ADDIS ABABA UNIVERSITY

COLLEGE OF NATURAL SCIENCE

DEPARTMENT OF ZOOLOGICAL SCIENCE

USE AND CONSERVATION OF TRADITIONAL MEDICINAL PLANTS IN ALELITU WOREDA NORTH SHEWA, OROMIA REGION ETHIOPIA

BY

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USE AND CONSERVATION OF TRADITIONAL MEDICINAL PLANTS IN ALELITU WOREDA NORTH SHEWA, OROMIA REGION ETHIOPIA

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GRADUATE PROGRAMMES

This is to certify that the thesis prepared by Genet Shiferaw Negesse, entitled: *USE AND CONSERVATION OF TRADITIONAL MEDICINAL PLANTS IN ALELITU WOREDA NORTH SHEWA, OROMIA REGION ETHIOPIA* and submitted in fulfillment of the requirements for the Degree of Master of Science in Biology complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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ABSTRACTS

Use and Conservation of Traditional Medicinal Plants in Alelitu Woreda North Shewa,Oromia Region Ethiopia

By Genet Shiferaw Negesse MSc Thesis

Addis Ababa University, September, 2019

An Ethnobotanical study was conducted between September 2018 to June 2019 to document medicinal plants used by local people and their indigenous knowledge in Alelitu District, North Shewa Zone of Oromia Region. Data were collected from eighty informants in 11 kebeles by using Semi-structured interview, group discussion, guided field walk and Market survey. A total of 83 medicinal plants that belong to 77genera and 43 families were gathered.The family Asteraceae was represented by the highest (10,12%) species, followed by Lamiaceae (7,8.4%) species. Herbs were the highest, (42,50.6%) followed by Growth forms Shrubs (21.25.3 %). Most of the medicinal plant species (49,59%) were collected from wild. The most frequently used plant part was the leaf (63,50%)followed by the root (26,21%).Fresh (69%) form of remedy preparation was the highest followed by dried form(20%).The highest mode of preparation was Crushing(59,42%). The most widely used route of administration were Oral (31,37%) followed by dermal (24,28.9%).The most commonly used application of medicinal plants was drinking. The result of preference ranking exercise showed that *Ocimium lamiifolium* was the most preferred species by traditional healers for treatment of febrile illness. *Juniperus procera* was the most widely used multipurpose species. The major threat factor of medicinal plants in the study area was agricultural expansion. In order to protect biodiversity erosion and loss of indigenous knowledge, local communities must be trained and involved in conservation and management of plant resources and their indigenous knowledge. Also give attention for conservation of medicinal plants by cultivated in home garden.

Keywords: Ethnobotany, Indigenous knowledge, Remedy preparation, Traditional Medicine

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List of Acronyms

AFI	Acute Febrile Illness
AURTI	Acute Upper Respiratory Tract Infection
AWAO	Alelitu Woreda Agricultural Office
AWCTO	Alelitu Woreda Cultural and Tourism Office
EVM	Ethnoveterinary Medicine
EBI	Ethiopian Biodiversity Institute
FAO	Food and Agricultural Organization
TMPS	Traditional Medicinal Pant
TKMPS	Traditional Knowledge of Medicinal Plants
UTI	Urinary Tract Infection
WHO	World Health Organization

CHAPTER ONE

1. Introduction

1.1 Background and Justification

Plants are great source of medicines especially in traditional medicine, which are useful in the treatment of various diseases. Traditional medicine refers to the sum total of all the knowledge, beliefs and practices that are used in diagnosis, prevention and elimination of physical, mental or social imbalance and rely exclusively on practical experiences and observation handed down from generation to generation (WHO, 1998). In many parts of the world, medicinal plants have been used for antibacterial, antifungal and antiviral activities (Barbour *et al*., 2004 and Yasunaka *et al*., 2005).

According to Balick and Cox (1996) a number of important modern drugs have been derived from plants used by indigenous people. Traditional knowledge of medicinal plants (TKMPs) is also important for development of modern medicine (WHO, 2001; Luiz and Barbosa, 2012). Singh (2015) explained that medicinal plants are integral components of research developments in the pharmaceutical industry. Such research focuses on the isolation and direct use of active medicinal constituents, or on the development of semi-synthetic drugs, or still again on the active screening of natural products to yield synthetic pharmacologically-active compounds.

According to the world Health Organization, at least 80% of the people in developing countries depend largely on indigenous practices for controlling treatment of various disease affecting both human beings and their animals (WHO, 2002). Ethiopia is rich in its biodiversity as a

result of the different ecological and climatic conditions. This rich biodiversity is also favored for a wide range of disease causing agents. These diseases were tackled by herbal remedies and religious beliefs now and then (Dawit Abebe and Ahadu Ayehu, 1993). Medicinal plants and knowledge of their uses provide a vital contribution to human and livestock health care needs throughout Ethiopia.

As clearly articulated by Dawit Abebe (2001), there is a large magnitude of use and interest in medicinal plants in Ethiopia due to acceptability, accessibility, affordability and biomedical benefits. In line with this, the long history of use of medicinal plants is reflected in various medico- religious manuscripts produced on parchments and believed to have originated several centuries ago (Fassil Kibebew, 2001). However, the practice of using medical plants as a primary health care is not only common in economically poor countries but also is a common practice for primary health care in countries where conventional medicine is predominant in the national health care system.

1.2 Statement of the Problem

Medicinal plants are the integral part of the variety of cultures in Ethiopia and have been used over many centuries. They are sources of traditional medicine for the rural population and are of high demand in the health care systems of this population. As have been observed in various cultural practices and indigenious knowlegdes, most of the Ethiopian people are highly dependent on plant-based traditional medicne compared to modern medication. According to Mulugeta Kuma (2014), about 1000 identified medicinal plant species are reported in the Ethiopian Flora among the most species not yet identified. Of these identified types, about 300 species are frequently mentioned in many sources which are commonly applicable.

The distribution of knowledge and services of medicinal plants are hierarchically placed. The information is obtained from the family, neighborhood, and village or beyond. Knowledge from herbalists also transferred secretely from one generation to the next through verbal communication (Pankhurst, 1990; Vicchiato, 1993). Furthermore, there is very little ethno-botanical documentation on most medicinal species in the country.

In this view, documentation of traditional use of medicinal plant is important to preserve indigenous knowledge and the role of medicinal plant in traditional medicine (Dawit Abebe and Ahadu Ayehu, 1993; Pankhurst, 2001). Therefore, proper insight should be given to indigenous knowledge and traditional medicine because it is the basis of modern scientific knowledge (Abbink, 1995; Quanah, 1998). There is a need for further research to be done for all traditional medicinal plants in an effort to establish their uses and the active phytochemicals with medicinal properties. The information will help to bridge the

gap between modern medicine and traditional medicine making it possible to compliment the modern medicine.

To the best of my knowledge there is no research conducted on traditional medicine and indigenous knowledge of people in Alelitu district North shewa Ethiopia, thus this research targets on studying the medicinal plants use of the people in Alelitu Woreda before they become extinct. The finding of this research could also be used as a basis for future study on medicinal plants and knowledge of the people in the study area.

1.3 Research questions

The following research questions were used to address this research

- Are there Medicinal plants in Alelitu district?
- What are the main human and livestock health problems in Alelitu district?
- How do people control those human and livestock health problems or ailments?
- Which plant parts are used to treat human and ivestock ailments?
- How do people prepare and demonstrate those plant medicines in the study area?

1.4 Objectives

1.4.1General objective

The general objective of this study is to document indigenous medicinal plants use and knowledge of people in Alelitu Woreda North Shewa Zone of Ethiopia.

1.4.2 Specific Objectives

- To record and document medicinal plants species used by people in Alelitu woreda, North shewa Zone of Ethiopia.
- To identify plant species which are used to treat both human and livestock ailments
- To identify the plant parts used to treat human and livestock ailments
- To document the indigenous knowledge of the people on how they prepare herbal remedies treat health problems in the study area.
- To evaluate indigenous medicinal plant knowledge of the people on how to conserve medicinal plant species in the area
- To study the medicinal plant and document local knowledge about their utilization, conservation and management in Alelitu woreda

CHAPTER TWO

2. LITERATURE REVIEW

2.1 Ethnobotany and ethnomedicine in Africa

Ethnobotany refers to the scientific study of how peoples interact with plant resources within their ethnic group. Cotton (1996) defined ethnobotany as the study of the use of plants by aboriginal people or the relationship between human societies with natural vegetation. On the other hand, Martin (1995) defined ethnobotany as the study of people's classification, management and use of plants. In general, ethnobotany is a scientific investigation about use of plants such as cultures, food, medicine, construction, house hold utensil, fire wood, pesticides, clothing, shelter and other purposes (Urga Kelbessa *et al*., 2004). Ethno botany is an indispensable tool to identify and document plant species that have been underutilized by human beings for centuries for various reasons (Martin, 1995; Balick and Cox, 1996; Tilahun Teklehaymanot and Mirutse Giday, 2007).

Human beings have used plants for the treatment of diverse ailments for thousands of years (Sofowara, 1982; Hill, 1989).The health care need of about 80% of the population in most developing nation depend on traditional medicines (Cunningham, 1993; Elujoba *et al*., 2005). The World Health organization (WHO) has emphasized the importance of the traditional indigenous medicines, since a large majority of rural people in the developing countries still use these medicines as the first defense in health care (Goleniowski *et al*., 2006). The Traditional Medicine has been the focus for wider

coverage of primary health care delivery in Africa and the rest of the world (Elujoba *et al*., 2005).

The use of medicinal plants in Africa is significant mainly because traditional knowledge and cultural practices are widely common in African societies and of course herbal drugs are relatively cheap compared to the unaffordable costs of imported synthetic drugs (M.M.J MIinja, 1994).Of those African countries, communities living in Tanzania are known in using traditional herbal medications just to site as an example. A study by Mapiye and Sibanda (2005) has shown that large number of farmers deliver traditional medicine to chicken indicating that traditional medicines in some instances have potential to improve the health status of rural household flocks in countries like Botswana .

2.2 Medicinal plants in Ethiopia

Plants have been used as source of traditional medicine in Ethiopia to combat different ailments and human sufferings (Mirutse Giday, 2001). As mentioned in various local researches time and again, medicinal plants are widely used for primary health care and the people developed indigenous knowledge's on the use of herbal medications. Use of medicinal plants as a source of traditional medicine has been inherited through generations in the country. In Ethiopia, traditional remedies represent not only part of the struggle of the people to fulfill their essential drug needs but also they are integral components of the cultural beliefs and attitudes (Duru *et al*., 2006). The use of plants in religious ceremonies as well as for magic and medicinal purposes is very common and widely distributed in Ethiopia (Dawit Abebe, 2001)

According to Mulugeta Kuma's (2014) research the available modern health care services of the country are not only in sufficient, but also inaccessible and unaffordable to the majority. This problem along with the rapidly increasing human population and cultural resistance towards the use of modern medicines made the majority of the people in Ethiopia to depend on traditional medicines mainly of plant origin (Dawit Abebe, 2001).

2.2.1 Indigenous knowledge of medicinal plant in Ethiopia

Indigenous people of different localities have developed their own specific knowledge on plant resources, use, management and conservation (Cotton, 1996), According to Fassil Kibebew (2001); Mirutse Giday *et al.* (2003); Pankhurst, (2001) much of the earliest knowledge of plant remedies was not written down which makes the knowledge difficult to obtain . The knowledge of traditional medicine both for man and animal livestock is handed down from one generation to another through practical demonstrations or through oral communications. According to Mengistu Gebrehiwot (2010) People who have knowledge of plant remedies pass their knowledge to the person to whom they trust. The person who has knowledge on the identities and use of medicinal plant species transmits his expertise mostly to first born son in an incomplete way. Some of the knowledgeable people take their sons to the field and show the plants with medical value, tell the time when and the place where they are collected and the son is told not to share the skills of healing to anybody. These people pass their knowledge when they approach death and is transferred by oral communication.

Ethiopian people have their own set of written and or oral pharmacopoeias with the medicinal use of some species being restricted to each ethnic group. In Ethiopia, even though the traditional medical practitioners are the best sources of information about the

knowledge of the medicinal plants, it was found very difficult to obtain their traditional medicinal information as they considered their indigenous knowledge as a professional secret, only to be passed orally to their older son, at their oldest age (Jansen, 1981).

In this advanced age of modern education and a continued research on bioengineering, the local indigenous knowledge on medicinal plants is expected to be challenged. This advancement of modern education and research on modern medication hoped has made the younger generation to underestimate the herbal medication traditional values in addition to the absence of a structured ways of transferring the traditional knowledge from one generation to the other since the mode of knowledge transfer is oral based. In this case, Ethiopia's ancient church practices could be taken as a pioneer in documenting some of the traditional knowledge on herbal medication as inscribed in parchments. This traditional medical system usually described as medico religious written in Geez manuscripts of the 15 century according to (Gelahun Abate 1989), Dawit Abebe and Ahadu Ayehu, 1993). In the Ethiopian case, people living in rural areas know that these traditional remedies are valuable sources of natural products to maintain human health based on their personal experiences as exposed to practical attachments. But the people may not understand the science behind these medicines and only know that some medicinal plants are highly effective when used at therapeutic doses (Van Wyk *et al*., 2000).

2.2.2 Plants of ethnoveterinary medicine in Ethiopia

In developing countries like Ethiopia, crop production and economy of the population depend on livestock. According to United the Nations Food and Agricultural Organization (FAO), the lack of drugs to treat the disease and infections results in loss of

30-35% in the breeding sector of many developing countries, where poor animal health remains the major constraint to increase production (FAO, 2002).Plants are the most commonly used ingredients in the preparation of ethnoveterinary medicines(EVM). Veterinary medicine is the branch of medicine that deals with the prevention, diagnosis and treatment of disease, disorder and injury in animals' Ethnoveterinary medicine studies traditional knowledge, folk beliefs, skill, methods and practices used for the treatment of livestock ailments (Tabuti *et al*., 2003).

