plant based traditional medicine

Plants have formed the basis of sophisticated traditional medicine (TM) practices that have been used for thousands of years by people in China, India, and many other countries. Historical accounts of 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 (Dery *et al.*, 1999). Some of the earliest records of the usage of plants as drugs are found in the Artharvaveda, which is the basis for Ayurvedic medicine in India (dating back to 2000 BC), the clay tablets in Mesopotamia (1700 BC), and the Eber Papyrus in Egypt (1550 BC). Since then, the major system of traditional medicine, this originated from ancient China not only in China but also in neighboring countries such as Japan, the Republic of Korea and Vietnam (WHO, 2008). Nowadays plants are still important sources of medicines, especially in developing countries that still use plant-based TM for their healthcare.

The use of medicinal plants as a source for relief from illness can be traced back over five millennia to written documents of the early civilization in China, India, and the Near east, but it is doubtless on an art as old as mankind (Mohsenzadeh, 2007). Natural products perform various functions and many of them have interesting and useful biological activities. There are more than 35,000 plant species being used in various human cultures around the world for medicinal purpose (Philip *et al.*, 2009).

In Ethiopia, traditional medicine has also drawbacks as various authors stated (Amare Getahun, 1976; Sofowora, 1982 and Dawit Abebe, 1986) lack of precision in standardization is one drawback for the recognition of the traditional healthcare system. Although plants have been used as source of medicine to treat both human and livestock ailments in Ethiopia, research and documentation on medicinal plants have been started only very recently (Mesfin Tadesse and Sebsibe Demissew, 1992).

2.2 Indigenous knowledge (IK)

Indigenous Knowledge (IK) is knowledge that is unique to a given culture or society. It is the basis for local-level decision making in agriculture, health care, food preparation, education, natural resource management, and a host of other activities in rural communities (WHO, 2001).

Indigenous knowledge refers to the accumulation of knowledge, rule, standards, skills, and mental sets, which are possessed by local people in a particular area (Quanash, 1998). It is a body of knowledge built up by a group of people through generations of living in close contact with nature and it is cumulative and dynamic. It was believed to be the result of many generations' long year experiences, careful observations and trial and error experiments that early humans acquired the knowledge on the utilization of plants for disease prevention and curative purposes (Sofowora, 1982; Martin, 1995). Therefore, the knowledge and application of traditional medicine is one of the widely used indigenous knowledge systems. This implies that humans are dependent on other organisms for their life. This close interaction and reliance of humans on plants is studied under the field of ethnobotany. Such knowledge, known as ethnomedicinal knowledge involves traditional diagnosis, collection of raw materials, preparation of remedies and its prescription to the patients. The documentation of traditional knowledge, especially on the medicinal uses of plants, has provided many important drugs of modern day (Balick and Cox, 1997). Indigenous knowledge on remedies in many countries including Ethiopia passes from one generation to the other verbally with great secrecy. Such secrete makes indigenous knowledge or ethnomedicinal knowledge vulnerable to distortion and in most cases, some of the lore is lost at each point of transfer. Hence, there is a need for systematic documentation of such useful knowledge through ethnobotanical researches.

2.3. Traditional medicines in Ethiopia

2.3.1 The value of traditional medicinal plants in human health

Ancient Man is known to have utilized plants as drugs for millennia. However, it is impossible to pinpoint the birth of medicine in Ethiopia; but certainly, the evolution of curative practices closely follows the path of a disease. Traditional medical practitioners mostly implement herbs, spiritual healing, bone setting and minor surgical procedures in treating disease. Ethiopian traditional medicine is vastly complex and diverse and varies greatly among different ethnic groups. Most traditional medical practices in Ethiopia rely on an explanation of disease that draws on both the

“mystical” and “natural” causes of an illness and employ a holistic approach to treatment (Bishaw Mengiste, 1991).

Under the rule of Menelik (1865-1913) Western medicine became significantly more incorporated into the Ethiopian medical system. Numerous medical envoys from abroad, starting with the Italians and Russians, were influential in building hospitals, providing medical training and participating in vaccination campaigns. However, most medical establishments primarily served the urban elites and foreign missionaries and were concentrated in the major cities (Pankhurst, 2001).

Despite Western medicine not becoming more widespread in Ethiopia, Ethiopians tend to rely more on traditional medicine. About 60-85% of the population in every country of the developing world has to rely on traditional medicine (Sofowora, 1982). Moreover, Western medicine has become more focused on preventative measures and people seeking curative practices still rely on indigenous medicine as the primary source for health care (Pankhurst, 2001).

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 (Pankhurst, 1965). 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.

Traditional medicine covers a wide variety of therapies and practices which vary from country to country and region to region (in some countries, it is referred to as alternative or complimentary medicine (CAM). Complementary/alternative medicine often refers to traditional medicine that is practiced in a country but is not part of the country's own traditions. These days the term “Alternative Medicine” became very common in western culture, it focus on the idea of using the plants for medicinal purpose (Singh, 2015). Nevertheless, the current belief that medicines that come in capsules or pills are the only medicines that we can trust and use. Even so, most of these pills and capsules, we take and use during our daily life came from plants. Medicinal plants frequently used as raw materials for extraction of active ingredients, which used in the synthesis of different drugs. Like in case of laxatives, blood thinners, antibiotics and antimalaria medications, contain ingredients from plants (Singh, 2015). Medicinal plants have many characteristics when used as a treatment as follow:

- Synergic medicine- The ingredients of plants all interact simultaneously, so their uses can complement or damage others or neutralize their possible negative effects.
- Support of official medicine- In the treatment of complex cases like cancer diseases the components of the plants proved to be very effective.
- Preventive medicine- It has been proven that the component of the plants also characterize by their ability to prevent the appearance of some diseases. This will help to reduce the use of the chemical remedies which will be used when the disease is already present i.e., reduce the side effect of synthetic treatment.

2.3.2 Ethno-veterinary medicinal plants

Veterinary traditional medicines are locally available and cheaper than the standard treatments because of this livestock holders can prepare and use homemade remedies with minimum expense (Tafesse and Mekonnen, 2001). In addition, due to relatively few veterinarians and shortage of other facilities, traditional medicinal plants are the only choice to treat many ailments in developing countries like Ethiopia (Tena Regessa, 2008).

In Ethiopia as well as in most developing countries, animal diseases remained one of the principal causes of poor livestock performance, leading to an ever-increasing gap between the supply and demand for livestock products. The poor health condition and of its livestock has partially been responsible for the low productivity (Mirutse Giday and Gobena Ameni, 2003).

The finding of (Kebu Belami *et al.* 2004), indicated that some livestock problems are treated by more than one medicinal plants species. 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 (TafesseMesfin and Mekonnen Lemma, 2001).

2.4 Medicinal plants as the base for development of modern drugs

Medicinal plants belong to a big plant group with a great interest due to its pharmaceutical, cosmetic and nutritional application and are the base for the development of new drug and the survival of until human kind as well as other livestock. The potential of higher plants as source for new drugs is still largely an explored. Among the estimated 250, 000- 500,000 plant species only a

small percent ages has-been investigated. Of these, only about 6% have been screened for biologic activity, and a reported 15% have been evaluated photochemical (Ramor and Ponnampulam, 2008).

Various modern drugs were extracted from medicinal plants through the use of plant material as indigenous cure in folklore or traditional system of medicine (Verma and Singh, 2008) and it is believed that half of the top 25 best-selling medicine in the world originate from natural materials including plant materials (Ohigashi, 2008).

The present activities of international organizations in the field of traditional medicine, like WHO in designating the world in six regional zones (African, American, South-east Asian, European, western Mediterranean, Western pacific), and providing a technical and financial supports, are the most encouraging system to collect, describe and investigate the medicinal plants at institutional level. However, the effort to provide public acceptance and ascertain scientifically remained to minimum in developing countries.

Ethiopia is a rich source of medicinal plants. However, the knowledge and use of plant is an integral part of many ethnic rural cultures, the extent of which has not yet been studied in depth (Abbink, 1995). Perhaps the best-known species is *Phytolacadodecandra*. Extracts of the plant, commonly known as endod, are used as an effective molluscicide to control shistomiasis (AkliluLemma *et al.*, 1984).

2.5 Threats to medicinal plants

Environmental degradation, agricultural expansion, loss of forests and woodlands, over-harvesting, fire, cultivation of marginal lands, overgrazing and urbanization appear to be the major threats to the medicinal plants of Ethiopia. Such a threat poses a significant threat to the future well-being of the human and animal populations that have for generations, relied on these resources to combat various ailments. Changing of cultures, habits and lifestyles further aggravate the situation (EnsermuLulekal *et al.*, 1992). The current loss of medicinal plants and the associated indigenous knowledge in Ethiopia is due to natural and anthropogenic factors (Giday Yirga, 2010 and Ermias lulekal *et al.*, 2008).

2.6 Conservation of Medicinal Plants

Ethiopia has polices and strategies that support the development and utilization of plant resources in a sustainable manner. The polices are reflected under various sectors including environmental

protection, development of the natural resources and diversification of the domestic and export commodities (Endashaw Bekele, 2007). The country also has developed policy and a guideline for intellectual property rights protection of traditional medicine. The policy encourages and promotes the appropriate use and protections of traditional medicine knowledge in Ethiopia taking into account the need of the traditional medicinal knowledge holders and the communities who benefit from the use of the knowledge. Medicinal plants fit in the development activities that support public efforts in meeting livelihood requirements.

Conservation is defined as the sustainable use of biological resources. The concept of sustainability is now seen as the guiding principle for economic and social development, particularly with reference to biological resources. Various authors gave their suggestion on how to conserve medicinal plants based on the threat they observed in their study. Awareness on the contribution of traditional medical practice towards fulfilling the primary health care needs should be created among the youth (Mirutse Giday *et al.*, 2010).

The finding of Zemedu Asfew (2006), also pointed out that, the dynamic indigenous knowledge practice for the optimization of the uses and management of plant resources particularly in Ethiopian dry land is among the key recommendations for the conservation, use and management of biodiversity.

3. MATERIALS AND METHODS

3.1 Description of the study area

3.1.1 Location

Sewena is one of the districts in the Oromia Regional State of Ethiopia. It is located in the eastern part of the Bale Zone, about 619 km southeast of Addis Ababa. It has latitude and longitude of 41°08'40"-41°14'50" E and 7°20'08"-7°32'06" N. The altitude of the study area ranges between 900m-1800 m above sea level. Micha is the town of the district, which is located at a distance of about 189 kilometers from the zonal capital town, Robe. Total land coverage of the district is about 954,336 hectares, which means 60% hectare of the land is plain, 13% sloppy, 12% gorge and the remaining 15% is other parts (Sewena district agricultural office, 2016). Sewena district bordered with Somali Regional state in the east, Rayitu district in the south, Gindhir district in the southwest, Gololcha district in northwest and Legehida in the north (Fig.1). The district subdivided into 28 kebeles administration (Sewena district agricultural office and Rural land developmental office, 2016).

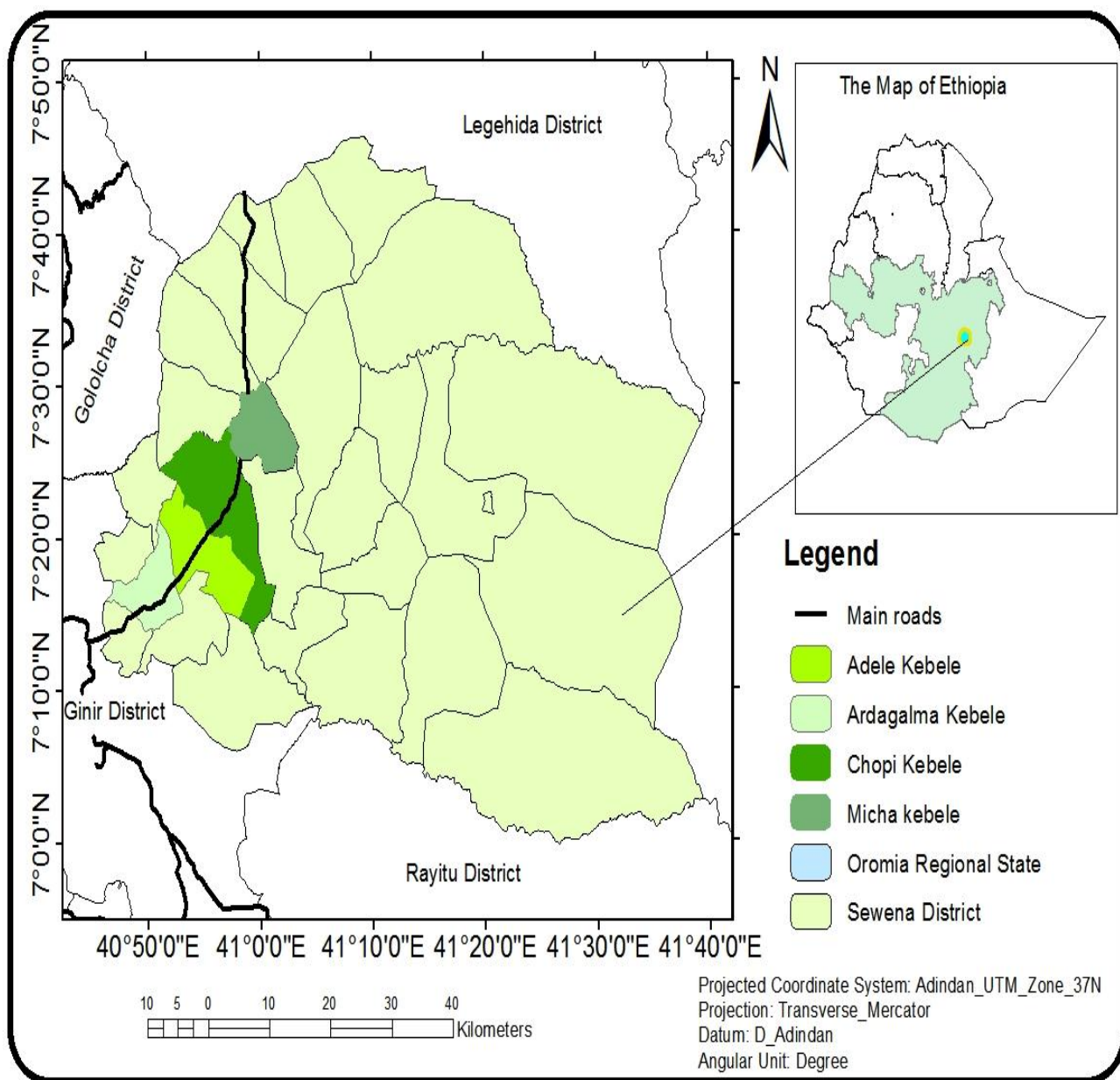
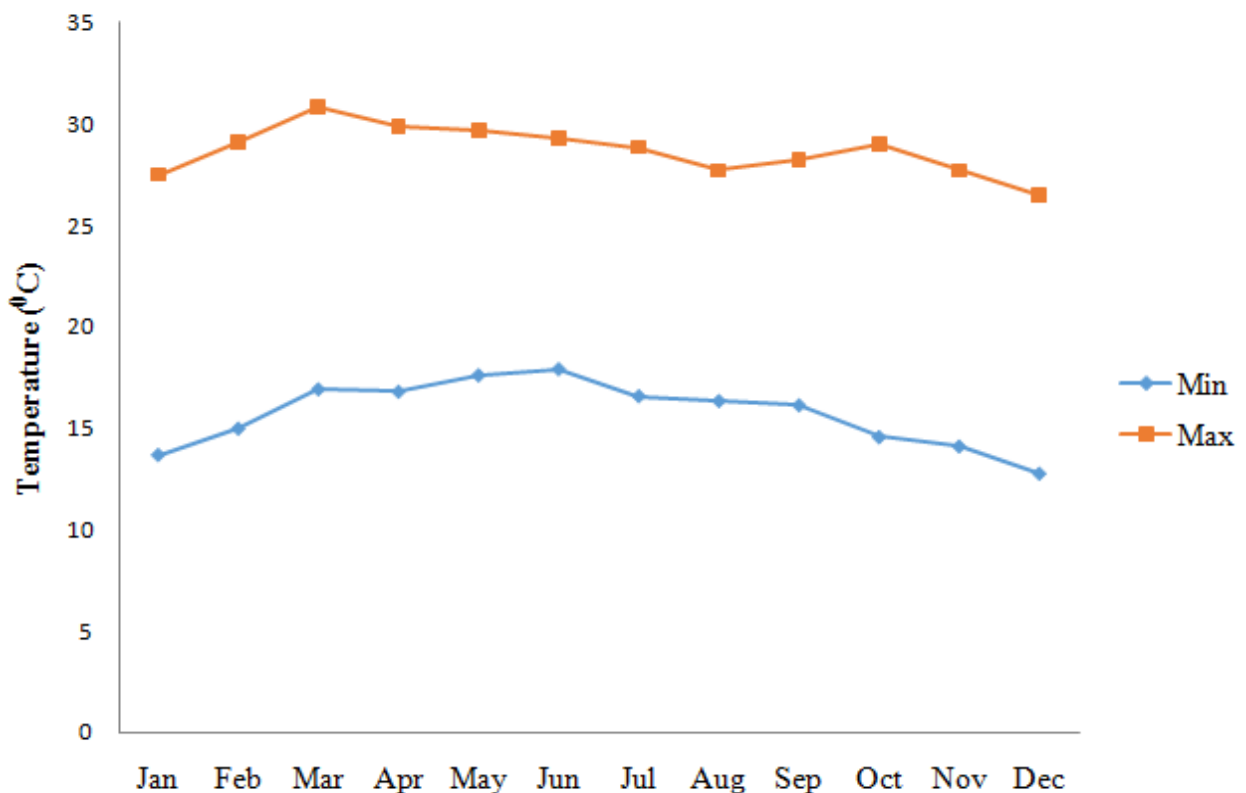


Figure 1: Map of the study area

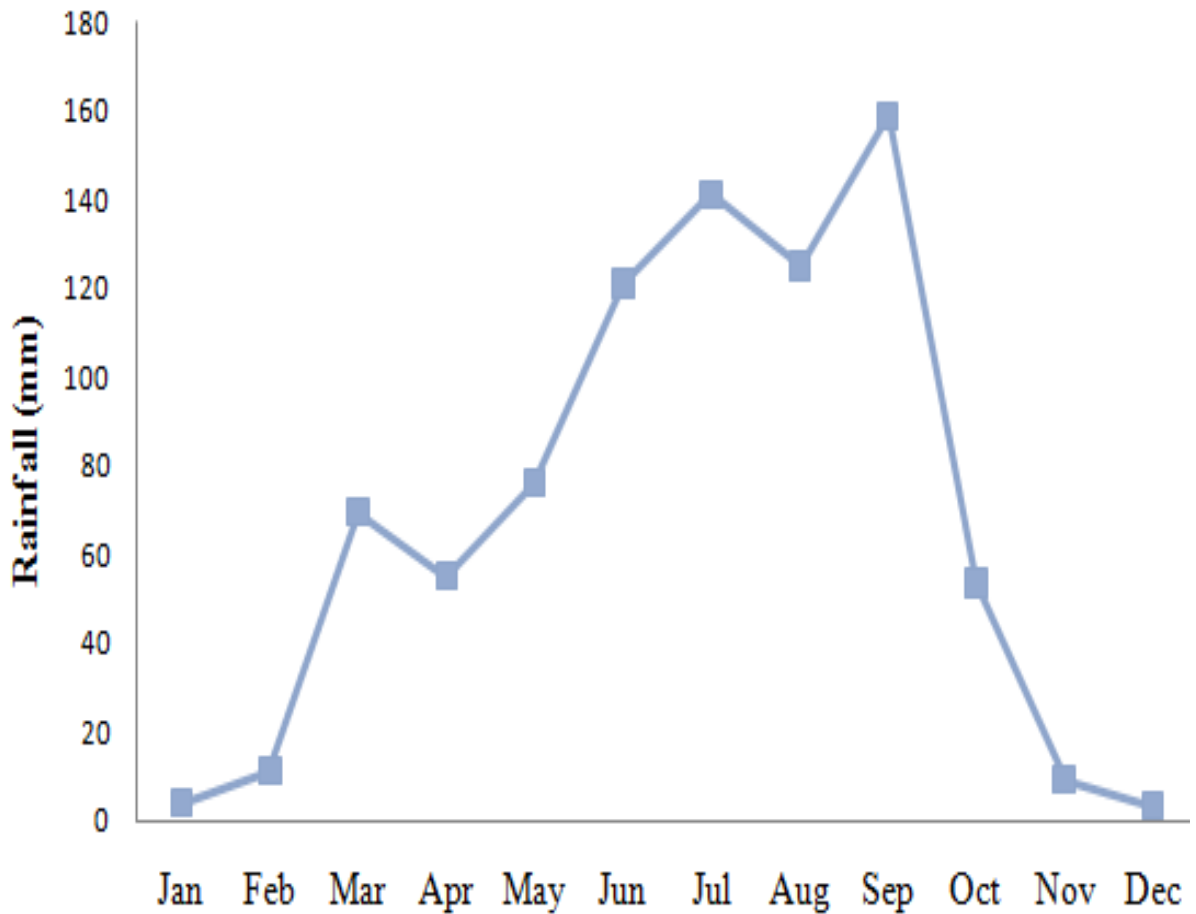
3.1.2 Climate

According to Sewena district agricultural office (SDAO, 2016), annual report showed that, the study area is grouped under arid and semi-arid climate with low and erratic rainfall. The climate of the study area is classified into two main agro climatic zones, namely lowlands that cover about 715,752 (75%) hectare and midland (middle altitude) which covers 238,584 (25%) hectare. The rainfall and the temperature condition of the area was described based on the data collected from 2012-2016 by the National Meteorological Service Agency at Bale Robe station. The annual average temperature in study area is 23°C with temperature ranging from minimum 14°C to maximum 32°C (Fig.2). Annual rainfall ranges from about (400 mm to 700 mm/year). It is characterized by bimodal rainfall i.e. have two distinct rainy seasons. The district receives high rainfall between June, July, August and September as well as relatively good amount of rainfall from March to May (Fig.3). The dry season extends from November, December, January and February.



Data Source: National Meteorological Service Agency at Bale Robe station.

Figure 2: Temperature of the study area from 2012-2016.