The application of traditional medicines to veterinary medicine has been termed as Ethno Veterinary Medicine (EVM). EVM has been defined in broad sense as an indigenous animal healthcare system that includes traditional beliefs, knowledge, skills, methods and practices of a given society. According to Misra and Kumar (2004), EVM is the community-based local or indigenous knowledge and methods of caring for, healing and managing livestock. The majority of livestock raisers in Ethiopia are the geographically distant from the site of veterinary stations and those that are closer to the sites may not afford the fees for services Fitsum Dulo and Amere Mekonnen (2017). According to Mirutse Giday and Gobena (2003), most commercial drugs are expensive for farmers and pastoralists. Therefore, most of the farmers and pastoralists rely on their traditional knowledge, practice and locally available materials (plants) in controlling diseases of their domestic animals.

In many poor rural areas, ethnoveterinary medicine can play an important role in animal production and livelihood development, and often becomes the only available means for farmers treat ill animals (Tamboura *et al*., 2000, Jabbar *et al*., 2005, Shical *et al*., 2010).Conventional veterinary service is still less developed in the country, which is

characterized by lack of adequate animal health infrastructure, veterinary clinics, and veterinarians. Furthermore, most modern drugs are expensive and not affordable to the majority of Ethiopian farmers and pastoralists. Ethnoveterinary medicine provides traditional medicines, which are locally available and usually cheaper than standard treatments. Farmers and Livestock holders can prepare and use homemade remedies with minimum expense. Many livestock holders in rural areas where there are relatively few veterinarians and shortages of other facilities, traditional medicinal plants are the only choice to treat many ailments (McCorkle, 1995).

2.2.3 Research on medicinal plants in Ethiopia

Ethiopia, is a country characterized by a wide range of climate and ecological conditions, possesses enormous diversity of fauna and flora (Pankhurst, 2001). Due to this difference ecological and climatic condition, the country possesses a wide range of potentially useful medicinal plants. Researches showed that traditional medicinal plants are still playing a significant role in meeting the basic health care need of the people in Ethiopia (Miruse Giday *et al*.,(2006). Ethnobotanical research involved in documenting how plants are identified, classified by local people in different part of the world.

The greater concentrations of medicinal plants are found in the south and south western parts of Ethiopia following the concentration of biological and cultural diversity (Edwards, 2001). Many researchers try to document medicinal plants in this part of country. For example Behailu Bizuayehu and Temesgen Assefa(2017) medicinal plants in Cheha district, Guraghe Zone, Southern Ethiopia,Habtamu Agisho *et al*., (2014) in HadiyZone,ketema Tolossa *et al*.,(2013) in South Omo, Southern Ethiopia.

The researchs on medicinal plants in western side of Ehtiopia by Endalew Amenu (2007) in Ejaji area (Chelya woreda), In eastern Tigray by Yemane Tilahun (2018), Hailu Atnafu *et al*., (2018) in Selale mountain ridges North Shewa, by Mulugeta Kuma (2014) in Jima rare district in oromia region in Fafan Zone and by Teka Feyera *et al*.,(2017) in eastern side of Ethiopia, all of those researchers tried to document many medicinal plants used to treat human and livestock aliments. However, in many developing countries, medicinal plants have not been well studied, tested or documented. Most of the information is still in the hands of traditional healers and knowledge of healers is either lost or passed to generation by the word of mouth. Thus, ethnobotanical research attempts to document the knowledge of the healers in the community in order to reserve it for future use Tesfaye Seifu (2004).

2.2.4 Threats of medicinal plants in Ethiopia

Ethiopia's traditional medicine, as elsewhere in Africa, is faced with problems of continuity and sustainability (Ensermu Kelbessa *et al*., 1992).Nowadays herbal practitioners have to walk longer distance for collection of herbal medicine that once grew in the vicinity of their homes. This is because the availability of plants has been affected by a dramatic decrease of vegetation. The primary causes of this problem are loss of taxa of medicinal plants, loss of habitats of medicinal plants and loss of indigenous knowledge (Ensermu Kelbessa *et al*., 1992).

According to Zemede Asfaw (2001), medicinal plants are considered to be at conservation risk due to over use and destructive harvesting (roots and barks collection).According to Ensermu Kelbessa *et al*. (1992) and Edwards (2001), habitat and species are being lost rapidly as a result of the combined effects of environmental

degradation, agricultural expansion, deforestation and over harvesting of species and this is further enhanced by human and livestock population increase thus hastening the overall rural livelihood impoverishment and loss of the biological diversity and indigenous knowledge which is also of global concern since some of this are endemic to Ethiopia.

2.2.5 Conservation and sustainable utilization of Traditional medicinal plants (TMPs) in Ethiopia.

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 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. The Ethiopian Biodiversity Institute has pledged to do this in its long range strategic research plan (EBI, 2000). However, there exists an accelerated devastation of plant resources with loss of indigenous knowledge.

Zemede Asfaw (2001) explained that medicinal plants can be conserved by ensuring and encouraging their growth in special places, as they have been traditionally, this can be possible in places of worship (churches, mosques, grave yards, etc.), scared grooves, farm margins, river banks, road sides, live fences of gardens and fields, also can be conserved using appropriate conservational methods in gene banks and botanical gardens. This type of conservation of medicinal plants can also be possible in home gardens, as the home

garden is strategic and ideal farming system for the conservation, production and enhancement of medicinal plants. According to Cunninghum (1996), Medicinal plants around the world designed to protect from further damage in in-situ and ex-situ conservation measure.Both in-situ and ex-situ conservation efforts are implemented to capture medicinal plants genetic resources. In-situ conservation is conservation of species in their natural habitats.

CHAPTER THREE

3. MATERIALS AND METHODS

3.1 Description of study area

3.1.1 Location of the study area

The study was conducted in AlelituWoreda, Oromia Region, North Shewa Zone in North central Ethiopia. Alelitu is one of the woreda in the Oromia region of Ethiopia. It was part of former Berehna Alelitu Woreda of the North Shewa Zone. The study area lies between latitude 9^0 20'0'' and $9^0$5'0'' North and longitudes 39^0 0'0'' and $39^0$15'0'' East with total area of about 48418 hectares. The altitude of the study area ranges between1700-2900 meters above sea level. This woreda is subdivided in to 20 rural kebeles and 3 urban kebeles. The administrative town of Alelitu woreda is Mikewa which is located 55km north of Addis Ababa on the Dessie road (Alelitu woreda culture and truism office, AWCTO, 2019)

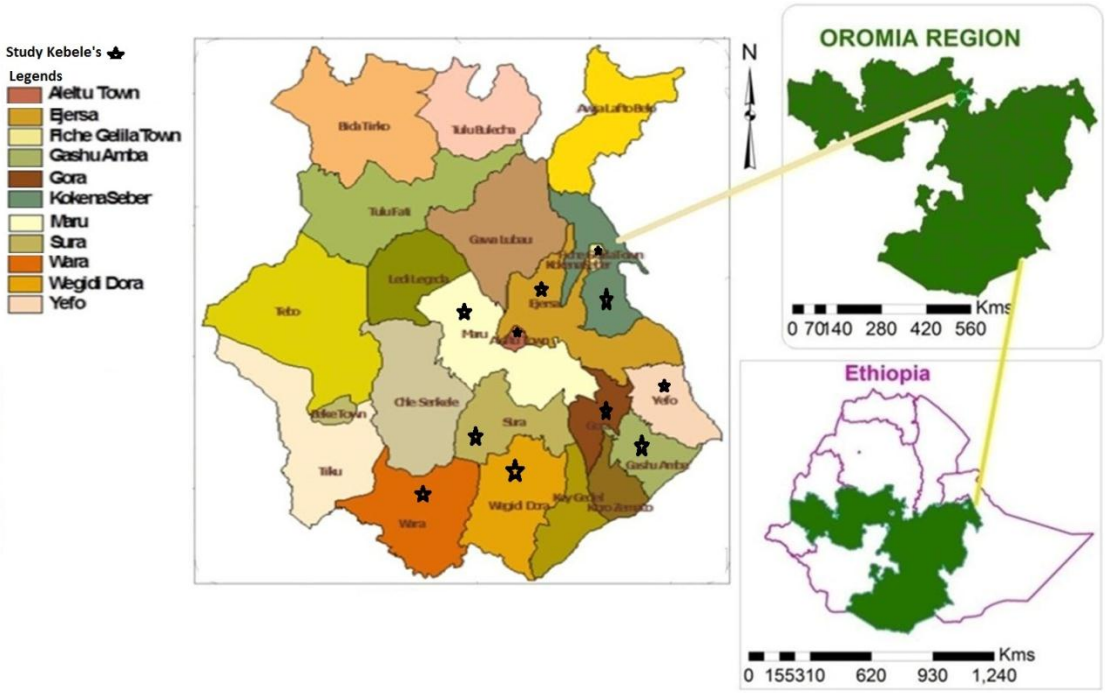

Figure 1: Map of Ethiopia Showing the Study Site

3.1.2 Climate

The climatic condition of Alelitu woreda is subdivided into three agroecolgical zones Dega $36^0/_0$, Woinadega $49^0/_0$ and Kola $15^0/_0$. The maximum temperature of this woreda is 26^0 c and the minimum is 15^0 c. The area obtains higher rain fall between July to August with average Rainfall of 1143ml. Mostly from October to February the district exhibits dry season. The woreda is located in highland mixed livelihood system. Rain fed production of a wide range of highland cereals including teff, wheat and pulses is commonly practiced (AlelituWoreda administrative office, 2018).

3.1.3 Population

The 2007 National Census reported a total population of this woreda is 53,414 of whom 27,109 were men and 26,305 were women. However, data obtained from the woreda

office; shows that the total population of the woreda from 1990-2010 was about 32224-32874, currently the total population is estimated about 66472.The woreda has three urban centers that is Mikewa, Woneda and Fiche Gelila. About $87^0/_0$of population live in rural area and the other $13^0/_0$ lives in urban areas. The life of the rural population is based on farming and livestock rearing. The majority of residents are from the Oromo ethnic group, the major language is Afan Oromo but peoples spoke both Afan Oromo and Amharic, however, the residents of Kola and some areas of Woina dega peoples belong to the Amhara ethnic group(Alelitu woreda administrative office, unpublished).

3.1.4 Status of Human Health services in the District

The study area has four health centers and 20 health posts; In addition there are three private clinics. Alelitu woreda health center(2009) reported the first ten top major disease as acute febrileillness(AFI),acute upper respiratory infection (AURTI), Trauma, Dyspepsia, Helminthiasis, Urinary tract infection(UTI), skininfection, Intestinal parasites, Disease of Eye and Admexa, Pneumonia (Alelitu woreda health center office, unpublished)

3.1.5 Livestock population and status of veterinary services in the Destrict

The number of livestock population in Alelitu woreda shows the presence 98644 Cattle, 105196 Sheep, 10247 Goat, 53736 Hen local breed,17912 exotic,71648 total hen, 6705 Horse,311 Mule and 17970 Donkey. Total livestock population in the woreda is about 310721.In addition to this there is 1142 modern and local beehive in the woreda (Alelitu Woreda agricultural office 2018). The most common top ten livestock diseases either suspected or confirmed in the woreda(2009) are pasteurellosis, shoat pox, black leg,

Necatel Disease, African Horse Sickness, Foot Rot, Mastitis, Salmonellosis, Lumpy Skin Disease and Rabies (Alelitu woreda Veterinary health center,2011).

Table 1: Number of Livestock population in the study area

Live stocks	**Total**
Cattles	98644
Sheep	105196
Goat	10247
Hen	71648
Horse	6705
Mule	311
Donkey	17970
Total	310721

Source: Modified from (AWAO, 2019)

3.1.6 Vegetation, soil and major crop cultivation

The study area has various types of soil including Loam soil ($50^0/_0$), sandy ($70^0/_0$), sandy loam soil ($10\ ^0/_0$), clay soil ($15^0/_0$) and silt ($5^0/_0$). The land in the study area is classified through functional categorization that is 16% grazing land, 67% agricultural land, 5.8% forest land, 7.75% for construction and 3.47% for other purpose. People in study area lead their life based on cultivation of crops and livestock raring, so different types of crops are cultivated. However fruit production is rare, Lentil, Teff and Wheat are the major cash crops in the woreda (AWAO, 2011).

Table 2: List of major food crops cultivated in study area

Crop categories	Sintific name	English name	Local name
Cereals	*Triticum aestivum* *Hordeum vulgare* *Zea mays* L. *Sorghum bicolor* L. *Eleusine coracana* (L.)Gaertn *Eragrostis tef*	wheat barley maize Sorghum Finger millet Teff	Qamadii Gaarbuu Boqqolloo Boobee Dagussa Xaafii
Pulses	*Vicia faba* L. *Pisum sativum* L. *Cicer aestivum* *Lens culinaris* *Phaseolus vulgaris* L.	Bean Pea Chickpeas Lentil Haricot beans	Baaqelaa Atar Shinbera Misir Adenguare
Oil crops	*Linum usitatissimum* L. *Brassica carinata* A.Br	Lin seed Kale seed	Talibaa Gomenzer
Vegetables	*Brassica integrifolia* *Lycopersicon esculentum* Mill *Allium sativum* L. *Allium cepa* L. *Capsicum annuum* L. *Spinacia oleracea L.*	Cabbage Tomato Garlic Shallot Berbere spinach	Tkilgomen Timatimii Qullubbii adii Qullubbii Barbaree
Root crops	*Daucus carota* *Beta vulgaris*	Carrot Sugar beet Potato	Carotii Keysir Dinich

Source: Modified from (AWAO, 2011)

3.2. Methods

3.2.1 Reconnaissance Survey and Selection of study sites

A reconnaissance survey of the study area was conducted from September to December 2018 so as to get the general impression of the study site. Basic information was collected from Alelitu woreda offices members and local people before conducting field study. The study area includes 20 rural kebeles and 3 urban kebeles, from this 11kebeles (Maru, Wegide, Ejersa, Geshu Amba,Yefo, Fichgelila, Kokenesseber, Wara, Sura, and Mikewa) were selected based on the information about the availability of medicinal practitioners .And the other criteria considered for selecting the study kebele was based on agro ecology (Kola, dega and woina dega).