Data Source: National Metrological Service Agency at Bale Robe station

Figure 3: Rainfall of the study area (annual rain fall 2012-2016)

3.1.3 Soil type and vegetation cover

The major type of soils includes sandy, clay and black soils. Black soils the most fertile and suitable for agriculture. On the other hand, the latter two soil types less fertile. Tropical and sub-tropical types of climate mainly characterize the area. The type of vegetation and its distribution in the area varies mainly based on the temperature, altitude, soil type and humidity or precipitation. That is why the natural vegetation of an area is a good indicator of the areas climate condition. The population density is also an important factor for vegetation cover. The vegetation of the study area consists of various species of trees, shrubs, herbaceous vegetation, grass species and bushes. Some of the common vegetation species include *Acacia species*, *Juniperus procera*, *Cordia Africana*, *Olea*

europaea, *Calpurnia aurea*, *Dodonaea angustifolia*, *Euclea divinorum*, *Rhus natalensis*, *Carrissa spinarum* etc. Among the cultivated crops *Eragrotis teff*, *Guizotia abyssinica*, *Saccharum officinarum*, *Citrus lemon*, *Citrus simensis*, *Carica papaya*, *Nigella sativum* are among the commonly cultivated crops in the study area (Sewena District Agricultural and Rural land developmental office, 2016).

3.1.4 Human population and medical services

The total population of the district was 86401 of which 43307 are males and 43094 are females. The livelihood of the local people in the district is based on a nomadic and semi nomadic life style. Ethnically, majority of the population are Oromo, Afan Oromo is the widely spoken language, and there are few number of Somali people who live in the district. The first ten top diseases are malaria confirmed with *Plasmodium falciparum*, diarrhea (non-bloody diarrhea), pneumonia, disease of skeletal muscle system and connective tissue, infection of skin and subcutaneous tissue, acute febrile illness, helminthiasis, trauma (injure fracture), urinary tract infection and dyspepsia. In the district, 5 health stations and 30 health posts supporting these population (Sewena district health office, 2016).

3.1.5 Livestock population and land use

The district possesses 224,201 livestock population consisting of 63,351 cattle, 66,986, goats, 880, mules, 290, horses 10,840, donkeys, Camels, 21,131, sheep 42,619 and poultry, 18,104. These large number of Livestock suffer from a multitude diseases such as lumpy skin disease, tuberculosis, brucellosis, blackleg, pastuerolosis, copri pox, trypanosomiasis, cowdrosis, foot and mouth disease, mastitis, pestedes petites ruminants, external and internal parasites (Sewena district agricultural Office, 2016).

People in the study area use and classify their land through functional categorization i.e. grazing land, browsing land, agricultural land and forestland. The district is known for its livestock production. About, 87,684 hectares of land are used for grazing and for browsing land (Annual report of Sewena district agricultural office, 2016).

3.2. Reconnaissance survey and Selections of study sites

A reconnaissance survey of the study area to select study sites was carried out from September 15 to 30, 2016. The study was conducted in the Sewena district mainly in four kebeles (Micha, Cophi,

Adele, and Ardagalma) were purposively selected based on accessibility to maintain roads, information network and availability of traditional medicine practitioners.

3.3 Sources of data

The primary data were collected from Sewena district four kebele of elders, local authorities and developmental agents through data gathering methods.

3.4 Sampling procedures

From the selected four sites of the district ninety-three (80 males and 13 females) informants were randomly selected. From the four study sites 16 key informants were selected, 4 individual from each study site. Purposive random sampling method employed to select locally recognized traditional healers. The selection of traditional healers, who participated as key respondents, carried out on recommendations from local leaders, elder people, and development agents in the study kebeles. Since they were expected to have intensive knowledge about the medicinal plants. Informants aged 20 and above were included in this study. Generally, informants were grouped into three age groups, young (20–40), adult (41–60) and elderly (above 61) to see how the knowledge varies with age groups. Such choice of key informants is following the suggestion made by Martin (1995). In the identification of informants and key informants, age, gender and educational status were considered. The total number of households of each of the 4 kebeles administrations is 784 in Micha, 467 in Adele, 335 in Cophi, and 835 in Ardagalma. The sample size of the study was, therefore, determined using the method of Kothari (2004).

$$n = \frac{Z^2 \cdot P \cdot q \cdot N}{e^2 (N - 1) + Z^2 \cdot P \cdot q}$$

Where: n: is the sample size for a finite population

N = size of population which is the number of population number of households

P: population reliability; where p is 0.5, which is taken for all developing countries population.

q: expected population proportion

P+ q= 1

e= margin of error considered is 10%

Z= level of significance is 1.96

The sample size for all four kebeles administration is:

$$n = \frac{(1.96)^2 \times 0.5 \times 0.5 \times 2421}{(0.1)^2 (2421 - 1) + (1.96)^2 \times 0.5 \times 0.5} = 93 \text{ households as a sample}$$

Formula used for sample size at kebeles level is:

$$n (\text{sector}) = \frac{N (\text{sector}) \times n (\text{all sectors})}{N (\text{all sectors})}$$

Where: n (sector): is the sample size at kebeles level

N (sector) = is the household number of a kebele

n (all sectors) = is the sample size of all four kebeles

N (all sectors) = is the household number of four kebeles through which the study was conducted.

The sample size for the four kebeles is:

$$n (\text{Micha}) = \frac{784 \times 93}{2421} = 30$$

$$n (\text{Copi}) = \frac{335 \times 93}{2421} = 13$$

$$n (\text{Adele}) = \frac{467 \times 93}{2421} = 18$$

$$n (\text{Ardagelma}) = \frac{835 \times 93}{2421} = 32$$

Therefore, the desired sample obtained based on the sample size of each kebele administration.

3.5 Ethnobotanical data collection

The methods used for ethnobotanical data collection were semi-structured interviews, guided field walk with informants and focus group discussion. Ethnobotanical data collection was made from January 2017 to June 2017 to obtain the indigenous knowledge of the local people on health, vegetation, use, conservation and threats of medicinal plants and related issues.

Interview was taking place based on checklist of questions prepared beforehand in English and later translated to Afan Oromo, the language of the inhabitants (Appendix A and appendix B). During interviews, the respondents' background, namely the name, age, sex, level of education, occupation, religion, and ethnicity were recorded. Likewise, disease treated (human and livestock), diagnosis and treatment methods, local names of medicinal plant species, habitat of medicinal plant species, plant parts used, condition of plant part used (fresh/dried), methods of remedy preparation, dosage prescriptions, routes of remedy administration, detectable adverse effects, the use of antidotes, conservation and management methods were recorded.

The focus group discussion was conducted with 6 to 12 informants that were selected from local healers, elders, developmental agents and youth on the use, management, threat to medicinal plants, conservation and how the knowledge transfers to the next generation. Informant consensus was considered and both quantitative and qualitative data were collected following the interview questions (Appendix A).

Field observations (field walk) were performed with the help of local healers in study area. During observation full notes about major threats, habit and habitat of the plants were recorded on site with informants selected from local healers and interviewed informants.

3.6 Plant specimen collection and Identification

Specimen collection and identification were carried out between January 2017 to June 2017 in the study area. In each study site, sample specimens of the medicinal plants cited by informants were collected, numbered, pressed, and dried for identification. Finally, species identification was carried out at National Herbarium at Addis Ababa University.

3.7 Data analysis

Data on informants' background and medicinal plant species used in Sewena district were entered on Ms Excel spreadsheet, and the descriptive statistics was employed.

3.7.1 Descriptive statistics

Descriptive statistical methods such as percentages and frequency were employed to analyze and summarize the data on medicinal plants, use and associated knowledge.

3.7.2 Factor of informants consensus (Fic)

To analyze the cultural importance of an individual species, the reports obtained were calculated for each category to identify the agreements of the informants. The Factor informant consensus (Fic) was calculated to see the agreement of informants for a plant species in treating a particular disease using a formula, recommended by (Leonti *et al.*, 2001).

$$\text{Fic} = \text{nur-nt} / \text{nur} - 1$$

Where; Fic- Factor of informants consensus

nur- number of use reports in each category

nt-no of taxa used

A value close to 1 indicates a high intercultural consensus i.e., more healers use the same species. A value close to zero indicates a high variation in the use of species.

3.7.3 Fidelity level index

The percentage of informants claiming the use of a certain plant for the same major purpose was calculated based on the formula recommended by (Friedman *et al.*, 1986).

$$FLI (\%) = \frac{Np}{N} \times 100$$

Where; Np: Number of use-reports cited for a given species for a particular ailment

N: Total number of use- reports cited for any given species

3.7.4 Preference ranking

The preference ranking was conducted to identify the most preferred species for treating commonly reported disease. Preference ranking was done using the method applied by Martin (1995), eight key informants have been selected randomly to assess the degree of effectiveness of five medicinal plants for humans in order to identify best-preferred medicinal plants for treatment of gastrointestinal disorder. The informants were given the plants and asked to arrange the medicinal plants based on their preference of efficacy by assigning the highest value 5 for plant species most preferred, 4 for more preferred ones, 3 for moderately preferred, 2 for less moderately preferred plant species and the lowest value 1 for the least preferred plant. The values were summed up and ranked. These helped to indicate the most effective medicinal plants for gastrointestinal disorder and highly specified medicinal plants by informants.

3.7.5 Direct matrix ranking

Direct matrix exercise was employed for multipurpose medicinal plants commonly reported by informants following Martin (1995) and Cotton (1996). Based on the information gathered from the informants and collected ethnobotanical data, five most widely utilized multi-purpose plant species that are seven uses were selected and identified out the medicinal plants. The use diversities of these plants were listed for randomly selected key informants to assign use values to each species. Twelve chosen key informants asked to assign use values (5=best, 4=very good, 3 = good, 2 = less used, 1 = least used and zero = not used). The values of each species were summed up and ranked.

4. RESULTS

4.1 Background of respondents

The total numbers of informants incorporated in this study were males 80, females 13 and totally 93 informants were taken as the respondents of the study. All of the respondents were from the rural area of the Sewena district. Of the two sexes of informants, male informants took a large proportion that is 80 (86%) medicinal plant accomplisher and very few female participants 13 (14%) rarely distribute medicinal plants to their patients to cure them from their illness (Table1).

With regard to age variation, 30 informants were in between the ages 20-40 (31.25%), 40 informants were in between the ages of 41-61 (67%) and 23 (27%) informants were above the ages 61 (Table 1). Even though all the age groups mentioned above contributed a lot on medicinal plants as participants, those who were at the ages between 61 and above took the largest lion share on mentioning medicinal plants in the area this study was conducted.

With regard to their educational background, of the total 93 respondents, 60 (64.5) of them are illiterate, but 18 (19.5%) of informants have attended basic religious education (Quran) and the remaining 15 (16%) informants have attended primary schools, secondary schools and college courses (Table 2).

Table 1: Gender and Age of informants of Sewena district

Category	N _o of informants	Percentage of informants	N _o of medicinal plant reported	Percentage (%)
Gender				
Male	80	86	32	76.2
Female	13	14	10	23.8
Total	93	100	42	100
Age				
20-40	30	32.5	11	26
41-60	40	43	16	38
≥ 60	23	24.7	15	35.7
Total	93	100	42	100

Table 2: Educational level of informants in the Sewena district

Educational level	No of informants	Percentage of informants	No of medicinal plants reported	Percentage (%)
Illiterate	60	64.5	22	52.38
Quran	18	19.35	10	23.8
Primary	7	7.5	5	11.9
Secondary	2	2	2	4.76
College level	6	6.45	3	7
Total	93	100	42	100

4.2 Medicinal plants identified and distributed in the study area

In the present study a total 42 medicinal plants species, 39 genera and 29 families were identified and distributed (Appendix C). Out of the 42 medicinal plants collected in four sites, the highest number recorded in Ardagelma and the least in Adele (Table 3). The families Fabaceae, Solanaceae and Asteraceae were represented by 4 species each (9.5% each), Rutaceae contributed by 3 (7.14%) and other 27 (64.28%) families consist of 1-2 representative species.