3.2.2 Selection of informants

For this study, 80 informants were selected from 11 kebeles. Of those informants, 20 key informants were selected purposively based on the information locally gathered regarding their knowledge about medicinal plants. The rest 60 informants were selected purposively based on local knowledge and using snowball Sampling method and informants were asked to provide information about the medicinal plants that could be used to treat human and livestock disease. The age of informants ranges from 26 to 80 years. Of the respondents, 57 were male and 23 of them were female. Regarding marital status, 61 of the informants were married and 19 of them were unmarried and divorced. As their educational status is concerned, 64 of them can read and write but 8 of them cannot read and write while other 8 were grade 10 completed (Table 3).

Table 3: Profile of the informants in study area

Age Range	**Male**	**Female**	**Total**	**percent**
26-36	20	5	25	31%
37-46	21	6	27	34%
47-56	9	8	17	21 %
57-66	3	2	5	6 %
67-80	4	2	6	8 %
Total	57	23	80	
Marital status	**male**	**Female**	**Total**	**Percent**
Married	45	16	61	76%
Unmarried	12	7	19	24%
Educational	**Male**	**Female**	**Total**	**Percent**
Read and write	47	17	64	80%
Illiterate	5	3	8	10%
Completed	5	3	8	10&

3.2.3 Ethnobotanical data collection

Ethnobotanical data were collected between January- May, 2019, following the methods used by Martin (1995), Cotton (1996) and Cunningham (2001) with four field trips. Accordingly, semi-structured interview, guided field walk, group discussions and market survey with key informants were applied to obtain indigenous knowledge (IK) of the local people on medicinal plants. Key informants were first interviewed about their biography, knowledge about traditional medicinal plants followed by woreda sharing knowledge and about the local names of medicinal plants used to treat diseases, source of collection, type of health problem treated, which part of plants used, methods of preparation, route of application, dosage, side effects of the treatment, uses of the plants other than medicine. The data were held based on check list of semi structured interviews (Appendix 10).Group discussions were focused on treatment, conservation and the way of transfer of knowledge to new generation about medicinal plants during the time.

3.2.3.1 Semi-structured interviews

Semi-structured interview was prepared and done following Martin (1995) and Cotton (1996) and information about medicinal plant species, parts used, source of medicinal plants, method of preparation, routes of administration, health problem treated, the conservation and management practices they follow to safeguard traditional medicinal plants (Appendix 10).

3.2.3.2 Direct field observation and guided garden walk

Guided field observation was done with the help of informants; source of the medicinal plants was observed and representative images were taken. Guided field interview was made with informants and all relevant data including the vernacular names of plants, habit, habitat of the plant, the parts used, the preparation methods, modes of administration, disease condition treated as well as the strategies they use for the conservation of medicinal plants and the preservation of the indigenous knowledge on medicinal plants were recorded. Field observations were performed with the help of local guides who knows the study area and sources of medicinal plants.

3.2.3.3 Group discussions

Group discussions were conducted on threats, conservation of medicinal plants and transfer ability of IK in the community in the study sites. One group discussion was conducted in Mikewa kebele with seven members (5 Men and 2 Women) participants were selected from total informants based on their knowledge about medicinal plants to understand and gain further information on the traditional medicinal system of the people and its management, conservation and to know how the knowledge is maintained and transferred from one generation to other generations.

3.2.3.4 Market survey

During the study, three market surveys were made to record the names of the medicinal plants and other aspects of herbal drugs sold in the Mikewa local market of the study area.It was done on April 2019 in Alelitu Market to distinguish and record the type of medicinal plants sell in the market. In addition, sellers and others who brought plant species were interviewed for what purpose they use, price, and part of the plant and how they are administered.

3.2.4 Botanical data collection

3.2.4.1 Specimen collection

Voucher specimens of medicinal plants were collected between June10 to17, 2019 with two field trips. Based on Ethnobotanical information provided by informants, specimens were collected from their natural habitats (wild and home garden), numbered, pressed, and dried for identification.

3.2.4.2 Specimen identification

Preliminary identification of medicinal plants was done in the field and local names of medicinal plants, their uses and application methods recorded accordingly. In addition, identification of unidentified medicinal plants was carried out with the support of experts from the National Herbarium at Addis Ababa University and scientific name of those identified traditional medicinal plants searched using taxonomic key in the Flora of Ethiopia and Eritrea Then, identified specimens were confirmed by my Advisor, Doctor Ermias Lulekal and stored at the National Herbarium, Addis Ababa University.

3.2.5 Data analysis

3.2.5.1 Descriptive statistics

Ethnobotanical data were entered in to excel 2007 and SPSS version 20 software and analyzed with descriptive statistical methods and explained with frequency distribution and percentage. All useful information about medicinal plants, medicinal value, growth form, habitats, and health problem treated, parts of plants used were recorded as per the information obtained from the local people. In line with this issue, methods of preparation, way of application and route of administration were analyzed through descriptive statistical analysis. In addition table, pi-charts and graphs were used to summarize the data on medicinal plants.

3.2.5.2 Preference and direct matrix ranking

3.2.5.2.1 Preference ranking

Preference ranking activity was carried out following Martin (1995). The exercise was done for those ailments reported to get treated by more than two medicinal plants. Ten informants were selected based on their local knowledge considering the information gathered from the local people and asked to rank seven medicinal plants which are used for treatment of Febrile illness (Mich) based on high frequency of report. Each informant was asked to assign the highest value 7 for plant species most preferred to treat a disease and the lowest value 1 for the least preferred plant. Finally, the total value was identified and the rank of each species was stated by integer values. These helped to indicate the most effective medicinal plants for treating Febrile illness (Mich) and the most threatened plant species.

3.2.5.2.2 Direct matrix

Direct matrix ranking was carried out following the methods of Martin (1995) and Cotton (1996) to compare the multipurpose use of plant species. Based on the information gathered from the informants six medicinal plants with six use values were selected and identified. Seven key informants were selected for both applications and score five for highest value and one for least value were given based on the effectiveness in use. Finally, the total score summed up and ranked. The ranks of value help to show the use diversity of medicinal plants as well as to identify the main cause for threatened plant species.

CHAPTER FOUR

4. Results

4.1 Ethnomedicinal plant species used by people of Alelitu Woreda

4.1.1 Diversity of medicinal plants in study area

A total of 83 medicinal plants species used for the treatment of human and livestock ailments were gathered and documented. Out of these 57, (68.7%) species were used as treat human ailments, others 9,(10.8%) species were used to treat livestock ailments, the remaining17, (20.5%) species were used to treat both livestock and human ailments.The collected medicinal plants in the study area belong to77 genera and 43 families.The family Asteraceae was represented by the highest 10 (12%) species, followed by Lamiaceae 7(8.4%) Solanaceae 6(7.2 %), Euphorbiaceae 5(6%) species, the Rubiaceae 4(4.8%) and the Fabaceae 3(3.6%) species. On the other hand the Family Acanthaceae, Alliaceae, Apiaceae, Brassicaceae, Malvaceae, Moraceae, Myrsinaceae, Rhamnaceae and Rosaceae represented by 2(2.4%) species each. The other remaining 28 families were represented by single species each (Appendix 2).

4.1.2 Habit or growth form of medicinal plants

The growth form of analysis of medicinal plants collected in the study area shows that herbs were the highest number with 42 (50.6%) followed by shrubs 29 (34.9%) (Table 4)

Table 4: Growth forms of medicinal plants in Alelitu Woreda

	Habit	**Frequencies**	**Percent**
1	Climber	3	3.6
2	Grass	1	1.2
3	Herb	42	50.6
4	Shrub	29	34.9
5	Tree	8	9.6
Total		**83**	

4.1.3 Habitat of medicinal plants

From the 83 medicinal plant species the highest number of species was collected from the wild (63, 75.9%) followed by homegarden about (20, 24.1%) species (Table 5)

Table 5: Habitat of medicinal plants in Alelitu Woreda

	Habitat	Frequencies	Percent%
1	Wild	63	76.9
2	Home garden	20	24.1
Total		**83**	

4.1.4 Parts of medicinal plants for preparation of remedies

The most widely used plant part for remedy preparation were leaves (63, 50%), followed by roots (26, 21%) (Table 6)

Table 6: Parts of medicinal plants for remedy preparation

	Part used	Frequencies	Percent%
1	Leaf	63	50
2	Root	26	21
3	Seed	14	11
4	Fruit	4	3
5	Bulb	2	1.6
6	Bark	3	2.4
7	Flower	2	1.6
8	Root and Leaf	2	1.6
9	Latex	2	1.6
10	Rhizome	1	0.8
11	Milk	2	1.6
12	Sap	1	0.8
13	Stem	1	0.8
14	Leaf and Bark	1	0.8
15	Shoot	2	1.6
Total		**126**	

4.1.5 Condition of preparation of remedies

Local people in the study area prepare remedies for human and livestock ailments in different forms such as fresh form, dry form, dry or fresh form about 69% of the remedies were prepared in fresh form followed by dried form (Figure 2)

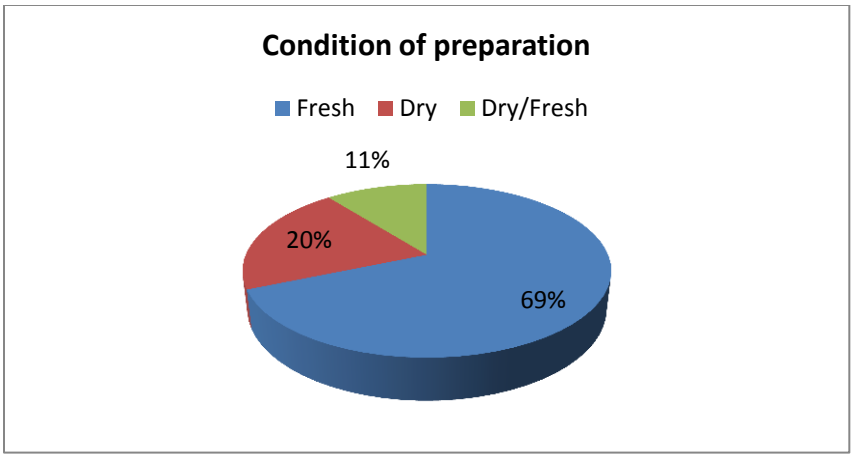

Figure 2: Condition of preparation of remedies

4.1.6 Preparation methods of medicinal plants

The people in study area used different methods of remedies preparation for various type of human and livestock ailments. The principal method of preparation were crushing (59, 42%), followed by Crushing and squeezing (19,13.7%) and Boiling (10,7 %), The other methods of preparation were pounding, powdering, crushing and smashing, roasting, cooking and cutting (Table7)

Table 7: Method of preparation of remedies in Alelitu woreda

Preparation	Frequencies	Percent%
Crushing	59	42
Crushing and squeezing	19	13.7
Boiling	10	7
Cutting	5	3.6
Powdering	9	6.5
Pounding, powdering	7	5
Roasting	4	2.9
Crushing and boiling	1	0.7
Pounding	9	6.5
Crushing and smashing	6	4
Drying and fumigate	3	2
Grinding	3	2
Cooking	3	2
Squeezing	1	0.7
Total	**139**	

4.1.7 Route of administration and dosage of medicinal plants

According to the informants report, dosage have no uniformity, it was based on strength of disease, age and physical strength of patients. The dose given to the patients is estimated using pinch of finger and spoon for powder, using measurements like glass, cup, can, and glass of local drink called Areke. The most widely used method of administration was oral (31, 37%), followed by dermal (24, 28.9%) (Table 8)

Table 8: The route of administration of medicinal plants in Alelitu Woreda

	Administration	Frequency	Percent%
1	Dermal	24	28.9
2	Oral	31	37.0
3	Nasal	1	1.2
4	Dermal/ Oral	8	9.6
5	Dermal / Nasal	4	4.8
6	Nasal &Oral	2	2.4
7	Fumigate	3	3.6
8	Optical/Dermal	1	1.2
9	Tooth surface	2	2.4
10	Dermal/ / Sniff	1	1.2
11	Dermal/oral/Nasal	1	1.2
12	Sniff t surface	1	1.2
13	Oral/Dermal/Optical	1	1.2
14	Oral/auricular	1	1.2
15	Nasal/Oral	2	2.4
	Total	**83**	

4.2 Medicinal plants used to treat human ailments

4.2.1 Major human disease and number of plant species used by indigenous people

In this study area informants reported a total of 32 various human ailments. The most frequently cited 10 diseases by informants were Febrile illness (Mich), Common cold, Evileye, Tapeworm, Hypertension, Quaqucha, Gastrits, Hemorrhoid, Cough, Stomachache. While Ascaris and Jaudice were the last reported human disease. A total of

57 species of medicinal plants were reported to treat those 32 human ailments (Appendix 8).

4.2.2 Habit or growth form of medicinal plants used to treat human ailments

Regarding the growth form of medicinal plants herbs with 32 species (56%) were the highest, followed by shrubs with 18 species (32 %) and Tree were represented with few species (Figure 3)

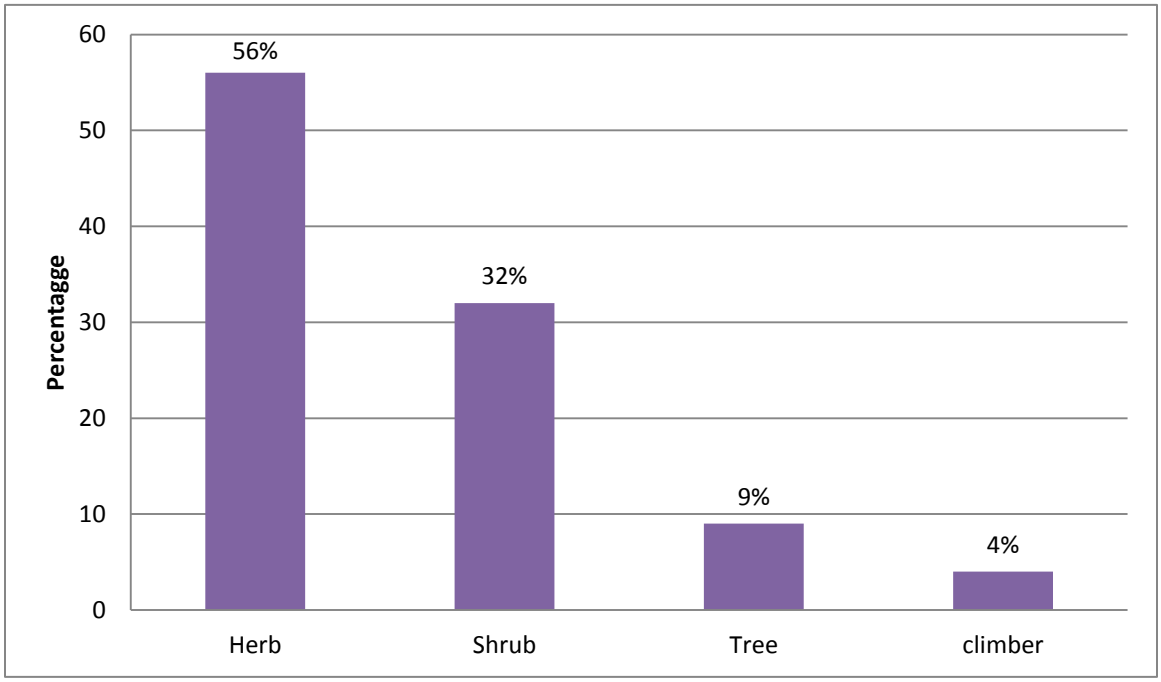

Figure 3: Habits of medicinal plants used for human ailments

4.2.3 Habitat of medicinal plants used to treat human ailments

The highest number of species were gathered from wild (39, 68 %) followed by home garden (18, 32 %) (Table 9)

Table 9: Habitat of medicinal plants for human

Habitat	Frequencies	Percent%
Wild	39	68
Home garden	18	32
Total	**57**	

4.2.4 Parts used and mode of preparation of medicinal plants used to treat human ailments

Leaves were found the most dominantly used (32, 45%) plant parts for remedy preparation followed by root (12, 16.9%) and seed (15, 5%) (Table10).

Table 10: Parts of medicinal plants for preparation of remedies for human ailments in Alelitu Woreda

	Part used	Frequencies	Percent%
1	Leaf	32	45
2	Root	12	16.9
3	Seed	11	15.5
4	Fruit	3	4.2
5	Flower	2	2.8
6	Root/ Leaf	1	1.4
7	Bark	1	1.4
8	Stem	1	1.4
9	Rhizome	1	1.4
10	Bulb	2	2.8
11	Milk	2	2.8
12	Shoot	2	2.8
13	Sap	1	1.4
	Total	71	

The local people in the study area employed various methods of preparation of medicinal plants for different types of human ailments. The principal method of remedy preparation was Crushing (23, 31.8%), followed by crushing and Squeezing (11, 15.9%) (Table 11)

Table 11: Mode of preparation of medicinal plants for treating human ailment in Alelitu Woreda

	Mode of preparation	**Frequencies**	**Percent%**
1	Crushing and Squeezing	11	15.9
2	Grinding and Powdering	2	2.9
3	Crushing	23	33
4	Cooking	1	1.4
5	Cutting	2	2.9
6	Dried and fumigate	3	4
7	Grinding	1	1.4
8	Boiling	5	7
9	Smashing	3	4
10	Pounded and Squeezed	2	2.9
11	Smoking	2	2.9
12	Roasting and powdering	2	2.9
13	Pounding	2	2.9
14	Pounding, powdering	6	8.7
15	Powdering	4	5.8
	Total	**69**	

4.2.5 Route of administration

The most frequently reported route of administration was oral (35, 61%) followed by dermal (20, 35%) (Figure 4)

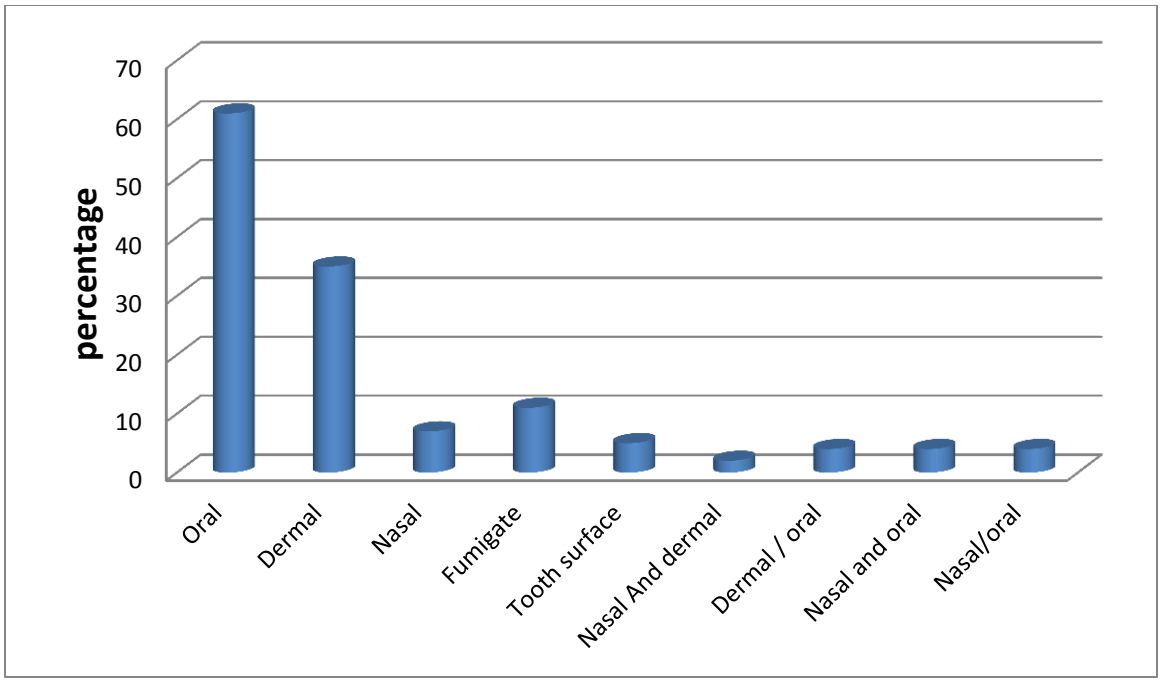

Figure 4: The route of administration of medicinal plants

4.2.6 Route of administration and application of medicinal plants

Medicinal plants were applied in different ways, including drinking which accounts 35%, followed by painting which accounts 10%, tying which accounts 6%, Chewing which accounts 6%, washing which accounts 4%, dropping which accounts 4%, the least application methods were creaming which accounts 2% and Sniffing which accounts 2%.

4.2.7 Preference ranking

Preference ranking of seven medicinal plants reported for treating febrile illness was conducted after selecting 10 informants based on their indigenous knowledge about medicinal plants and asked to ranking and gives the highest number seven (7) for most effective and gives one (1) for the least effective medicinal plants. *Ocimum lamiifolium* scored first and hence identified as most effective and *Otostegia integrifolia* scored the last (Table 12)

Table 12: Preference ranking of medicinal plants to treat Febrile illness/ Mich

	Respondents(R_1----------R_{10})											
Medicinal plants	**R_1**	**R_2**	**R_3**	**R_4**	**R_5**	**R_6**	**R_7**	**R_8**	**R_9**	**R_{10}**	**Total**	
Withania somnifera	4	1	5	2	5	7	6	4	3	2	39	**4th**
Echinops kebericho	6	7	6	5	4	2	3	5	6	1	43	**3rd**
Ocimum lamifolium	7	5	3	6	6	6	2	2	7	4	56	**1st**
Silene macrosolen	3	6	7	1	7	1	4	6	5	5	45	**2nd**
Ocimum urticifolium	5	3	4	3	3	5	7	1	1	3	35	**6th**
Salvia nilotica	2	4	1	4	2	3	5	7	2	7	37	**5th**
Otostegia integrifolia	1	2	2	7	1	4	1	3	4	6	31	**7th**

4.2.8 Direct matrix ranking

The result of direct matrix ranking for multipurpose species of medicinal plants in the study area showed that *Juniperus procera* scored first and followed by *Eucalyptus globulus.* (Table 13)

Table 13: Direct matrix ranking of eight multi purpose medicinal plant species in Alelitu Woreda

(5 = best 4 = very good 3 = good 2 = less used 1 = least used 0 = not used)

Use	**Medicinal plant species**								
	Juniperus procera	*Eucalyptus globulus*	*Maesa lanceolata*	*Croton macrostachyus*	*Buddleja polystachya*	*Hagenia abyssinica*	*Dodonaea angustifolia*		
K.informants	R_1	R_2	R_3	R_4	R_5	R_6	R_7	Total	Rank
Furniture	5	5	1	2	2	3	1	19	4th
Timber	4	3	3	0	0	1	0	11	6th
Firewood	2	4	2	4	4	3	5	24	2nd
Charcoal	3	1	4	3	3	5	3	22	3rd
Construction	4	3	1	2	0	2	1	13	5th
Fence	5	5	4	5	5	3	3	30	1st
Total	23	21	15	16	14	17	13		
Rank	1st	2nd	5th	4th	6th	3rd	7th		

4.3 Major livestock disease and number of plant species used by indigenous people of study area

Informants reported a total of 13 different livestock ailments. Among this frequently cited by informants were Leech, Eye disease, Fasciola, Anthrax and Sudden sickness (Appendix 9).Of total collected medicinal plants 9 species were reported to treat only livestock ailments and those 13 livestock ailments were reported to be treated by 26 medicinal plants in the area.

4.3.1 Habit of medicinal plants used to treat Livestock ailments

Medicinal plants collected from the study area used to treat livestock ailments had various growth form, herbs with (56%) was dominantly used (Figure 5)

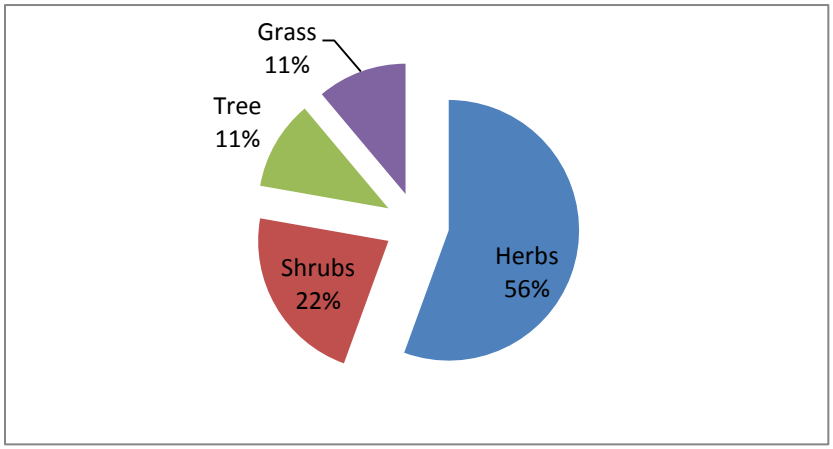

Figure 5: Habit of medicinal plants for livestock ailments

4.3.2 Habitat of medicinal plants used to treat Livestock ailment

Medicinal plants which were used for treating of livestock ailments were gathered from various sources. The highest 7(78%) of species were gathered from the wild (Figure 6)

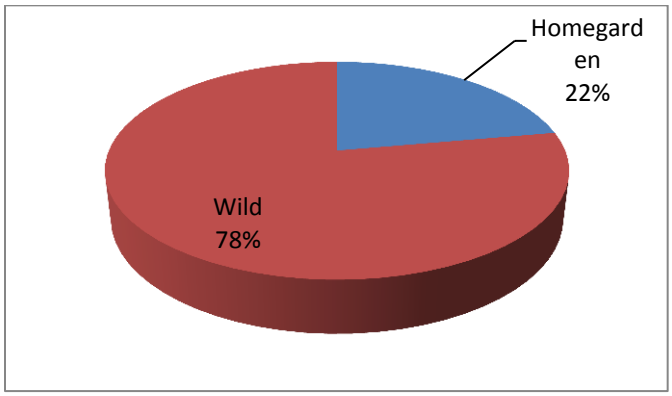

Figure 6: Habitat of medicinal plants for Livestock

4.3.3 Plant parts used and mode of preparation

Regarding the part of medicinal plants used to remedy preparation for livestock ailments, about 82% of the parts reported used were leaves ,whereas the leaf and root and root were the last(Figure 7). The mode of preparation of these medicinal plants includes crushing, crushing and squeezing, crushing and smashing and pounding. 64% of preparation was reported to be by crushing followed by crushing and squeezing (Figure 8)

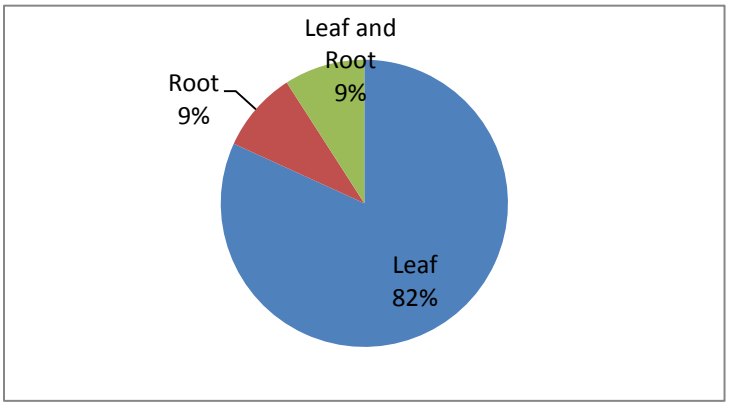

Figure 7: The parts of medicinal plants for remedy preparation only for Livestock