Table 3: Number and percentage of medicinal plants in each study sites of Sewena district

Study site	No of medicinal plants	Percentage (%)
Ardagelma	12	28.57
Adele	8	19
Cophi	9	21
Micha	11	26
Total	42	100

4.2.1 Medicinal plants used to treat only human disease

Among the identified medicinal plants, 27 (64.28%) plant species, which belongs to 24 genera and 23 families, used to treat the common human disease only (Appendix D). Family Rutaceae contribute three species followed by Asteraceae and Fabaceae contributes two species (Table 4).

Table 4: Medicinal plant species used to treat human beings only in Sewena district

Family	Number of plant species	Disease treated	Percentage (%)
<i>Actinopteridaceae</i>	1	Wound	3.7
<i>Amaranthaceae</i>	1	Lengthy of menstruation cycle	3.7
<i>Anacardiaceae</i>	1	Lengthy of menstruation cycle	3.7
<i>Apiaceae</i>	1	Evil eye	3.7
<i>Asteraceae</i>	2	Retained placenta	7.4
<i>Boraginaceae</i>	1	Toothache, sudden sickness	3.7
<i>Brassicaceae</i>	1	Malaria, Febrile	3.7
<i>Caricaceae</i>	1	Gastritis	3.7
<i>Celastraceae</i>	1	Cough	3.7
<i>Colchicaceae</i>	1	Hemorrhoid	3.7
<i>Convolvulaceae</i>	1	Urine retention	3.7
<i>Cupressaceae</i>	1	Skin infection	3.7
<i>Euphorbaceae</i>	1	Headache	3.7
<i>Fabaceae</i>	2	Stomachache, toothache, skin rash	7.4
<i>Lamiaceae</i>	1	Eye problem	3.7
<i>Myrtaceae</i>	1	Toothache	3.7
<i>Oleaceae</i>	1	Kidney problem, Liver problem, Heart problem, Pancreatic problem	3.7
<i>Poaceae</i>	1	Common cold	3.7
<i>Ruscaceae</i>	1	Ascariasis, Tape worm	3.7
<i>Rutaceae</i>	3	Common cold	11
<i>Sapindaceae</i>	1	Lymph swelling, Wound	3.7
<i>Scrophulariaceae</i>	1	Vomiting	3.7
<i>Solanaceae</i>	1	Toothache, spider poison, skin rash	3.7
Total	27		100

4.2.2 Medicinal plants used to treat livestock ailments only

Five medicinal plant species that belongs to five genera and five families (i.e. Asparagaceae, Asteraceae, Fabaceae, Solanaceae, Vitaceae) were collected and identified to treat livestock ailments only in the study area (Table 5). Medicinal plant species used to treat common disease of livestock only (Appendix E).

Table 5: Families of medicinal plants used to treat livestock only in Sewena district

Family	No of plant specie	Disease treated	Percentage (%)
<i>Asparagaceae</i>	1	Diarrhea	20
<i>Fabaceae</i>	1	External swelling	20
<i>Vitaceae</i>	1	Body swelling and hyena bite	20
<i>Asteraceae</i>	1	Broken bone, body swelling	20
<i>Solanaceae</i>	1	Epizootic lymphgities and ulceritic lymphagities	20
Total	5		100

4.2.3 Medicinal plants used to treat both human diseases and livestock ailments

From the study area, 10 medicinal plants used to treat both human and livestock ailments were collected and recorded; which belongs to 10 genera and 9 families (Appendix F). Family Solanaceae contribute two species and the rest of the families contribute one species each (Table 6).

Table 6: Families of medicinal plant species used to treat both livestock and human ailments in Sewena district

Family	No of species	Disease treated	Percentage (%)
Alliance	1	Cough, malaria, asthma, stomachache	10
Euphorbiaceae	1	Intestine parasites, stomachache, bloating, Amoeba, gonorrhea	10
Fabaceae	1	Mastitis, Wound	10
Solanaceae	2	Snake bite, bloating, cough	20
Ranunculaceae	1		10
Convolvulaceae	1	Butii bite, scorpion bite	10

Table 6: continued

Asteraceae	1	Stomach problem	10
Capparidaceae	1		10
Maliaceae	1	Toothache, Anthrax	10
Total	10		100

4.2.4 Habitat and growth habit of medicinal plants

Out of the 42 plant species, Most of medicinal plants 27 (64.28%) were obtained from the wild followed by 13 (30.95%) from cultivated area (homegardens, fences and agricultural lands) (Fig. 4). Regarding the habit of medicinal plants species, analysis of medicinal types indicated that the highest proportion 18 (42.85%) of the growth shrubs, 14 (33.3%) followed by herbs (Fig.5).

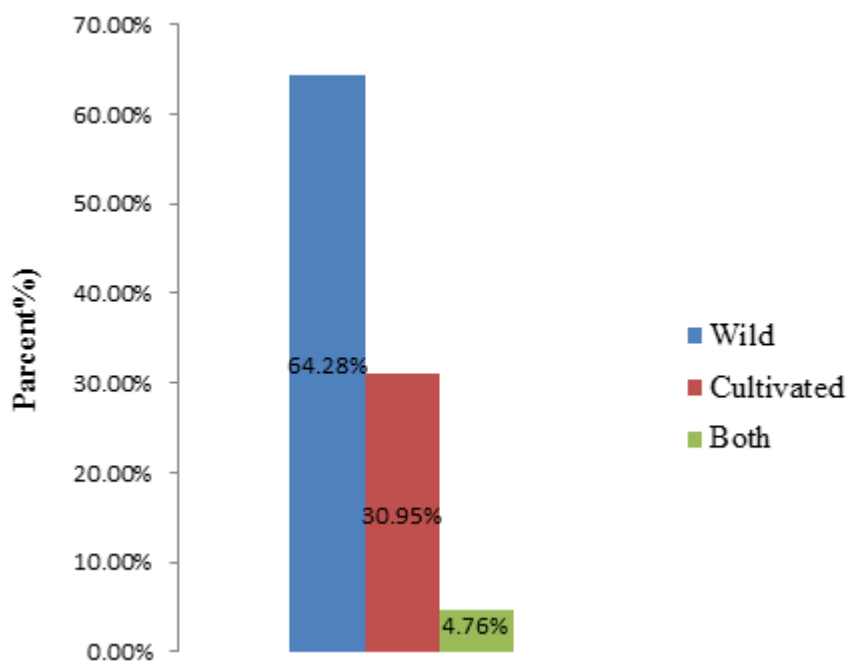


Figure 4: Sources of medicinal plants in the Sewena district

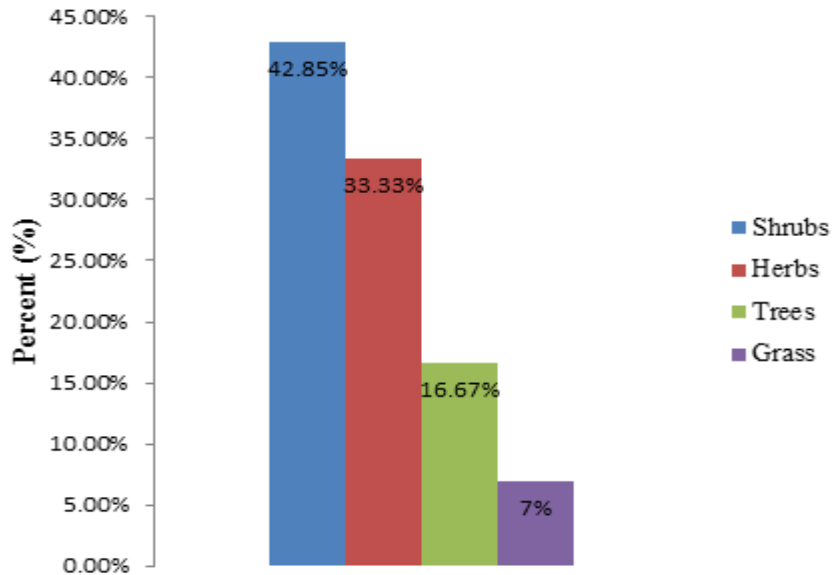


Figure 5: Habit of medicinal plants in the Sewena district

4.2.5 Plant parts used to treat human and livestock ailments

In the study area, local people harvest plant parts like root, bark, leaves, seed, stem, and a whole plant (in case of herbs) have known uses. Of these, most of the medicinal plants were harvested for their leaves accounting for of the total 14 (33.3%) followed by the roots 9 (21.4%) and others (Fig.6)

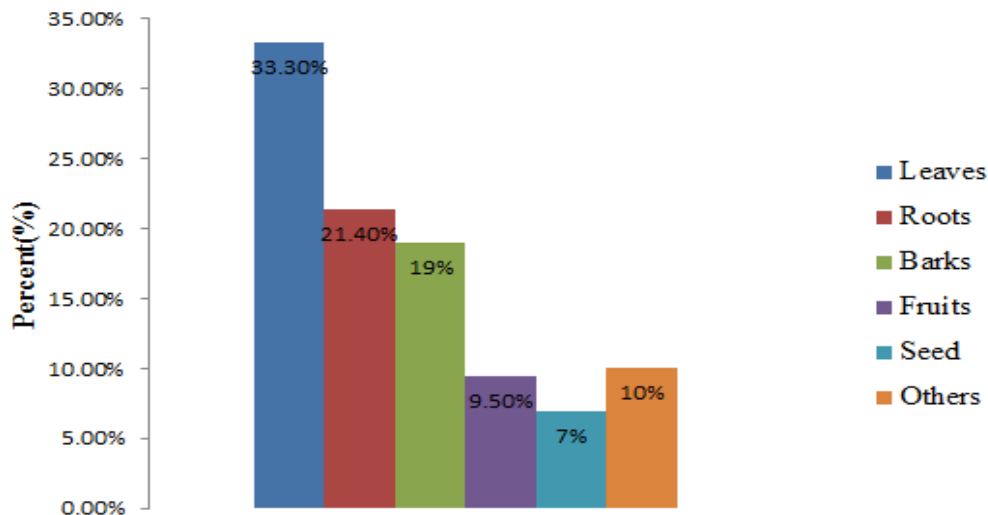


Figure 6: Plant parts used to treat human livestock ailments

4.2.6 Route of administration of medicinal plants

The processed remedies were mostly administered through oral, dermal, and others routes. Oral route contributed 21 (50 %), dermal 17 (41%) and others (Fig 7.)

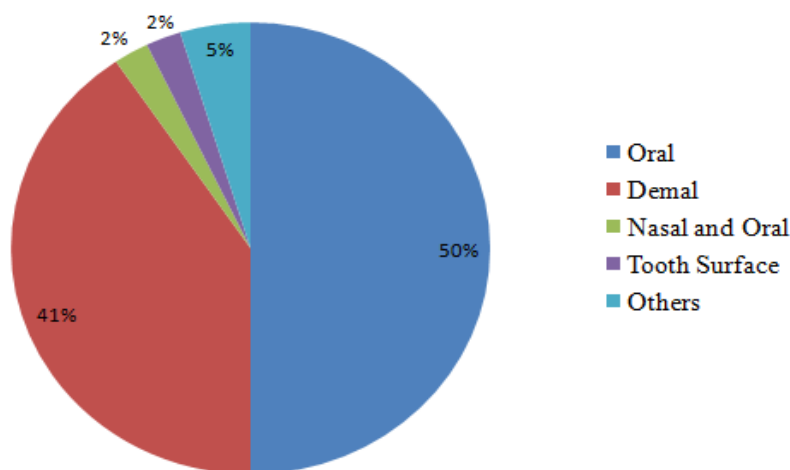


Figure 7: Route of administration of traditional medicine in the study area

4.2.7 Condition of plant parts used and methods of preparation of medicinal plants

Remedial plant species 30 (71.42%) were processed in fresh, were 10 (23.8%) processed in dry, 2 (4.46%) both in dry and in fresh. Regarding, methods of preparation the plant parts were mainly prepared by crushing 15 (35.7%), powdering 7 (16.67%), crushing and powdering 4 (9.5%) and others (Fig. 8).

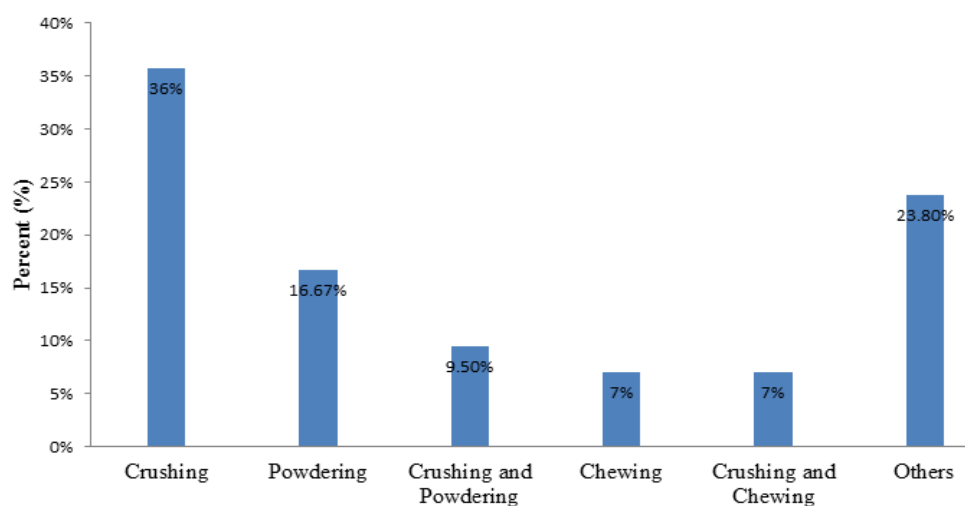


Figure 8: Methods of preparation of traditional medicine in Sewena district

4.2.8 Diagnosis, Dosage and effectiveness of traditional medicine in the study area

The practitioners diagnose each health problems by an interview and visual inspection of the patient. The patients interviewed for symptoms observed and the duration of the health problem, changes in eye, tongue, throat regions, and body temperature inspected visually by the healers and the remedy prescribed according to personal preference (depends on the ages, sexes, physical fitness and presence or absence of pregnancy). Local healers were used various measuring tools such as coffee cup, glass cup, bottle, spoon and index finger length to estimate and fix the dosage of the medicine. Hence sometimes overdose was reported to bring adverse effects like diarrhea, vomiting, abdominal pain and painting of the patient. During such incident, the traditional healers use different antidotes for reversing adverse effects like honey, milk, coffee, water etc. In this study, informants reported that traditional medicines were very effective for treatment, prevent and control of human and livestock ailments (Fig.9). This indicates that in the study area the people have solutions to their health problems through traditional medicinal plants (Table7).



Figure 9: Interview with three local healers on how to diagnose the patients, dosage given to the patients, adverse effects detected, solutions and effectiveness in the Sewena district.

:

Table 7: Human diseases that treated more than two number of plant species in Sewena district

Disease treated	Local name	Plant species used
Asthma	Asmii (kurruufsiisaa)	2
Common cold	Utalloo	3
Cough	Qufaa	2
Malaria	Shekeree	2
Spider poison	Summii shararitii	2
Stomachache	Garaa cininnaa	3
Toothache	Dhukkubbii ilkaanii	4

4.2.9 Traditional knowledge transfer to the next generation (young)

The common ways of gaining knowledge on traditional medicinal plant is father 65 (70%) followed by mother 10 (10.75%) and others (Table 8). This knowledge has remained undocumented and handed down orally from father to son or from mother to daughter.

Table 8: Sources of knowledge on traditional medicine in the Sewena district

Sources	Number of informants	Percentage (%)
Father	65	70
Mother	10	10.75
Brother	8	8.6
Friends	7	7.5
Other	3	3
Total	93	100

Most informants said that, boys have greater chance to gather knowledge on medicinal plants than girls do because fathers have high interest to give their talent to their sons. One of the interviewed local healers provided the following comment while an interview was conducted with him at Adele kebele administration, I have tried to teach my son all the knowledge I have about medicinal plants and how to heal human beings and livestock ailments with this medicinal plants. However, he was

unwilling, refused me all, and considered it is implications of backwardness and he responded me, as this is the act of primitive society (Fig.10).



Figure 10: The local healer that talking on the disinterest of his son in Adele kebele administration

4.2.10 Informants consensus

Participants reported that some members of the community had better knowledge on some medicinal plants than others. For example, *Allium sativum*, *Gloriosa superba*, *Seddera bagshawei*, *Actinopterys semiflabellata*, *Ruta chalepensis* frequently cited by informants (Table 9). The well-known of these medicinal plants is due to the effectiveness of the species treating various diseases.

Table 9: Informants consensus of Sewena district

Scientific name	Local name	No of informants (Frequency citation)	Percentage (%)
<i>Actiniopteris semiflabellata</i>	Baga gubatte	76	81.7
<i>Allium sativum</i>	Qullubbii adii	80	86
<i>Gloriosa superba</i>	Qullubbii warabessaa	80	86
<i>Ruta chalepensis</i>	xenaddaamii	65	70
<i>Seddera bagshawei</i>	Hidhaa gaangee	80	86
<i>Leucas glabrata</i>	Qamadii dubraa	68	73
<i>Solanum somalense</i>	Arreelee	70	75
<i>Withania somnifera</i>	Uunjoo	57	61

4.2.11 Illness treated and their factor of informants consensus value (Fic)

About 42 identified medicinal plant species, 27 in number were found to treat more than 35 various ailments of humans only. Ailments with a high factor of informant's consensus value were malaria and headache, gastrointestinal problem and poisonous animal bite that had factor of informants consensus values of 0.875, 0.875, 0.79, and 0.76 respectively (Table 10). A taxa may fall in more than one ailment categories.

Table 10: Factor of informant's consensus about the use of medicinal plant species for categories of disease.

Ailments category	No of plant species	No of use citation	Fic
Gastrointestinal disorder	7	30	0.79
Toothache and eye problem	6	20	0.7
Malaria and headache	4	25	0.875
Swelling body parts, Dermal problems (skin rash), nervous system disorder (sudden sickness, devil and evil eye)	9	26	0.68
Sexually transmitted disease and Gynecological problems (Gonorrhea problem and Lengthy of menstruation)	3	5	0.5
Poisonous animal bite such as snake bite, spider poison, bat poison and scorpion poison	6	22	0.76
Respiratory tract infection	6	10	0.44
Livestock ailments (Anthrax, mastitis, lumpy skin, epizootic and ulceritic lymphagities, tick, scabies).	5	12	0.63

4. 3 Ranking of medicinal plants in the study area

4.3.1 Preference Ranking

Different species prescribed to protect some diseases and people show preference of one medicinal plant over the other. Based on the information obtained from informants, preference ranking was carried out on 5 medicinal plants used to treat gastrointestinal disorder, *Allium sativum* stood first, followed by *Hagenia abyssinica* and *Calpurnia aurea*. Eight key informants which have long experience and practices on medicinal plant species that were reported for treatment of gastrointestinal problem. Since unlike other disease categories, this category was selected for preference ranking because it comprised the highest number of medicinal plants specified by the informants by giving 5 for the most effective medicinal plant species and 1 for the least effective medicinal plants (Table 11).

Table 11: Preference ranking of six medicinal plants used for treating gastrointestinal problem in the study area

Medicinal plants used	Respondents (R1-R8)								Total	Rank
	R1	R2	R3	R4	R5	R6	R7	R8		
<i>Allium sativum</i>	4	5	5	3	4	4	3	4	32	1 st
<i>Calpurnia aurea</i>	3	4	4	5	3	3	4	4	29	3 rd
<i>Acacia abyssinica</i>	4	4	3	3	3	2	3	4	26	4 th
<i>Ficus vasta</i>	3	2	2	1	3	3	2	2	18	5 th
<i>Hagenia abyssinica</i>	4	4	3	3	3	4	5	4	30	2 nd

4.3.2 Direct matrix ranking for multipurpose uses of plants

Five commonly reported multipurpose species and seven use categories were involved in direct matrix ranking with 12 key informants. Respondents evaluate their relative importance to the local people and the extent of the existing threats related to their use values (5 best, 4 very good, 3 good, 2 less, 1 least used (Table 12).

Table 12: Direct matrix ranking of five medicinal plants of with different uses other than medicinal use (total score of twelve informants)

Use categories	Plant species				
	<i>Acacia abyssinica</i>	<i>Acacia busei</i>	<i>Hagenia abyssinica</i>	<i>Juniperus procera</i>	<i>Olea europea</i>
Medicinal	3	3	4	3	4
Charcoal	4	5	3	3	4
Fire	5	5	3	4	4
Construction	3	3	5	5	4
Furniture	3	3	5	5	3
Fodder	3	3	3	1	4
Fence	3	4	3	2	2
Total	23	25	26	22	24
Rank	4 th	2 nd	1 st	5 th	3 rd

4.3.3 Fidelity Level Index (FLI) of preferred plant species

Fidelity level index shows the proportion in percentage of informants claiming the use of a plant species for the same major ailment to the total number of informants who mention the plant for any use. The importance of plants species in the treatment of the mentioned specific conditions, for instance, *Gloriosa superba*, had a FLI of 100% to treat hemorrhoids, *Seddera bagshawei*, had a FLI of 100 % in treatment of scorpion bite (Table 13). High FLI for these species indicates their outstanding preference for treating the corresponding ailments.

Table 13: Fidelity level index on MPs to treat some specific human ailments

Plant species	Therapeutic use	Np	N	FLI%
<i>Gloriosa superba</i>	Hemorrhoids	5	5	100
<i>Seddera bagshawei</i>	Scorpion bite	7	7	100
<i>Leucas glabrata</i>	Eye problem	4	5	80
<i>Withania somnifera</i>	Evil eye	4	8	50
<i>Hagenia abyssinica</i>	Tape worm	10	10	100

4.3.4 Conservation and threat to medicinal plants

In the study area, indigenous people were highly dependent upon plant resources for multiple applications that threatened diversity of medicinal plants. The principal threats reported for medicinal purpose in the study area were drought, overgrazing and deforestation (Table14). Regarding the conservation of medicinal plants there were no conservation and management efforts in the district. The major challenging of medicinal plants conservation in Sewena district is lack of awareness, lack of water, secret etc. The conservation status of medicinal plants is still limited and its needs proper attention to conserve medicinal plants for the welfare of future generation in a sustainable manner. Some of the medicinal plants like *Allium sativum*, *Nicotiana tobacum*, *Ruta chalepensis*, *Zingiber officinale*, *Catha edulis*, *Citrus limon*, *Citrus sinensis* and *Carica papaya* had started to conserve by local people growing them in homegardens.