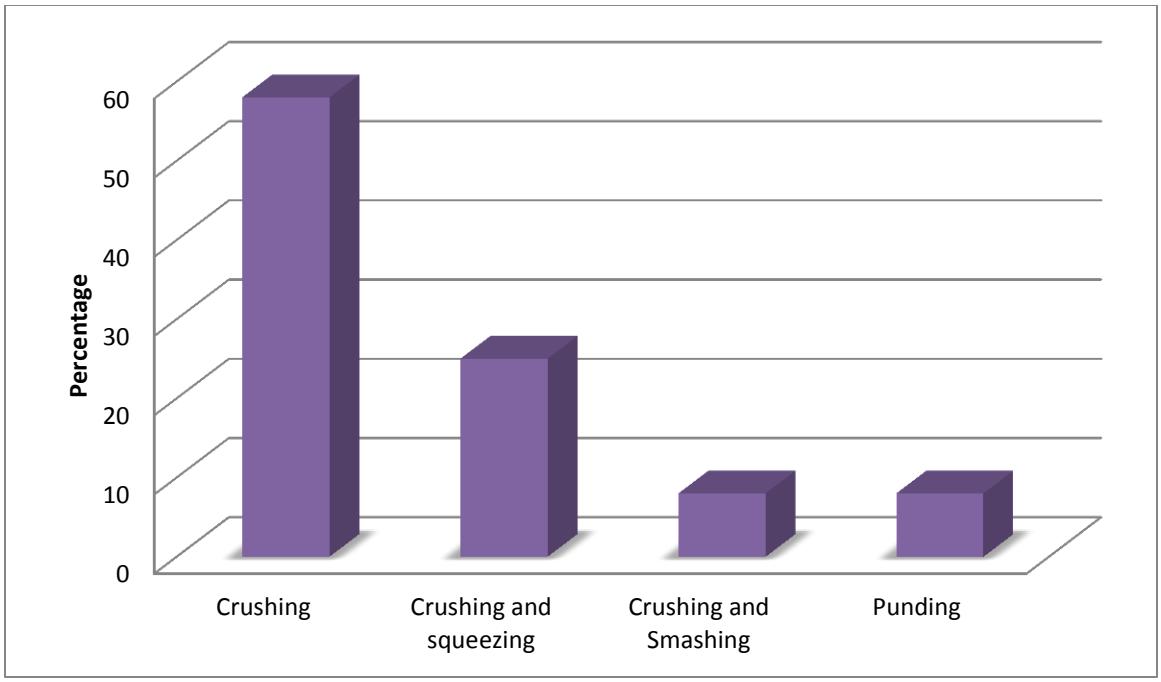

Figure 8: Mode of preparation of medicinal plants only for livestock

4.3.4 Application and route of administration

Drinking was the highest route of administration which accounted for 55%, followed by painting which accounts 9%, Oral application was the highest 55%, followed by dermal 36% and the last was Nasal (Figure 9)

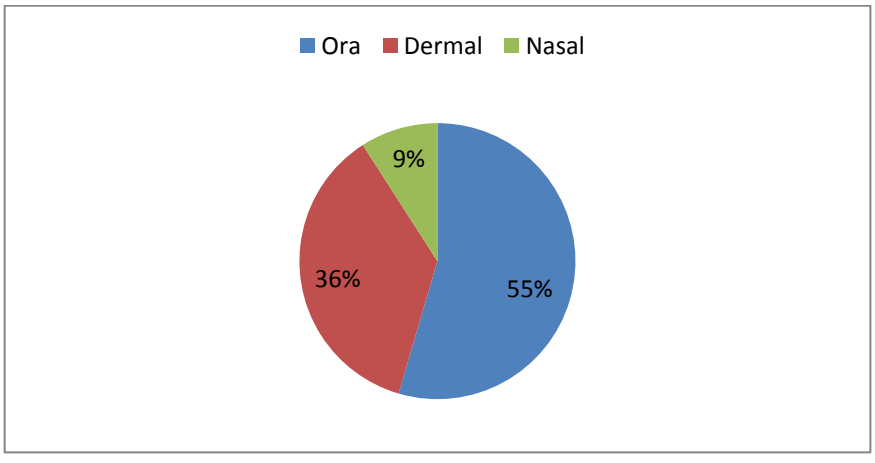

Figure 9: Route of administration of medicinal plants for Livestock

4.4. Medicinal plant species used to treat both livestock and human ailments

A total of 17 species of medicinal plants belongs to 14 families and 16 genera were reported for the treatment of both human and livestock ailments in the study area. The family Euphorbiaceae was represented by three species followed by Polygonaceae with 2 species. These medicinal plants reported to treat 26 health problems of human and livestock ailments (Appendix 5)

4.4.1 Habit of medicinal plants used to treat both Livestock and human ailments

This study showed that medicinal plants used to treat livestock and human ailments had different growth forms, Shrubs were the most commonly represented growth forms accounting 53% of the collections followed by herbs (29%) (Figure10)

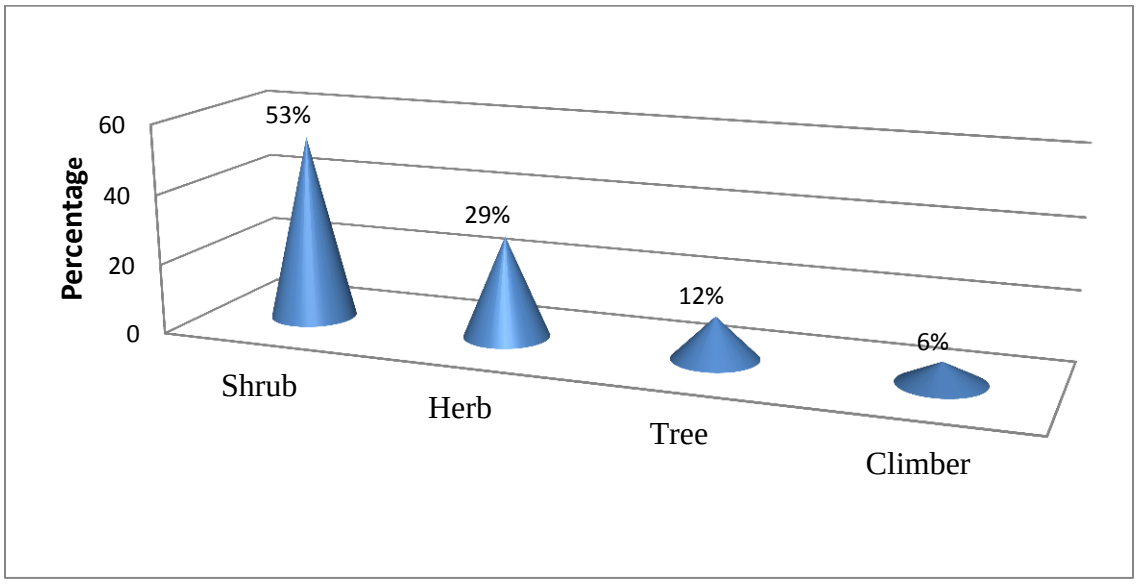

Figure 10: Habit of medicinal plants used for livestock and human

4.4.2 Habitat of medicinal plants used to treat both Livestock and human ailments

About 12, 71% of the species were collected from wild where as 5, 30% of the species were obtained from farm land (Figure 11)

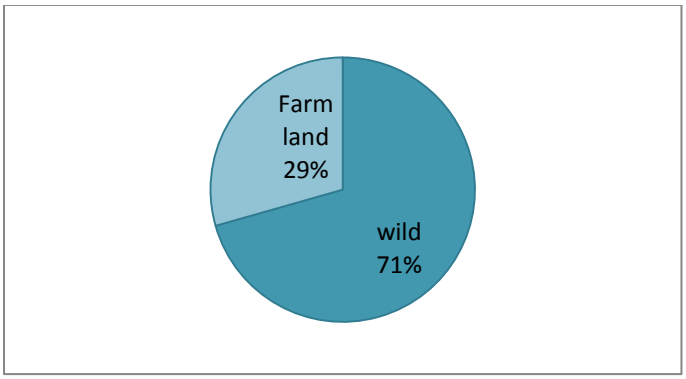

Figure 11: Habitat of medicinal plants used for both human and livestock

4.4.3 Plant parts used and mode of preparation

The parts of the plants commonly used for herbal preparation were leaves (22, 50%), followed by roots (13, 30%), Seed (3, 7 (Figure 12).

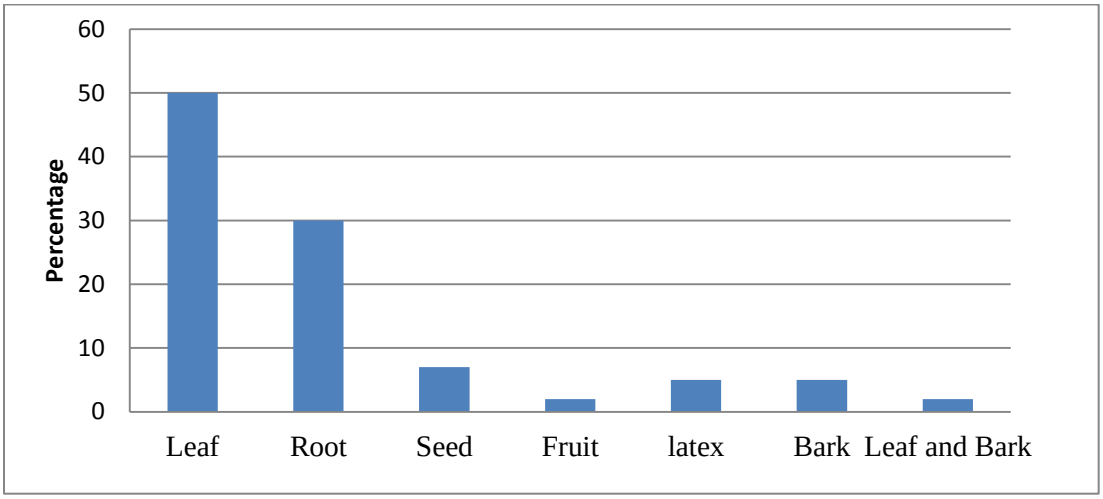

Figure 12: Parts of medicinal plants used for both livestock's and human

Local people in the study area use various preparation methods for remedies, The most commonly used methods were crushing, Crushing and squeezing, crushing and smashing, pounding. However, Crushing (24, preparation, 141%) was the highest followed by crushing and squeezing (5, preparation, 29%), the third method was cutting and Powdering (3, preparation, 17.6%) each (Table 14).

Table 14: The preparation methods of remedies for human and livestock

Preparation	**Frequencies**	**Percent%**
Crushing	24	141.0
Crushing and smashed	2	11.8
Crushing and squeezing	5	29.0
Cutting	3	17.6
Pounding	4	23.5
Powdering	3	17.6
Crushing and boiling	1	5.9
Roasting and pounding	1	5.9
pounding and powdering	1	5.9
Squeezing	1	5.9
Cooking	1	5.9
Grounding	1	5.9
Roasting	1	5.9
Total	**17**	

4.4.4 Application and Route of administration for human and Livestock

The collected medicinal plants in the study area have various methods of application including drinking (19, 36.5%), dropping (6, 11.5%), painting (15.28.8%), tying, creaming, and chewing (3, 5.8%) each. Smoking and sniffing, washing and brushing (1, 1.9%) each. Medicinal plants used for human and livestock ailments were applied through different routes of administration including oral, dermal, nasal, optical, dermal or optical route. However, dermal application (11, preparation, 48%) was the highest and commonly used route of administration followed by oral application (10, preparation, 43.5%).others applications like Nasal, optical and dermal or optical application (1, preparation, 4.3%) each.

4.5 Sources and Transferring of indigenous knowledge of medicinal plants

4.5.1 Sources of indigenous knowledge

The knowledge of medicinal plants in Alelitu passes to the generation secretly along parents to the family members. Of the total informants, (30,37.5%) of the informants reported that they gained their knowledge from their grandparents, (29,36%) of them gained from their fathers, (15,18.8%) of the informants reported that they gained from their mother, others (5,6%) gained from their eldest brother, the last (1,1.3%) of the informant reported that gained their knowledge by trial and error

4.5.2 Transferring of indigenous knowledge

The result of interview in the study area showed that mostly traditional knowledge was transferred between family members from parents to children, about (32.5%) of the informants reported that indigenous knowledge of medicinal plants was transferred to the elder son through secretly and orally followed by a transfer to trusted daughter (Table 15)

Table 15: way of transferring the knowledge of medicinal plants

Knowledge sources	Number of informants	Percent
Trusted daughter	22	27.5
Eldest son	26	32.5
Younger brother	18	22.5
Younger son	4	5
Friends	5	6.3
Brother	4	5
Younger sister	1	1.2

4.6 Marketed medicinal plants in study area

The result obtained from Alelitu (Mikewa) market, showed that medicinal plant were not sold for medicinal purposes only, They were reported to be sold for additional purpose like food, Flavoring of foods, use as aroma during coffee ceremony, spices and used as Insecticide or expelling insects. *Taverniera abyssinica* Rich, *Echinops kebericho* Mesfin, *Embelia schimperi* Vatke, *Silene macrosolen* A.Rich, *Hagenia abyssinica* (Bruce) J.F.Gm, *Withania somnifera* (L.) were sold only for their medicinal purpose but other sold for their use other than medicinal value (Appendix 7).

4.7 Threats and conservation of medicinal plants of study area

4.7.1 Threats to medicinal plants

As reported by informants in the study area agricultural expansion was the highest threatening factor for medicinal plants (Table 16).

Table 16: Threat and number of respondents who sited the factors

Factors	**Numbers of respondents**	**Percent%**
Construction	5	26.3
Agricultural expansion	21	23.8
Deforestation	17	21.3
Fire wood	9	10
Urbanization	7	11.3
Over harvesting	8	7.5

4.7.2 Conservation of medicinal plants

The conservation practice of medicinal plants in the study area was found very poor; people in the study area give priority to immediate use of medicinal plants than to sustainable future uses. Some medicinal plants were destroyed during harvesting. However, some practitioners try to conserve few medicinal plants by cultivating some medicinal plants in home garden, such as *Cymbopogon citratus*, *Artemisia rehan*, *Ruta chalpensis.*

CHAPTER FIVE

5. DISCUSSION, CONCLUSION AND RECOMMENDATION

5.1 Discussion

5.1.1 Diversity of medicinal plant species used by people of the study area

A total of eighty three medicinal plant species distributed in 43 families and 77 genera were reported to treat human and livestock ailments. Of this the family Asteraceae was found highly diversified in the area .Similarly different studies reported various numbers of medicinal plants in their study area. for example, Mengistu Gebrehiwot (2010) documented 121 medicinal plants in Seru Woreda, Arisi zone of Oromia Regional state; Genene Bekele and Ramachandra (2015) 43 medicinal plants by Guji Oromio Tribes, in Abaya District, Borana, Oromia, Ethiopia; Mirutse Giday *et al*.,(2010) 71 medicinal plants by Sheko ethnic group in south west Ethiopia; Ermias Lulekal *et.al*., (2013), 135 medicinal plants in Ankober District,North Shewa Zone, Amahara Region, Ethiopia.This showed medicinal plants were diversified in different study areas and might be variation related to their availability.

Among 43 families, family, Asteraceae (10,12%) was the highest distributed medicinal plants in study area, This study agrees with the finding by Mengistu Gebrehiwot (2010),Mulugeta Kuma (2014) ,Bishaw Baye(2016), Endalew Amenu (2007) and Abebe Ayele (2017) in which family Asteraceae was the most widely distributed family of medicinal plant. This indicated that family Asteraceae was more diversified species of medicinal plants than other families in different areas of the country.

5.1.2 Habit, habitats and parts of medicinal plants used for preparation of remedies in Alelitu Woreda

The result of the study showed that herbs were the highest proportion growth form of medicinal plants followed by shrubs. This indicated that herbs were relatively common in the study area as compared to other life forms. Similar research results were reported elsewhere in Ethiopia by HaileYineger *et al*.,(2008), Eshetu Girma (2017),Eskedar Abebe(2011), Hailu Atnafu *et. al*.,(2018), Yemane Tilahun (2018),Miruste Giday *et.al*.,(2009),Bizuneh Woldeab *et al*.,(2018),Balcha Abera (2014),Behailu Bizuayehu and Temesgen Assefa (2017),Tilahun Tekilehmanot (2007),This showed that most growth form of medicinal plants in their study areas were herbs as compared to other growth forms. This indicated that the different growth form and presence of herbaceous form of medicinal plants in the area. In contrary, Ermias Lulekal (2014), Getu Alemayehu *et al*., (2015), Endalew Amenu (2007), reported in their study area, shrubs were the highest proportion followed by herbs. This could be related to wider presence of shrubs in those areas.

About 75.9% of medicinal plants were obtained from wild in Alelitu District. This was agrees with that of studies made by Hailu Atnafu *et.al*.,(2018), Haile Yineger *et.al*.,(2008),Ermias Lulekal *et al*.,(2008), Yemane Tilahun(2018), Atinafu Kebede *et al*.,(2016) and Seblewongel Yohannis *et al*.,(2018) who reported that wild area were primary source of medicinal plants. This showed that the local people harvest more medicinal plant species from wild than from home garden. This could be related to the practice that cultivation of plants for medicinal purpose in home garden is low in most part of the country.

The analysis of data on plant parts used indicated that, leaf (63, 50%) were the most widely used plant parts in preparation of remedies followed by roots (26, 21%). Similar ethnobotanical studies undertaken elsewhere in Ethiopia reported by Behailu Bizuayehu and Temesgen Assefa(2017),Endalew Amenu (2007),Tigist Wondimu *et al.*,(2007),Hailu Atnafu *et al*.,(2018),Eshetu Girma(2017), Yemane Tilahun(2018), Tewodros Kelemu and Worku Wolde (2018), Abebe Ayele (2017), have also showed that leaves were the most commonly used parts. In addition to this Fitsum Dulo and Amare Mekonnen(2017) reported that leaves have been utilized for the preparation of remedies all over the world due to ease of collection than the underground parts and due to their active in metabolic production and photosynthesis. In contrary other finding by Ermias Lulekal *et al*.,(2013), Meaza Giday *et al*., (2015) reported different result showing that root was the most frequently used plant part followed by the leaves in their respective research site. This might be related to the attitude of practitioners to use root than other parts, On the other hand, Getu Alemaehu *et al.*, (2015) reported, the plant whose roots harvested for medicinal value have less sustainability unless conservation methods have been taken.

5.1.3 Dosage, Condition of Preparation, and route of administration of medicinal plants.

The dose of medicinal plants have no standard measurements, as informants reported the traditional healer gives the medicine based on age and physical strength of the patients, it was also noted that the amount given to patients is estimated by using Pinch of finger and spoon for powder, size of finger for root, glass, cup, tassa (can), glass of areke for liquid form. Similar findings were reported elsewhere in Ethiopia by Mulugeta Kuma (2014), Mengistu Gebrehiwot (2010), Ermias Lulekal *et al*., (2013) who have reported that there

are no standard measurements for dosage of traditional medicinal plant in their study area. This indicated that, there is no common dose of medicinal plants in most hearbal medicine system, additives like milk, Coffee Tella and barley flour (Beso), were also reported for reducing certain adverse effect of medicinal plants.

In this study area the majority preparation of remedies of medicinal plants was in fresh (69%) form. This study agrees with similar studies elsewhere in Ethiopia. Ermias Lulekal *et al*.,(2013),Haile Yineger *et al*., (2008);Menigistu Gebrehiwot (2010); Eskedar Abebe (2011), who reported that in their study areas the fresh form of medicinal plants were most common. According to Getnet Chekol (2011) report, Fresh form of preparation of remedies were most effective for treatment of ailments than dried form, as the contents are not lost before use compared to the dried forms. Also this could be related to immediate preparation of remedies than dry form.

The preparation and application methods of medicinal plants vary based on the type of ailments. In the study area, the most commonly reported remedy preparation were crushing (59, preparation 42%) followed by crushing and squeezing. Yemane Tilahun (2018), Atinafu Kebede *et al*., (2016) also found similar results in their study areas. The authors showed that crushing was the most common remedy preparation method. This might be the practitioners believed that medicinal plant part that crushed give immediate response for their health problems However, Ermias Lulekal *et al*., (2008), reported that powdering and crushing were the most methods of preparation. This indicated that methods of remedy preparation were not common in different study area.

The most commonly reported method of application of remedies in the study area was oral which accounts for (35,61%) followed by dermal .Similar findings were reported by

many other researchers such as Eshetu Girma (2011),Bishaw Baye (2016),Sublewongel *et al*.,(2018), Mulugeta Kibebew (2016),Fisseha Mesifine(2009), Endalew Amenu (2007), Yemane Tilahun (2018),Hailu Atinafu *et al*., (2018),Haile Yineger (2008), Fitsum Dolu and Amare Mekonnen (2017),Abebe Ayele(2017) indicating the oral route as the most common mode of administration. This indicated that local people in different study areas used oral application of medicinal plants. This might be related to rapid physiological reaction of medicinal plants orally.

5.1.4 Major human and livestock diseases and corresponding medicinal plants used to treat

Informants reported that there are about 32 types of ailments affecting human health problem in the district. The most commonly reported human ailments during the interview were febrile illness followed by common cold. The local people utilized 57 species of medicinal plants only for human and 17species for both human and Livestock ailment. A total 74 species of medicinal plants were reported to be used for treating those human ailments. Similar finding were reported elsewhere in Ethiopia, Sebilwongel *et al*.,(2018).One species can treat single ailment; similarly one ailment may treated by single species or more than two species of medicinal plants. For instance, febrile illness were treated by 10 species of medicinal plants, Common cold and Ring worm treated by 6 species each, Skin rash, hypertension, Dandruff, Diarrhea, Hemorrhoid and Tonsillitis were treated by 5 species each, toothache, Tapeworm, Cough, and stomachache were treated by 4 species each. And the other remaining 18 human ailments were reported to be treated by one up to three species of medicinal plants in the study area. Similar finding was reported by Endalew Amenu (2007) single ailments treated by more than two

species. This showed that the local people have options to use various medicinal plants treat their health problems.

Also a single species of medicinal plants used for a number of human ailments was common in the area. For instance, *Laggera tomentosa* was reported to treat three types of human ailments(hypertension, Ring worm and Febrile illness).*Foniculum vulgare* treats three types of human ailments (Chiffee, Kidney stone and cough),This result showed that local people used the single species of medicinal plants to treat various human health problem. Similar finding by Mulugeta Kibebew (2016) reported 60.2% of medicinal plant and Asegid Assefa (2014) reported 56% of medicinal plants were used for human ailments in their study area. This might be some medicinal plants have wide spectrum roles.

5.1.5 Preference ranking and direct matrix ranking

The result of preference ranking showed that *Ocimum lamiifolium* was the most preferred medicinal plant to treat febrile illness followed by *Silene macrosolen*, and *Otostegia integrifolia* was least effective. In contrary Tigist wondemu *et al*., (2007) reported that *Withania somnifera* was most preferred species in their study area. This could be related to the popularity by local people and accessibility of these medicinal plants in the area. The result of direct matrix ranking in this study area showed that *Juniperus procera* was more threated species due to harvesting for its use other than medicinal value and this was the cause for depletion of the species in the area. Therefore this species needs more conservation attention in Alelitu Woreda. In contrary the finding of study by Bishaw Baye (2016) reported that *Dodonaea angustifolia* was most threatened species in his study area. Also other study by Mulugeta Kuma (2014) reported that *Hagenia abyssinica*

was most threatened and need more focus of conservation. This showed that these species of medicinal plants were more utilized by their other uses than medicinal value in the respective study areas.

5.1.6 Major livestock diseases, medicinal plants used by indigenous people of study area

In the study area 13 Livestock health problems were recorded during the interview and according to the informants the most common livestock health problems were Leech followed by Eye disease, Fasciol or Liver fluek affecting sheep in the area, the other such as Antherax, Sudden sickness, Shoat pox were the major diseases reported to affect the livestock's in the area. Out of collected medicinal plants 9 species were reported to be used only for livestock ailments and 17 species were used to treat both. This study showed that the family Asteraceae was the most dominant family from all collected medicinal plants in the area. However; Euphorbiaceae showed dominance among collected species used for both human and livestock ailments. In contrary Tigist Wondimu *et al*., (2007) reported that the family Asteraceae was commonly used to treat both human and Livestock ailments in Dheeraa, town, Arsi Zone. This indicated that family Asteraceae showed dominancy in various areas of the country.

Some livestock ailments were found to be treated by more than one species of medicinal plant, For example Leech was treated by four species namely *Buddleja polystachya, Nicotiana tabacum,Phytolaca dodecandra and Millettia ferruginea.*Antherax treated by *Rumex nepalensis*, *Solanecio tuberosus* and *Achyranthes aspera*, Rabies treated by *Euphorbia abyssinica* , *Acanthus polytachius* and *Salix subserrata*. Wound treated by *Asparagus africanus, Zehneri scabra* and *Terminalia scimperian*. This indicated that one

livestock ailment able to treat by more number of plant species in the area. Similar findings were reported by Mulugeta Kuma (2014), Mengistu Gebrehiwot (2010) who reported that a single ailment could be treated by more than two medicinal plants.

5.1.7 Marketed medicinal plants in Alelitu District

The survey conducted in Alelitu market showed that medicinal plants were not widely traded for medicinal purpose, but mostly for other purposes. The informants believed that selling of medicinal plants decreases its efficacy potency of the medicine. However, some of the medicinal plants such as *Taverniera abyssinica* Rich, *Hagenia abyssinica* (Bruce) J.F.Gmelin, *Silene macrosolen* A.Rich, *Withania somnifera* (L.), *Echinops Kebericho* and *Embelia schimperi* Vatke were sold for their medicinal purpose only. The other remaining medicinal plants were sold for their other purposes, for example, *Zingiber officinale* Roscoe, *Nigella sativa* L, *Ruta chalpensis* L.were traded for other purpose like spices and flavoring.*Otostegia integrifolia* Decn for fumigation to expell insects, *Artemisia rehan* Chiov for aroma at coffee ceremony rather than medicinal value. This relates to reported of studies by Getu Alemayehu *et al*.,(2015), and Ermias Lulekal *et al*., (2013,) reported that most of marketable medicinal plants traded for their other uses than medicinal purposes. This could be related to the interest of traditional healers to keep their knowledge secrets.

5.1.8 Traditional medicinal plant and indigenous Knowledge transfer in the study area

The study showed that, the informant's age categories showed indigenous knowledge of the people in the area and the majority of the informants were married this was related to the indigenous knowledge of the people. According to the informants, most of the time parents use traditional medicinal plants than younger generation. This could be related to their responsibility for their families. As the information obtained from the informants in the study area, the indigenous knowledge of the people about medicinal plants were obtained from the parents mostly from the grandparents and from the father. The most common way of transfer of IK on medicinal plants was oral without written documents to family members especially to elder son. Similar findings by Mengistu Gebrehiwot (2010), Fassil Kibebew (2001), Ermias Lulekal *et al*., (2013) reported that IK of medicinal plants is transferred orally to the new generation. This indicated that there is no structured way of Knowledge transfer in different study area.This could be due to highly needs secrets of indigenous knowledge of practitioners.

5.1.9 Threats and conservation of medicinal plants and indigenous knowledge in the study area

The loss of biodiversity in Ethiopia including the study area is serious problem. It is caused by natural and anthropogenic factors such as deforestation, due to over exploitation of plants for various purposes including fire wood, agricultural expansion, over grazing, urbanization, harvesting for construction materials and making charcoal. In the study area, various factors were considered as main threats for medicinal plants The major threat factors to medicinal plants were human induced Agricultural expansion,

Deforestation, Firewood, Over harvesting, Urbanization and Construction. Agricultural expansion was the most threat factor in the study area. Similar findings were reported by Seblewongel *et al*., (2018), Behailu Bizuayehu and Temesgen Assefa (2017), Getnet Chekol (20110. This could be due to the interest of people to use land for crop production in different area of the country.