Table 14: Ranking of threat to medicinal plants in the Sewena district

Respondents (R1-R6)								
Factor	R1	R2	R3	R4	R5	R6	Total	Rank
Agricultural expansion	3	3	4	3	3	4	20	4
Deforestation	5	5	4	3	4	5	25	3
Drought	4	5	5	5	5	5	29	1
Overgrazing	5	5	5	5	3	4	27	2

5 DISCUSSION

According to the results of this study, the total numbers of medicinal plants collected for the research purpose were 42, which used for different purposes. About 10 (23.8%) of the medicinal plants are used for treating both human and livestock ailments, whereas 27 (64.28%) of the medicinal plants are only used for curing human beings and the remaining 5 (11.9%) medicinal plants are only used for animal health care reported by the informants. When compared to each other, medicinal plants used for healing human health problems account the largest portion of medicinal plants. The use of medicinal plants to treat human diseases than livestock ailments by local people indicated that local people of the study area seek traditional medicine for his ailments first and then try to search for his livestock ailments. Moa Megersa (2010) and Sintayehu Temene (2011), reported that local people could acquire low knowledge of medicinal plant species to treat livestock ailments than medicinal plant species treating human ailments.

Among the 39 genera and 29 families, the families Asteraceae, Fabaceae and Solanaceae were found to be the leading medicinal plant species 4 (9.5 % each). They were the contributors of higher number of plant species used for medicinal purposes than other families. This finding agrees with the findings of Bailu Etana, (2010) ; Geteneh Gebeyehu *et al.*, (2014); Temru Temam and Asalfew Dillo, (2016) the ethnomedicinal investigations they found that indicated family Fabaceae, Asteraceae and Solanaceae contribute the higher number of plant species.

The most widely used plant habit as remedies by people of Sewena district were obtained from shrubs, which constitutes, 18 (42.85%) species. The same result undertaken, with the results of (Genene Bekele and Reddy, (2015) and Zelelem Getnet *et al.* (2016), in which shrubs are dominant habits harvested to treat human ailments. This could be associated with the abundance and year round availability of shrubs species in the lowland areas.

People of the study area prepare remedy for themselves and to their livestock from different plant parts such as leaves, roots, stems, barks, fruits and others. The highest proportions of the medicinal plant species were harvested for their leaves to prepare the remedies. Although, the exploitation of some plant parts (e.g. fruits, seeds, leaves and latex) are less damaging than others (e.g. bark, stems, roots), almost any form of harvesting has an impact on the structure and function of plant populations. This study documented that leaves are the most of the medicinal plants harvested. Similar practices were reported by (Geteneh Gebeyehu *et al.*, 2014; Abiyu Enyew *et al.*, 2011;

Debela Hunde *et al.*, 2015; Temru Temam and Asalfew Dillo, 2016; Zelelem Getnet *et al.*, 2016; Yeneayehu Fentahun and Girma Eshetu, 2017). Utilization of leaves for remedy preparation is important for conservation of medicinal plants (Sintayehu Temene, 2011). In this study, the result showed that roots were the second major plant parts used for remedy preparation. Uses of root, whole plant parts and plant species with multipurpose uses are destructive practices that may result in species extinction. Similar findings by (Genene Bekele and Reddy, 2015) reported that the popularity of this part has serious consequences from both ecological point of view and from the sustainable survival of the medicinal plant species. This was observed on *Withania somnifera*, *Acacia brevispica* etc.

Concerning source of medicinal plants, majority of them harvested from wild, 27 (64.28%), whereas 13 (30.95%) from homegardens (Fig.4). This result is also similar to other ethnobotanical studies in Ethiopia (Bailu Etana, 2010 and Belcha Abera, 2014) reported that the local people obtain more medicinal plants from the wild vegetation than homegardens for treating human and livestock ailments. In fact, here in study area most of the herbalists were not interested to grow medicinal plants in their homegardens because they need to keep the secret of their medicinal value. It seems that, it was one of the worst experiences that leading a great danger of extinction on medicinal plant conservation and indigenous knowledge.

Knowledge between sexes, showed females tend to mention equal proportion number of medicinal plants compared with males. More male informants involved as participants than females; this is due to religious, cultural, the backward outlook the surrounding society, have towards female traditional healers. In addition, the traditional knowledge in the family is passed from father to his first son and is obvious that females were not allowed to go out of home because they look after babies and work at home. This limits participation of females in the study area. Similar studies by (Seyoum, 2009) in which reported that female's participation is limited due to socio cultural reasons.

Regarding age group, when compared collected data to determine whether the age of the person interviewed affected his or her knowledge of plant use, they found that older people held the bulk of the information in some categories, such as medicinal plant lore. This shows elder people know more medicinal plant species than the young people. Similar finding by (Melese Meryo, *et al.*, 2015), reported long experience and practice enabled older people know more medicinal plant species than the young people.

In the study area, it was showing that traditional medicinal plants and local healers have a great attention and popularity among the residents of the area. Traditional healers transfer traditional medicinal knowledge to the family members whom they think keep the secret. This knowledge has remained undocumented and handed down orally from father to son or from mother to daughter. However, today's young generations showed minimum interest in learning and practicing ethnomedicine practices with regarding to modern education. Similar finding by (Getnet chokolet, 2011 and Melese Meryo *et al.* 2015), in which they reported that the transfer of medicinal plants knowledge has been affected by modernization like access to modern education and health services.

Most of the remedies were prepared in the form of crushing 15 (35.7%) (Fig.8). This agrees with the results of studies carried out by (Getnet chokolet, 2011; Gonfa Kewessa *et al.*, 2015; Atinafu Kebede *et al.* 2016), who found that the main mode of preparation is crushing, accounting for 20%, 30% and 36.6%, respectively.

Concerning condition of preparation, 30 (74%) of medicinal plants are prepared as fresh forms, which is the highest number of preparation. This agrees with the results of studies carried out by (Abiyu Enyew, *et al.*, 2013; Melese Meryo, *et al.*, 2015; Tamru Temam and Asalfew Dillo, 2016; Zelalam Getnet *et al.*, 2016). Traditional healers claimed that using fresh plant parts mostly are because they believe that using fresh materials increases efficacy compared with the dry one. It has a contribution on threats of medicinal plants in the study area. This agrees with the results of Moa Megersa (2010) who reported that using fresh plant parts has contribution on threat of medicinal plants.

Regarding route of application, the oral route of remedial administration was the first 50 % (21), followed by dermal 41% (17) (Fig.7). This result agrees with the findings of Moa Megersa (2010) who reported that the leading route of application used by Wayu Tuka wereda, eastern Wellega zone is oral which accounted for 64 % and Atinafu Kebede *et al.* (2016), in the markets of Dire Dawa city, eastern Ethiopia reported that about 66% of remedies taken orally.

With regard to the measurement of the dose of medicinal plants, there is no standardized measurement of herbal remedies in the study area. In the study area, various ways of measuring tools reported by local people. This result is similar with results of Sintayehu Temene (2011) he reported that local healers prepared and prescribed traditional medicine to patients according to personal preference of the patient; based on the individual strength.

In the study area, the common ailments identified, diagnosed, treated, prevented and controlled by using medicinal plants collected from the wild or homegardens. From the identified medicinal plants, 27 medicinal plant species used to treat more than 30 different human ailments only. This implies that traditional medicinal plant species are playing an important role in supporting the primary health care needs among the communities in the study area. Ailments with the highest Fic were malaria and headache, gastrointestinal disorder and poisonous animal bite that had Fic values of 0.875, 0.875, 0.79, and 0.76 respectively. Medicinal Plants supposed to be effective for a certain category of disease treatment will have high Fic. Similar studies under taken by Atinafu Kebede *et al.* (2016), he reported that Fic is a good measure of assessing efficacy of medicinal plants for categorical disease in the context of the local community. Among the medicinal plants used against human ailments, the highest proportions were used to treat animal poisonous and gastrointestinal disorder. This could indicate that the disease is widespread in the study area.

The degrees of importance of medicinal plants were employed to asses by Preference ranking and direct matrix ranking. Ranking of medicinal plants showed that there are medicinal plants that are preferred by local people than the others. For instance, *Hagenia abyssinica* stood first by having the highest multipurpose use. This is the evidence for the depletion of this plant. *Juniperus procera* had the second rank; there is no fear for its depletion, since planting of multipurpose plants are beneficial. This study is in line with the result of Moa Megersa (2010) reported similar results.

The principal threats to conservation of biodiversity in the study area were drought, deforestation, overgrazing were the first three top factors perceived as threats to medicinal plant species. These anthropogenic and natural factors coupled with very poor conservation efforts threatened medicinal plant survival in the study area. As some informants mentioned excessive collection of wild plant resources by the rural people is therefore not just a case of preference but also a situation of having no other option. These trends and attitudes have led to a cycle of impoverishment in which the local people increasingly lose control over the management of their resources. As a result, countless plant species are facing considerable danger of threatens. Hence, the great diversity of wild plant resources, which serves as the source of livelihood to the rural people, is in deep trouble. Therefore, the urgent need is to protect the remaining vegetation. The result of Kebu Belami *et al.* (2004), reported overgrazing was principal threat to medicinal plants in Fentalle area. Getaneh Gebeyehu *et al.* (2014), reported that the principal threats for medicinal plants were deforestation in Ethiopia.

The success of conservation and sustainable use of resources, therefore, largely depends upon the understanding of the people and their acceptance of the concept. Some people of the study area know the benefit of conserving medicinal plants however; the effort of conserving medicinal plants is very less. Even, local healers do not conserve medicinal plants very well and they prefer to collect from wild when patients visit them to get relief from their ailments. Most of the herbalists were not interested to grow medicinal plants in their home garden because they need to keep the secrecy of their medicinal value and hide the medicinal plants from other community members. Due to above reason, threaten of medicinal plant increases. Mulugeta Kuma (2014) reported similar finding local healers do not grow medicinal plants in their homegardens in order to hide the medicinal plants from other community members.

Informants reported that there is no hesitation as more medicinal plants were found in the past decade than today and knowledge of traditional medicine is declining than ever before. Regarding modernization young generation, hesitate from using traditional medicine it is because do not trust the dosage, the nature of ingredients etc. In addition, they responded, as this is the act of the primitive society. Health officers have reported to have impact on the knowledge of medicinal plants discourage with dosage in the study area. In this area, careful ethnobotanical documentation must be needed because each plant can be the basis for the invention of modern drugs and better ethnomedicinal illustrations in future. Similar findings by (Atinafu *et al.* 2016), reported careful ethnobotanical documentations must be needed because each plant will have better ethnomedicinal illustrations in future.

6. Conclusion and Recommendations

6.1. Conclusion

The present study indicates that the Sewena district has a high diversity of useful medicinal plants and traditional knowledge about the use, preparation, and application, which still maintained among local people of the Sewena district. The overall plant species identified and collected were 42, of these 27(64%) used to treat human ailments only. In the study area, Asteraceae, Fabaceae, Solanaceae was the leading Families by which local people of the district derive their medicine for treatment of various ailments as it was represented by 4 plant species each. Shrubs found to be dominant traditional medicinal plant remedies in the study area followed by herbs and trees. Leaves also found to be the most harvested plant parts for the preparation of the remedies followed by roots and barks. Large medicinal plants collected from wild areas. The routes of administration are mainly internal in which oral administration is the common one.

The traditional medicine is an inseparable part of the community health care system. The community members do not use to reveal ethnomedicinal treasure and only pass to their blood relatives from generation to generation. It was one of the worst experience that, most of the informants the real knowledge of plant medicines, they do not want to share it with others except their few blood relatives until their death; this seems great danger of extinction on the indigenous knowledge. Therefore, it is not only essential to conserve such a wealth of information hidden among the local people but also to apply them to modern knowledge of science and technology to meet the ever-increasing requirement of humankind.

The main factors to loss of plant species in the study area are drought, deforestation and overgrazing. Other problems threatening medicinal plants are lack of awareness, secret, oral based knowledge transfer, unwillingness of young generation and influence of modern educations. Because today young, generations have different options with regarding modern education to obtain medical health services and therefore, these traditional skills are doomed to get lost even faster than the plants themselves in future. Therefore, awareness rising should be made among the healers to loss of the indigenous knowledge and to ensure its sustainable use.

6.2 Recommendations

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

- As most rural people of the study area are ignorant of the needs for medicinal plant conservation, the district of agricultural office needs to focus on conservation of medicinal plants and teach practical skills to make people more self-reliant and aware of how to use, manage and conserve their ethnomedicine sustainably and more profitably.
- The Sewena district has a rich resource base of medicinal plants, which potentially can contribute to biological, environmental and economic sustainability as well as to development; if recognized management practices and adequate regulatory procedures are brought into action.
- Local communities should be encouraged to cultivate the medicinal plants in their homegardens.
- The knowledge of traditional medicine, treatments and practices should be respected, preserved, promoted and communicated widely and appropriately in the district among the communities.
- Government should formulate national policies, regulations, and standards as part of comprehensive national health systems to ensure appropriate, safe and effective use of traditional medicine.
- Government should establish systems for the qualification, licensing of traditional medicine practitioners. Traditional medicinal practitioners should upgrade their knowledge and skills based on national requirements.

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8. APPENDICES

Appendix A: Checklist of questions to use as basis for collecting medicinal plants information

1. Background of respondents

Name_____Age _____ Occupation_____Sex_____Educational
status_____Kebele_____

2. What is the common human disease in your kebele?
3. What is the common livestock disease in your kebele?
4. Which plant species do you use to treat human diseases only?
5. Which plant species do you use to treat livestock disease only?
6. List the medicinal plant species, which are commonly, used to treats for both human diseases and livestock ailments in study area?
7. How do you prevent and control those health problems or diseases?
8. List, parts of medicinal plant species used for remedy in your kebele.
9. Where is medicinal plant species gathered? From wild__, from homegardens__from both__
10. List the habit of medicinal plant species in your locality.
11. What methods of preparations forms, route of administrations and Condition forms you used to produce medicine in your kebeles?
12. How do local healers are diagnose and identify the patients?
13. Does traditional medicine have its own prescription as modern medicine? Yes or no
14. Does the dose differ among ages and sexes groups?
15. Does using traditional medicine have adverse effects? If it has, when, how and what solutions do people use to treat the adverse effects?
16. How does the indigenous knowledge transfer from generation to the next generation?
17. How does modern education make the tradition medicinal knowledge to be declined?
18. Is there any restriction or taboos in collection of medicinal plants?
19. How do you prefer one medicinal plant to the other in your area?
20. Besides its medicinal value, for what other purpose do you use these medicinal plants?
21. Is there any effort made to conserve the medicinal plants in your area?
22. How do you conserve medicinal plants?
23. What is the status of medicinal plants now, in your area?

Appendix B: Gaaffii checklistii akka bu'uraatti odefannoo biqiloota qorichummaaf oolaan funaanuuf gargaru kan gafatamtoota waliin tasifame.

1. Odeeffannoo dimshaashaa kan gafatamtootaa
Maqaa____Umrii____ hojii ____Saala: dhi____dub____Sad. barnootaa____ Ganda _____
2. Ganda kessaan kessatti dhibeen beekamoon namarratti mul'atan maal fa'aadha?
3. Ganda keessaan keessatti dhibeen beekamoo ta'an bineeldotaarraatti mul'atan maal fa'aadha?
4. Dhibeen namarratti qofa mul'atan kana yaaluuf gosa biqiltuu kamitti fayyadamtu?
5. Dhibeen bineeldota irratti qofa mul'atan kana yaaluuf gosa biqiltuu kamitti fayyadamtu?
6. Gosa biqilootaa dhibee bineeldotaa fi namaa yaaluuf oolaan kan naannoo keessan keessatti fayyadan tarreessi / ssaa?
7. Rakkoo fayyaa ykn dhibee uumamu akkamittiin of irraa ittisuu fi to'aachuu dandeessu?
8. Gosoota biqilootaa naannoo keessan keessatti argaman tarreessi?
9. Ganda keessaan keessatti qaamonni biqilootaa kanneen yaalaaf ykn qorichoomaaf oolaan tarreessi /ssaa?
10. Biqiloonni qorichummaaf oolaan kun eessaa funanamu? Bosonaa _____ qe'ee _____
iddoo lamaanuu _____
11. Naannoo keessaan keessatti qorichi haala akkamiitiin qophaa'a, akkamitti itti fayyadamtu, haala kamiin? Jiidhaa isaa moo gogaa isaa?
12. Dhukkubsataa haala kamiin qorattu? Mallattoo maliin adda baastu?
13. Qorichi aadaa akka qoricha ammayyaattii akaataa inni itti ajajamu jiraa? Eeyyeen ykn miti , eeyyeen yoo ta'e akkamitti?
14. Qoricha aadaa fayyadamuun hubaattii qabaa? Yoo eeyyeen ta'e, yoom, akkamitti fi furmaata akkamii hubaattii kanaaf taasistu?
15. Hammii qorichaa ajajamu umrii fi saala irratti ni hundaa'aa?
16. Beekumsi uumamaa keessaan kun akkamitti warra irraa gara ilmaan keessanitti dabra?
17. Barumsi ammayyaa beekumsa qoricha aadaa irratti akka kufaa deemu akkamittiin godhe?
18. Naannoo keessan keessatti biqiloota qorsaaf oolaan kana akkamitti filattu?
19. Biqiloota qorichummaaf tajaajilan kana guuruuf dhoorkan ykn qaaniin ni jiraa?
20. Qorichummaaf itti fayyadamuun alatti, biqiloota qorichummaaf fayyadan kana wan birootiif itti fayyadamtuu
21. Biqiloota qorichummaaf fayyadan kana kununsuuf carraaqqiin godhame jiraa? Yoo eeyyeen ta'e, akkamitti kununsitu?
22. Biqiloota qorichummaaf naannoo keessanitti fayyadan akkamitti filaattu ?
23. Sadarkaan biqilootaa qorichoomaaf oolaan kan nannoo kessanitti argamn amma maal irra jiru?

Appendix C: List of traditional medicinal plants used to treat human and livestock problem. RA- route of application (O-oral, N-nasal, Op-optical, TS- tooth surface, D- dermal, CO- condition (F-fresh, D-dried, F/D-Fresh or dried.

Scientific name and plant habit	Vernacular name (s)	Family	Preparation and application	Disease treated	R A	C O
<i>Acacia abyssinica</i> Hochst. ex Benth Tree	Halloo	Fabaceae	Bark: One tea spoon of powdered bark taken with tea for three days	Stomachache	D	O
			Bark: powdered and put on the area.	Skin rash		D
<i>Acacia busai</i> Harms ex.B.Y. Tree	Laaftoo	Fabaceae	Bark: powdered mix with a bite of water then apply on swelling breast of animal.	Mastitis	D	D
				Wound		
<i>Acacia brevispica</i> Harms. Shrubs	Hammar reessa	Fabaceae	Bark: of the root is crushed and holds on.	Toothache	F	D
<i>Achyranthes aspera</i> L. Herb	Darguu	Amaranthaceae	Root: crushed, powdered mix one teaspoon with three-glass cup, adds sugar to it and then use three times in a day.	Lengthy menstruation cycle.	F	O
<i>Actinopterys semiflabellata</i> Pic. Sem. Grass	Baga gubate	Actinopterydaceae	Whole part: crushed, roasted, and then apply on wound the ash.	Fire burn		D
<i>Allium sativum</i> . L. Herb	Qullubbi adii	Alliance	Bulb: Crushed and eaten	Cough	F	O
				Malaria		

Appendix C continued

			Bulb: eaten when there is pain	Stomachache		
			Bulb: Mixed with honey and one spoon is taken each day in the morning	Asthma		
			Bulb: Crushed, mix with water and given to animal	Stomachache		
<i>Asparagus africanus</i> Lam. Herb	Sariiti	Asparagaceae	Leaves: crushed, mix with water and given to equines.	Diarrhea	F	O
<i>Cadaba mirabilis</i> Gilg Grass	Barjeen	Capparidaceae	Root crushed, mixed with a bit of water and put on the affected part.	Body swelling	F	D
<i>Calpurnia aurea</i> (Ait.) Benth. Shrub	Ceekaa	Fabaceae	Seed: powdered mixed with water and rubbed against the body of animal	Lumpy skin	D	D
			Leaf: crushed and washed.	Tick		
				Scabies		
			Leaf: infusion is used to wash the affected body for a week.	wound		
			Leaf: squeezed and drunk one cup of coffee.	Stomachache		
<i>Catha edulis</i> (Vahl) Forrsk ex Edl. Shrub	Jimaa	Celastraceae	Leaf: Crushed, boiled with sugar and taken orally.	Cough	F	O
<i>Carica papaya</i> L. Shrub	Pappaayya	Caricaceae	Leaf: crushed mixed with water and drunk before eating breakfast.	Gastritis	F	O

Appendix C continued

			Root: crushed, squeezed and drunk one spoon.	Malaria		
<i>Citrus lemon</i> (L). Burn.f Shrub	Loomii	Rutaceae	Fruit: juice boiled with sugar and tea, then drunk.	Common cold	F	D
			Fruit: Squeezed the fresh fruit juice and apply on the gum bleeding.	gum bleeding		
<i>Citrus sinensis</i> (L) osb. Shrub	Burtakaan a	Rutaceae	Fruit: Squeezed, boiled with tea and sugar, taken orally.	common cold	F	O
<i>Cordia africana</i> Lam. Tree	Waddeessa a	Boraginaceae	Bark; chewed and placed on the area.	Spider poison	F	D
				skin rash		
				Tooth problem		
<i>Craterostigma pumilum</i> Hochst. Grass	Roobanjireettii	Scrophulariaceae	Whole part: crushed, powdered, add one teaspoon to water glass cup and taken orally.	Vomiting	F	O
<i>Croton macrostachyus</i> . Del Shrub	Bakkannisa	Euphorbiaceae	Bark; crushed with water and given orally for cattle.	Intestine parasites	F	O
				Stomachache		
			Leaves; juice with water is given orally.	Amoeba		
				Gonorrhea		
			Leaves: Crushed and sniffed	Bloating		

Appendix C continued

<i>Cyphostemma dembianense</i> (Chiov) Vollesen Shrub	Xaruu	Vitaceae	Leaves: crushed, and apply on the swelling and affected body parts	Hyena bite	F	O
				Wound		
				Body swelling		
<i>Dodonaea angustifolia</i> L.f Shrub	Ittacha	Sapindaceae	Leaves: powdered, mix with a bit of water and put on wound.	Lymph swelling	D	D
				Wound		
			Leaf: crushed mixed with water and given to animal.	Diarrhea		
<i>Ficus vasta</i> Forrsk. Tree	Qilxuu	Moraceae	Bark: powder with salt given orally with cattle.	Diarrhea	D	O
			Leaf latex: (fresh juice) dropped into the human eye.	Eye problem		
<i>Gloriosa superba</i> L. Herb	Qullubbii waraabee ssa	Colchicaceae	Root; mix with honey and tied on the affected body parts during the night.	Hemorrhoids	D /F	D
<i>Guizotia abyssinica</i> (L.f) Herb	Nuugii	Asteraceae	Seed; roasted, powdered and the decoction drunk.	Internal swell	D	O
				Cough		
				Asthma		
<i>Hagenia abyssinica</i> (Bruice) J.F.Gmel Tree	Koso/baa hee	Ruscaceae	Fruit; mix the powder with honey and a little bit of water, then boil, and drink before breakfast for 3-5 days.	Ascariasis, Tapeworm	D	O