The medicinal plants that were reported by local people to be rare in the area were *Echinops kebericho* Mesfin, *Taverniera abyssinica* Rich.and *Silene macrosolen* A.Rich. The threats of medicinal plants were the major causes for loss of medicinal plants and indigenous knowledge of the people in the area. The result of study showed that, other reason for loss of indigenous knowledge of the people were modernization and availability of modern medication has also contributed to the loss of indigenous knowledge of the new generation about medicinal plants. Similar finding reported by Mulugeta kuma (2014) reported that the knowledge of medicinal plants loss caused by modernization and availability of modern medication. This indicated that modernization could have negative impact on ethnobotanical Knowledge.

The study showed that the district is rich in medicinal plants diversity, however the conservation efforts was very poor. As reported by informants during discussion and interview peoples give little attention for conservation of medicinal plants. Only some informants conserved few medicinal plants by cultivating in home garden and making fence. for instance *Cymbopogon citratus*, *Artemisia rehan*, *Ruta chalpensis* were cultivated in homegarden in the area, Similar findings were reported by Mulugeta kibebew(2016),Fisseha Mesfin *et al*.,(2009).During field observation *Withania somnifera* was observed conserved in its natural habitat. However, during discussion with the key

informants some traditional practitioners do not have interest to cultivated medicinal plants in home garden. This indicated that the healers keep secret of medicinal value of medicinal plants. Similar findings were reported by Mulugeta Kibebe (2016) who reported that the healers have no interest to cultivate medicinal plants in home garden. This might be due to lack of knowledge as well as land access for conservation of medicinal plants.

5.2 Conclusion

The present study in Alelitu Woreda showed that there is a high diversity of medicinal plants and the local people have indigenous knowledge on the use of these plants. The knowledge of the people in the area as demonstrated in this study, helped meaningfully in treating human and livestock ailments which is prevalent in the locality. The aim of this study is primarily to record and identify the medical plants which are used in treating human and livestock diseases in the targeted locality. In addition, this study is also intended to assess the parts of medical plants used, the practice of medical plants conservation by the local dwellers, the way they prepare the herbal medication and the way they manage the entire process . In line with issues discussed above, this study has clearly showed that eeighty three medicinal plant species belonging to 77 genera and 43 families were collected, identified and recorded. While 57 species were known to have been used to treat only human health problems ,others 9 species were used to treat only livestock ailments and the rest 17 species were used to treat both human and livestock ailments. Most (49 species) of medicinal plants were collected from wild vegetation. As shown in the study, the species of medicinal plants collected from home garden is very low. In this case,The leaves were the most frequently used part of the plants for preparation of remedies. Most herbal remedies were prepared from fresh material and mostly administrated orally.So as to record and identify the medical plants and ingenious knowledge, 80 study subjects were drawn from 11 kebeles using convenient sampling technique. A comprehensive self-report instrument including socio-demographic and occupational characteristics used to gather data. This instrument was composed of

objective questions about socio-demographic and occupational characteristics such as sex, age, marital status and education.

The findings of this study reveal that there is a high diversity of the medical plant species in the study area and the culture of the people in using medical plants to treat both human and livestock diseases is strong. But the practice of transferring this indigenous knowledge to the younger generation is not well structured and transparent as well. The modality to cascading down this indigenous knowledge to the younger generation is in an oral form even which is limited to close family members only.

5.3 Recommendation

Based on the findings of the study, the following are recommended.

- The local government should support the people through awareness creation as to how they conserve and manage medical plants
- The people in the study area as well as traditional healers should cooperate each other in cultivating medicinal plants particularly in their home garden
- The concerned Health institutions at all levels should give due emphasis to help the community use these medical plants in a more evidence based and scientific manner through facilitating trainings to traditional healers
- Higher institutions should continue researches on the use, conservation and preparation of herbal medications and enhancement of indigenous knowledge's
- High schools, particularly the Biology Department should facilitate practical attachments for students to pave the way for further advancement of herbal medication and research in the area
- The traditional healers should transfer indigenous knowledge for younger generation in a structured way
- The local community and government should give priority for conservation of threaten species of medicinal plants
- The local administration should encourage the local herbal medicine practitioners to enhance the use of traditional medicine through licensing and other incentives.
- The local agricultural sector should give due attention to threaten species of indigenous medical plants and train the local community in plant conservation

- Further in depth ethnopharmacological investigation is recommended by other researchers to come up with a usable drug from medicinal plants of the area.

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Appendices

Appendix 1 List of medicinal plants collected from Alelitu District

No	Scientific Name	Local Name	Family Name	Habit	Habitat	Collection No
1	*Acanthus polytachius* Delile	Kosheshila	Acanthaceae	Shrub	road side	GSO40
2	*Achyranthes aspera* L.	Teleng	Amranthaceae	Herb	roadeside	GSO54
3	*Allium* cepa L.	Key shinkurt	Alliaceae	Herb	home garden	GSO71
4	*Allium* sativum L.	Nechshinkurt	Alliaceae	herb	homegarden	GSO70
5	*Artemisia abyssinica* Sch.Bip.ex A.Rich.	Chukugn	Asteraceae	Herb	farm field	GSo16
6	*Artemisia rehan* Chiov.	Arity	Asteraceae	Herb	Home garden	GSO17
7	*Asparagus africanus* Lam.	Serity	Asparagaceae	Shrub	wild	GSO52
8	*Buddleja polystachya* Fresen	Anfar	Loganjceae	Shrub/ Tree	wild	GSO21
9	*Calpurnia aurea* (Alt) Benth.	Digita	Fabaceae	Herb	Wild	GSO67
10	*Cheilanthes coriacea* Decne.	Demadrik	Sinopteridaceae	Herb	wild	GSO33
11	*Clematis simensis* Fresen.	Azoareg	Ranunculaceae	Climber	wild	GSO31
12	*Clutia abyssinica* Jaub.&Spach	Fiyelefej	Euphorbiaceae	Shrub/ Herb	wild	GSO22
13	*Coffea arabica* L.	Bunna	Rubiaceae	Shrub	home garden /Mrk	GSO76
14	*Coriandrum sativum* L.	Dinblal	Apiaceae	Herb	Home garden/Mrk	GSO82
15	*Croton macrostachyus* Del.	Bisana	Euphorbiaceae	Shrub/ Tree	roadside	GSO53
16	*Cymbopogon citratus* (DC.) Stapf.	Tejesar	Poaceae	Grass	Home garden	GSO58
17	*Cyphostemma cyphopetalum* (Fresen.)	Gindosh	Vitaceae	Climber	Wild	GSO60
18	*Datura stramonium* L.	Astefaris/Astenagir	Solanaceae	Shrub	road side	GSO23
19	*Dodonaea angustifolia* L.f	Kitikta	Sapindaceae	Shrub	wild	GSO35
20	*Dorstenia*	Werq-	Moraceae	herb	wild	GSO47

	barnimiana Schweinf.	bemieda				
21	*Echinops kebericho* Mesfin	kebericho	Asteraceae	Herb	wild	GSO68
22	*Embelia schimperi* Vatke	Enqoqo	Myrsinaceae	shrub	home garden/Mrk	GSO75
23	*Epilobiuam stereophyllum* Fresen.	Wonzadimik	Onagraceae	Herb	Wild	GSO56
24	*Eragrostis tef* (zucc.) Trotter	Teff	Poaceae	Herb	Farm land	GSO83
25	*Eucalyptus globulus* Labill.	Nech bahirzaf	Myrtaceae	Tree	wild	GS014
26	*Euphorbia abyssinica* Gmel.	Kulqual	Euphorbiaceae	Tree	wild	GSO36
27	*Euphorbia nubica* N.E.Br.	Kinchib	Euphorbiaceae	Tree	Wild	GSO43
28	*Ficus capreaefolia* Del.	Beles	Moraceae	Shrub/small tr	wild	GSo8
29	*Foniculum vulgare* Mill	Ensilai	Apiaceae	Shrub	wild	GGSO32
30	*Guizotia abyssinica* (L.f.) Cass.	Nug	Asteraceae	Herb	home garden/Mrk	GSO73
31	*Hagenia abyssinica* (Bruce) J.F.Gmelin	Koso	Rosaceae	Tree	Wild	GSo2
32	*Helianthus annuus* L.	suf/sunflower	Asteraceae	Herb	Home garden /Mrk	GSO79
33	*Hypericum gnidiifolium* A.Rich.	Ameja	Hypericaceae	Shrub/ Tree	wild	GSO24
34	*Impatiens ethiopica* Grey-Wilson.	Enshoshila	Balsaminaceae	Herb	wild	GSO61
35	*Juniperus procera* Hochst ex.Engl.	Tid	Cuppressaceae	Tree	wild	GSO49
36	*Justica schimperiana* Hochst'	Senisel	Acanthaceae	Shrub	wild	GS029
37	*Laggera tomentosa* (Sch.Bip-ex A.Rich)	Keskesso	Asteraceae	Herb	wild	GS018
38	*Leonotis nepetifolia* (L.) R.Br.	Raskimir	Lamiaceae	Herb	roadside	GSO57
39	*Lepidium sativum* L.	Feto	Brassicaceae	Herb	home garden /Mrk	GSO74
40	*Linum usitatissimum* L.	Teliba	Linaceae	Herb	home garden /Mrk	GSO72
41	*Lycopersicon esculentum* Mill	Timatim	Solanaceae	Herb	Home garden	GSO80

42	*Maesa lanceolata* Forss K.	Kelewa	Myrsinaceae	Tree	wild	GSO20
43	*Malva parviflora* Hojer	Lut	Malvaceae	Herb	roadside	GS09
44	*Millettia ferruginea* (Hochst.) Bak.	Biribra	Fabaceae	Tree	wild	GSO38
45	*Nicotiana tabacum* L.	Timbaho	Solanaceae	Herb	wild	GS041
46	*Nigella sativa* L	Tikurazmud	Ranunculaceae	Herb	home garden /Mrk	GSO77
47	*Ocimum lamifolium* Hochst.ex.Benth.	Damakesse	Lamiaceae	Shrub	Home garden	GSO19
48	*Ocimum urticifolium* Roth.	Yemich medihanit	Lamiaceae	Herb	wild	GSO44
49	*Oreophyton falcatum* (A.Rich) O.E.	Yemidir feto	Brassicaceae	Herb	wild	GSO50
50	*Osyris quadripartita* Decn.	Keret	Santalaceae	Tree/shrub	wild	GSO34
51	*Otostegia integrifolia* Decn.	Tunjut	Lamiaceae	shrub	wild	GSO10
52	*Pentas schimperiana* (A.Rich)	Woynagift	Rubiaceae	Shrub	wild	GS012
53	*Physalis peruviana* L.	Nech Awut	Solanaceae	Herb	roadside	GSO66
54	*Phytolaca dodicandra* L.	Endod	Phytolaceae	Shrub	Wild	GSO28
55	*Plantago lanceolata* L.	Yequra wosfe	Plantaginaceae	Herb	roadside	GSO65
56	*Plectranthus amboinicus* (Lour.)	Tejo	Lamiaceae	Herb	wild	GSO62
57	*Rhamnus prinoides* L.Hert	Gesho	Rhamnaceae	shrub	home garden	GSo6
58	*Ricinus communis* L.	Gulo	Euphorbiaceae	Shrub	wild	GS013
59	*Rosa abyssinica* Lindley.	Kega	Rosaceae	Shrub	rocky place	GSO51
60	*Rubia cordifolia* L.	Enchibir	Rubiaceae	Herb	wild	GSO55
61	*Rumex abyssinicus* Jacq.	Mekimeko	Polygonaceae	Herb	field	GSO59
62	*Rumex nepalensis* Spreng.	Tult	Polygonaceae	Herb	wild	GS015
63	*Rumex nervosus* Vahl.	Embacho	polygonaceae	Shrub	roadside	GSo1
64	*Ruta chalpensis* L.	Tenadam	Rutaceae	Herb	Home garden	GS030

65	*Salix subserrata* Will.	Ahaya	Salicaceae	Small Tree	Beside river/stream	GSO39
66	*Salvia nilotica* Jacq.	Hulgeb	Lamiaceae	Herb	wild	GSO45
67	*Senecio integerimus*	Huligeb	Asteraceae	Herb	wild	GSO63
68	*Sida schimperiana* Hochst,ex A.Rich	Chifreg	Malvaceae	Shrub	wild	GSO25
69	*Silene macrosolen* A.Rich	Wogert	Caryophyllcea e	Herb	wild	GSo7
70	*Solanecio gigas* (Vatke) C.Jeffrey	Yeshikoko gomen	Asteraceae	Shrub/ Tree	Wild	GSO42
71	*Solanecio tuberosus*(Sch.Bip.e x A.Rich.)	wosele	Asteraceae	Herb	wild	GSO64
72	*Solanum campylacanthum* Hochst.ex A.Rich	Embay	Solanaceae	Shrub	wild	GSO26
73	*Taverniera abyssinica* Rich.	Dingetegna	Rubiaceae	Shrub	wild /Mrk	GSO78
74	*Terminalia scimperiana* Rich.	abalo	Combretaceae	Tree	wild	GSo5
75	*Thymus schimperia* Ronniger.	Tosign	Lamiaceae	Herb	wild	GSO37
76	*Trigonella foenum* graecum L.	Abish	Fabaceae	Herb	farm land	GSO81
77	*Urtica simensis* Stedel.	sama	Uticaceae	Herb	wild	GSo4
78	*Verbacicum sinaiticum* Benth.	Yahiyajoro	Scrophulariac eae	Herb	rodeside	GS011
79	*Verbena officinalis* L.	Atuch	Verbenaceae	Herb	wild	GSO48
80	*Vernonia amygdalina* Del.	Girawa	Asteraceae	Shrub	wild	GS03
81	*Withania somnifera*(L.)	Gizewa	Solanaceae	Shrub	Wild	GSO27
82	*Zehneria scabra* (Linn.f.) Sond.	Aregresa	Cucurbitaceae	climber	wild	GSO46
83	*Zingiber officinale* Roscoe	Zingibl	Zingiberaceae	Herb	home garden/ Mrk	GSO69

Appendix 2 List of number of families, genera, and species with percent of medicinal plants in Alelitu District