Appendix C continued

<i>Heteromorpha arborea</i> (Spreng.) Cham and Schlecht. Shrub	Alihaan qaa	Apiaceae	Bark; of the steam smoked and inhaled orally or nasally.	Evil eye	D /F	
<i>Ipomoea kituiesis</i> Vatke Shrub	Baal bakkoo	Convolvulaceae	Root; crushed, boiled with water and drunk, then sleep for an hour.	Urine retention	F	O
<i>Juniperus procera</i> Hochst.ex Endl Tree	Gaattira a	Cupressaceae	Leaves; are crushed and apply topically on wound.	Skin infection	F	D
<i>Kleinia squarrosa</i> Cufod. Herb	Xiixxuu	Asteraceae	Root of the plant is crushed, mixed with water and given to the patients through nasal.	Retained placenta	F	N
<i>Lepidium sativum</i> L. Herb	Shinfaa	Brassicaceae	Seeds; powdered and rubbed the body for protection mosquito bite.	Malaria	D	D
			Seeds; powdered mixed with bulb of <i>Allium sativum</i> and salt, eaten	Febrile		
<i>Leucas glabrata</i> (vahl) Sm. in Rees Herb	Qamadii - dubraa	Lamiaceae	Root; crushed, mixed with water, drop to the eye through a piece of clothes.	Eye problem	F	E
<i>Lycopersicon esculentum</i> Mill. Herb	Timaati mii	Solanaceae	Leaves crushed and put on.	Toothache	F	TS
			Leaves chewed and put on	spider poison	F	D
					F	D

Appendix C continued

			Leave crushed and rubbed against the skin .	skin rash		
<i>Melia azedarech</i> L. Herb	Niimii	Maliaceae	The pounded bark is hold by dressing on affected for a while.	Toothache	D	D
			The leaf bark crushed together and given to the cattle.	Anthrax		
<i>Nicotiana Tobacum</i> L. Herb	Tamboo	Solanaceae	Leaves crushed and mixed with water and drunk	Snake bite	F	O
			Leaf pounded mixed with water and given to the animal.	Bloating		
				Cough		
<i>Olea europea</i> . L.subs. cuspidate (wall.ex G.Dons) Tree	Ejersa	Oleaceae	Leaves (juvenile leaves) chewed and swallowed	Kidney problem, liver problem	F	O
				Pancreatic problem.		
<i>Psidium guajava</i> L. Shrub	Zayituna	Myrtaceae	Fruit: held between the teeth for a while.	Tooth ache	F	TS
<i>Ranunculus multifidus</i> Forssk. Herb	Misinga a	Ranunculaceae	Leaves: crushed and put on	Urine bat	F	D
<i>Rhus natalensis</i> Krauss Shrub	Dabobesa	Anacardiaceae	Leave: crushed, boiled with coffee and taken orally.	Lengthy menstruation cycle	F	O
			Root: crushed, mixed with water and washed.	Athlete's foot.		

Appendix C continued

<i>Ricinus Cummuus</i> L. Shrub	Qobboo	Euphorb aceae	Seed: crushed, mix with butter and oil, then boiled , after a time tied on the head of the patient	Headache	D	D
<i>Ruta chalepensis</i> L. Herb	Xenadam ii	Rutacea e	Leaves: crushed mixed with coffee and drunk.	Stomachache	F	O
			Leaves: Chewing and swallowing fresh leaves	Sudden sickness		
<i>Saccharum officinarum</i> L. Shrub	Shankora	Poaceae	Stem: put on the fire and eaten when get hot in order to get relief from common cold.	Common cold	F	O
<i>Seddera bagshawei</i> Rendle Herb	Hidhaa gaangee	Convolv ulaceae	Root; crushed, mix with water and apply on swelling body parts	Butii	F	D
				scorpion bite		
<i>Solanecio angulatus</i> (Vahl) C Jeffrey Herb	Gilirus	Asterace ae	Root: crushed, mixed with water, oil, then boiled and after a while applied on body of the patients.	External swelling	F	O
<i>Solanum somalense</i> Franchet. Shrub	Arreelee	Solanac eae	Root; crushed, powdered, mixed with water and add in small amounts into nasal of equines forcefully.	Epizootic lymphagities	F	O
				Ulceritic lymphagities		
<i>Vernonia amygdalina</i> Del Shrub	Eebicha	Asterace ae	Leaves: Crushed, squeezed and drunk 1 glass cup to cattle forcefully.	Stomach problem	F	O

Appendix C continued

			Leaves: crushed mixed with water and drunk to animal	Bloating		
				Urine retention		
<i>Withania somnifera</i> (L.) Dual Shrub	Uunjoo	Solanaceae	Root: root crushed and smoke inhaled.	Devil eye	D	O/ N
				Evil eye		

Appendix D: List of Medicinal plants treating human diseases only Habitat: W-Wild, HG-Home garden,

B-both.

Scientific name	Family	Habit	Local name	Disease treated	Habitat
<i>Acacia abyssinica</i> Hochst.ex Benth	Fabaceae	T	Laaftoo	Stomachache Skin rash	W
<i>Acacia brevispicas</i> Harms.	Fabaceae	S	Hammarrees sa	Toothache	W
<i>Achyranthes aspera</i> L.	Amaranthaceae	H	Darguu	Lengthy of menstruation cycle	W
<i>Actinopteris semiflabellata</i> Pic.Sem.	Actinopteridaceae	G	Baga gubate	Fire burn /wound	W
<i>Carica papaya</i> L.	Caricaceae	S	Pappayyaa	Gastritis	HG
<i>Catha edulis</i> (Vahl) Forrsk ex Edl.	Celastraceae	S	Jimaa	Cough	HG
<i>Citrus lemon</i> (L) Burn.f	Rutaceae	S	loomii	Common cold Gum bleeding	HG
<i>Citrus sinensis</i> (L) osb.	Rutaceae	S	Burtakaana	Common cold	HG

Appendix D: continued

<i>Cordia Africana</i> Lam.	Boraginaceae	T	Waddeessa	Toothache, Sudden sickness	W
<i>Craterostigma pumilum</i> Hochst.	Scrophulariaceae	G	Roban jireti	Vomiting	W
<i>Gloriosa superba</i> L.	Colchicaceae	H	Qulubbii warabssaa	Hemorrhoid	W
<i>Guizotia abyssinica</i> (L.f) cass	Asteraceae	H	Nuugii	Any internal swelling, Cough, Asthma	HG
<i>Hagenia abyssinica</i> (Bruice) <i>J.F.Gmel</i>	Ruscaceae	T	Koosoo/ Baahee	Ascariasis, Tape worm	W
<i>Heteromorpha arborescens</i> (Spreng.) Cham and Schlecht.	Apiaceae	S	Alihanqaa	Evil eye	W
<i>Ipomoea kituiesis</i> Vatke	Convolvulaceae	H	Bal bakkoo	Urine retention	W
<i>Kleinia squarrosa</i> Cufod.	Asteraceae	H	Xiixxuu	Retained placenta	W
<i>Lepidium sativum</i> L.	Brassicaceae	H	Shinfaa	Malaria, Febrile	HG
<i>Leucas glabrata</i> (Vahl)Sm. in Rees	Lamiaceae	G	Qamadii dubara	Eye problem	W
<i>Lycopercon esculentum</i> Mill.	Solanaceae	H	Timaatimii	Tooth ache, Spider poison, Skin rash	HG
<i>Olea europea</i> . L.subs. cuspidate (wall.ex G.Dons)	Oleaceae	T	Ejersa	Kidney problem, liver problem, Heart problem, Pancreatic problem	W

Appendix D: continued

<i>Psidium guajava</i> L.	Myrtaceae	S	Zayituna	Tooth ache	HG
<i>Ranunculus multifidus</i> Forrsk.	Ranunculaceae	H	Misingaa	Urine bat	HG
<i>Rhus natalensis</i> Krauss	Anacardiaceae	S	Dabobessa	Lengthy menstruation cycle, Athletes foot	W
<i>Ricinus Cummunus</i> L.	Euphorbaceae	S	Qobboo	Headache	W
<i>Ruta chalepensis</i> L.	Rutaceae	H	Xenadamii	Sudden sickness Stomachache	HG
<i>Saccharum officinarum</i> L.	Poaceae	S	Shankoora	Common cold	HG
<i>Seddera bagshewei</i> Rendle	Convolvulaceae	S	Hidhaa gaangee	Butii bite and Scorpion bite	W

Appendix E: List of medicinal plants treating livestock disease, Habitat: W-Wild, HG-Home garden, B-both.

Scientific Name	Family	Habit	Local Name	Disease treated	Habitat
<i>Asparagus africanus</i> . L	Asparagaceae	H	Sariiti	Diarrhea	W
<i>Cadaba mirabilis</i> - Gilg	Capparidaceae	H	Barjen	External swelling	W

Appendix E: continued

<i>Cyphostemma- dembianense</i> (Chiov) Vollesen	Vitaceae	H	Xaruu	Swelling and hyena bite	W
<i>Solanecio angulatus</i> (Vahl) C Jeffrey	Asteraceae	H	Gilirus	Broken bone, body swelling muscular cramps	W
<i>Solanum somalense</i> Franchet.	Solanaceae	S	Arreelee	Epizootic lymphagities, Ulceric -lymphagities	W

Appendix F: List of medicinal plants for treating both human and livestock disease, Habitat:

W-wild, HG- home garden, B- both.

Scientific Name	Family	Local name	habit	Disease treated	habitat
<i>Acacia busai</i> Harms ex.B.Y.	Fabaceae	Halloo	T	Mastitis ,Wound	W
<i>Allium sativum</i> L	Alliance	Qullubbii adii	H	Cough, Malaria, Asthma Stomachache	HG
<i>Calpurnia aurea</i> (Ait.)	Euphorbiaceae	Ceekaa	S	Stomachache, Wound, Lumpy skin, Tick, scabies	W
<i>Croton macrostachyus</i> .Del	Euphorbiaceae	Bakkannisa	S	Intestine parasites, Stomachache, bloating Amoeba, gonorrhea , bloating	W
<i>Dodonoea angustifolia</i> L.f	Sapindaceae	Ittacha	S	Lymph swelling, Wound, Diarrhea	W
<i>Ficus vasta</i> Forrsk.	Moraceae	Qilxuu	T	Diarrhea, Eye problem	W

Appendix F: continued

<i>Melia azedarech</i> L.	Maliaceae	Niimii	S	Toothache, Anthrax	Both
<i>Nicotiana Tobacum</i> L.	Solanaceae	Tamboo	H	Snake bite, bloating, cough	HG
<i>Seddera bagshewei</i> Rendle	Convolvulaceae	Hidhaa gaangee	S	Butii bite	W
<i>Vernonia amygdalina</i> Del	Asteraceae	Eebicha	S	Stomach problem	Both