Family name	Number of genera	Percent %	Number of species	Percent %
Asteraceae	8	10.3	10	12.0
Acanthaceae	2	2.6	2	2.4
Alliaceae	2	2.6	2	2.4
Apiaceae	2	2.6	2	2.4
Asparagaceae	1	1.3	1	1.2
Balssaminaceae	1	1.3	1	1.2
Brassicaceae	2	2.6	2	2.4
Caryophyllceae	1	1.3	1	1.2
Combretaceae	1	1.3	1	1.2
Cucurbitaceae	1	1.3	1	1.2
Euphorbiaceae	4	5.2	5	6.0
Fabaceae	3	4.0	3	3.6
Hypericaceae	1	1.3	1	1.2
Lamiaceae	6	7.8	7	8.4
Linaceae	1	1.3	1	1.2
Loganiceae	1	1.3	1	1.2
Malvaceae	2	2.6	2	2.4
Amaranthaceae	1	1.3	1	1.2
Moraceae	2	2.6	2	2.4
Myrsinaceae	2	2.6	2	2.4
Myrtaceae	1	1.3	1	1.2
Onagraceae	1	1.3	1	1.2
Phytolaceae	1	1.3	1	1.2

Plantaginatacea	1	1.3	1	1.2
Poaceaae	1	1.3	1	1.2
Polygonaceae	1	1.3	3	3.6
Ranunculaceae	2	2.6	2	2.4
Rhamnaceae	1	1.3	1	1.2
Rosaceae	2	2.6	2	2.4
Rubiaceae	4	5.2	4	4.8
Rutaceae	1	1.3	1	1.2
Salicaceae	1	1.3	1	1.2
Santalaceae	1	1.3	1	1.2
Sapindaceae	1	1.3	1	1.2
sinopteridaceae	1	1.3	1	1.2
Solanaceae	6	7.8	6	7.2
Urticaceae	1	1.3	1	1.2
Verbenacee	1	1.3	1	1.2
Vitaceae	1	1.3	1	1.2
Zingiberaceae	1	1.3	1	1.2
Hypericaceae	1	1.3	1	1.2
Scrophulariaceae	1	1.3	1	1.2
Cuppressaceae	1	1.3	1	1.2
Total	**77**		**83**	

Appendix 3 List of medicinal plants only for human ailments in Alelitu District with scientific name, local name, family name, parts used, habit, Habitat disease treated, mode of preparation and Route of administration

	Scientific name	Local name	Family name	Part used	Habit	Habitat	Disease	Mode of preparation	Rout of administration
1	*Rumex nervosus* Vahl.	Embacho	polygonaceae	Leaf	shrub	Rode side	Wound	Crushed the fresh leaf and squeezed on wound	Dermal
2	*Hagenia abyssinica* (Bruce) J.F.Gmelin	Koso	Rosaceae	Firut	Tree	Wild	Tapeworm	Grounded,powdered the dry fruit mixed with tela and drunk	oral
3	*Vernonia amygdalina* Del.	Girawa	Asteraceae	Leaf	Shrub	Wild	Typhoid and Hypertension	Crushed the fresh leaf mixed with water and drunk one glass for three days	Oral
				Leaf			Ameobiasis	Crushed fresh leaf mixed with honey and eat	Oral
4	*Urtica simensis* Stedel.	Sama	Uticaceae	Leaf	Herb	Wild	Nose bleeding	Crushed the fresh leaf and applied on nose and sniff	Nasal
				Leaf			Stomachache	Cooked the leaf with powder of barley like wot and cooled then eat with injera	Oral

5	*Rhamnus prinoides* L.Hert	Gesho	Rhamnaceae	Leaf	Shrub	Home garden	Tonsillit	Chwed the fresh leaf or seed and swallow the juice	Oral
6	*Silene macrosolen* A.Rich	Wogert	Caryophyllceae	Root	Herb	wild	Evil eye	Dried the root and Fumigated	Fumigate
				Root			Mich	Dried the root and fumigate	Fumigate
7	*Ficus capreaefolia* Del.	Beles	Moraceae	Sap	Shrub/small tree	Wild	Itch/scabes	Crushed the leaf and applied on affected part of skin	Dermal
8	*Malva parviflora* Hojer	Lut	Malvaceae	Root	Herb	roadside	Dandruff	Crushed fresh root and wash the head	Dermal
9	*Otostegia integrifolia* Decn.	Tunjut	Lamiaceae	Flower	Srub	Wild	Toothache	Crushed the flower and hold to tooth surface	Tooth surface
				Leaf			Mich	Dried the leaf fumigated in nasal and oral	Fumigate

				Flower			Hypertension	The flower of *Otostegia integrifolia* and *Laggera tomentosa* leaf crushed together and mixed with water then drunk 1letter	Oral
10	*Eragrostis tef* (zucc.) Trotter	Teff	Poaceae	Seed	Herb	Farm land	Dandruff	Grounded the seed and mixed with water and applied the dough on head	Dermal
11	*Eucalyptus globulus* Labill	Nechbahir zaf	Myrtaceae	Leaf	Tree	Wild	Common cold	Boiled the leaf and bath the steam through nasal and oral	Nasal and Oral
12	*Artemisia abyssinica* Sch.Bip.ex A.Rich.	chukugn	Asteraceae	Leaf	Herb	Farm field	Hypertension	Crushed, squeezed and drunk the fluid	Oral
13	*Artemisia rehan* Chiov.	Arity	Asteraceae	Leaf	Herb	Home garden	Common cold	Crushed the fresh leaf sniff, squeezed and drunk the fluid with coffee	Nasal and oral
14	*Laggera tomentosa* (Sch.Bip-ex A.Rich)	Keskesso	Asteraceae	Leaf	Herb	Wild	Hypertension	Crushed the leaf mixed with water and drunk 1 glass	Oral

							Febrile Illness	Crushed leaf squeezed and painting the body	Dermal
							Ring worm	Crushed the fresh leaf and smashed the affected part	Dermal
15	*Ocimum lamifolium* Hochst.ex.Benth.	Damakesse	Lamiaceae	Leaf	Shrub	Home garden	Mich	Crushed, squeezed the fresh leaf and drunk with coffee or tea, applied the fluid on hole body	Dermal/oral
				Leaf			Headache	Smashed and sniffed through nose	Nasal

16	*Salvia nilotica* Jacq.	Hulgeb	Lamiaceae	Leaf	Herb	Wild	Mich	Smashed and sniff, mixed with tea or coffee and drunk	Dermal/Oral
17	*Maesa lanceolata* Forss K.	Kelewa	Myrsinaceae	Root	Tree	wild	Toothache	Crushed the fresh root and hold to tooth surface	Tooth surface
18	*Clutia abyssinica* Jaub.&Spach	Fiyelefej	Euphorbiaceae	Leaf	Shrub/Herb	Wild	Dandruff	The leaf is pounded, squeezed and creamed affected part until recovery	Dermal
19	*Hypericum gnidiifolium* A.Rich.	Ameja	Hypericaceae	Leaf	Shrub/Tree	Wild	Skin rash of new born baby	Crushed the fresh leaf with leaf of *Clutia abyssinica* and leaf of *Rumex nervosus* together mixed with water and wash the body of new born baby for three days	Dermal
20	*Sida schimperiana* Hochst,ex A.Rich	Chifreg	Malvaceae	Root	Shrub	wild	Toothache	Crushed the fresh root mixed with salt hold on affected tooth surface	Tooth surface
21	*Solanum campylacanthum* Hochst.ex A.Rich	Embay	Solanaceae	Leaf	Shrub	Wild	Nose bleeding	Crushed the fresh leaf and sniff through nose	Nasal
22	*Withania*	Gizewa	Solanaceae	Root	Shru	Wild	Evil eye		Fumigate

	somnifera(L.)				b		Mich	Smoked the dried root	
23	*Ruta chalpensis* L.	Tenadam	Rutaceae	Leaf	Herb	Home garden	Stomachache	Chewed the fresh leaf and swallow the juice or Crushed the fresh leaf squeezed the juice and drunk with coffee or tea	Oral
24	*Clematis simensis* Fresen.	Azoareg	Ranunculaceae	Root	Climber	Wild	Wound	Pounded, powdered the root and mixed with butter and applied on affected part until recovery	Dermal
25	*Foniculum vulgare* Mill	Ensilai	Apiaceae	Leaf	Shrub	Wild	Chiffe/Ezema	Crushed the fresh leaf and applied on affected part	Dermal
				Shoot			Kidney stone	Crushed the shoot squeezed and drunk with tea	Oral
				Shoot			Cough	Crushed shoot squeezed and drunk with coffee	Oral
26	*Cheilanthes coriacea*	Demadrik	Sinopteridacea	Leaf	Herb	wild		Dried leaf with	

	Decne.		e				Fire burn	*Juniperus procera* bark pounded, powdered together and applied on injured part and tie with cloth	Dermal
27	*Osyris quadripartita* Decn.	Keret	Santalaceae	Leaf	Tree /shrub	Wild	Wound	The leaf is crushed, powdered and applied on wound	Dermal
28	*Dodonaea angustifolia* L.f	Kitikta	Sapindaceae	Leaf	Shrub	wild	Wound	Pounded, powdered the leaf mixed with water and butter then applied on wound	Dermal
29	*Thymus schimperia* Ronniger.	Tosign	Lamiaceae	Leaf	Herb	Wild	Hypertension	Boiled fresh leaf with water as tea and drunk	Oral
				Leaf			Common cold	Boiled leaf with water and drunk	Oral
30	*Euphorbia nubica* N.E.Br.	Kinchib	Euphorbiaceae	Milk	Tree	Wild	Itch/ Scabies	Cut and applied the milk on affected part of the human body	Dermal
				Milk			Shahign/Qunchir	Cut and applied the milk on affected part of the human body	Dermal

31	*Ocimum urticifolium* Roth.	Yemich medihanit	Lamiaceae	Leaf	Herb	Wild	Common cold	Crushed the fresh leaf and sniff	Nasal
							Mich	Crushed the fresh leaf squeezed and drunk with tea or coffee	Oral
32	*Dorstenia barnimiana* Schweinf.	Werq-bemieda	Moraceae	Leaf	Herb	Wild	Wound	Crushed the leaf and tie on infected part of the body	Dermal
33	*Verbena officinalis* L.	Atuch	Verbenaceae	Leaf	Herb	Wild	Tonsillitis	Crushed and Squeezed the fresh leaf and drunk the juice or Chewed the fresh root and swallow the juice	Oral
				Root			Retained placenta	Crushed the fresh root mixed with water and drunk one glass for human	Oral

				Root			Diarrhea	Crushed the fresh root squeezed and drunk one glass of areke ,Crushed the fresh root mixed with water and small tea cup is given to drink for baby's above 5 years	Oral
34	*Juniperus procera* Hochst ex.Engl.	Tid	Cuppressaceae	Bark	Tree	Wild	Fire burn	Dried and powdered the bark with leaf of *Cheilanthes coriacea* and applied on injured part of the body	Dermal
35	*Oreophyton falcatum* (A.Rich) O.E.	Yemidir feto	Brassicaceae	Leaf	Herb	Wild	Itch /Scabies	Crushed the fresh leaf and smash affected part of skin	Dermal
36	*Rosa abyssinica* Lindley.	Kega	Rosaceae	Leaf	Shrub	rocky place	Ascarisis	Crushed fresh leaf mixed with water and drunk 1 cup	Oral
37	*Rubia cordifolia* L.	Enchibir	Rubiaceae	stem	Herb	Wild	Cough	Crushed the stem and leaf, boiled with water added sama kibe and drunk	Oral

38	*Leonotis nepetifolia* (L.) R.Br.	Raskimir	Lamiaceae	Leaf	Herb	Rode side	Mich	Crushed the leaf and sniff, applied on body	Nasal and dermal
39	*Cyphostemma cyphopetalum* (Fresen.)	Gindosh	Vitaceae	Leaf	Climber	Wild	Hemorrhoid	Crushed the fresh leaf squeezed and applied on infected part of the body	Dermal
40	*Impatiens ethiopica* Grey-Wilson.	Enshoshila	Balsaminaceae	Root	Herb	Wild	Gonorrhea	Dried and powdered the root with leaf of *Verbacicum sinaiticum* mixed with little amount of water and drunk	Oral
41	*Senecio integerimus*	Huligeb	Asteraceae	Leaf and Root	Herb	Wild	Tonsillitis	Crushed fresh leaf and sniff, Chewed the fresh root and holed crushed leaf under tongue	Oral
42	*Plantago lanceolata* L.	Yequra wosfe	Plantaginaceae	Leaf	Herb	rode side	wound	The leaf is crushed and applied on wound	Dermal
43	*Physalis peruviana* L.	Nech Awut	Solanaceae	Fruit	Herb	roadside	Hemorrhoid	Crushed the fresh fruit and applied on affected area of the body	Dermal
44	*Echinops kebericho* Mesfin	kebericho	Asteraceae	Root	Herb	wild	Evil eye mich	Smoked the dry root	Fumigate
45	*Zingiber officinale* Roscoe	Zingibl	Zingiberaceae	Rahizome	Herb	Home	Tonsillitis	Chewed the Rhizome and swallow the juice	Oral

						Garden/Mr			
46	*Allium sativum* L.	Nechshinkurt	Alliaceae	Bulb	Herb	Home garden	Common cold	Crushed the bulb boiled with *Zingiber officinale* and drunk	Oral
							Cough	Crushed the bulb mixed with honey and butter fermented for three days and swallow one spoon every morning	Oral
47	*Allium cepa* L.	Key shinkurt	Alliaceae	Bulb	Herb	Home garden	Stomachache	Smashed the bulb mixed with butter and eaten with injera	Oral
48	*Linum usitatissimum* L.	Teliba	Linaceae	Seed	Herb	Home egarden/Mr	Gastritis	Boiled the seed with water cooled and drunk, or pounded, powdered seed mixed with water and drunk	Oral
				Seed			Retained placenta	Pounded, powdered the seed boiled with water and drunk	Oral

49	*Guizotia abyssinica* (L.f.) Cass.	Nug	Asteraceae	Seed	Herb	Home garden/Mr	Cough	Pounded the seed mixed with water and boiled then drunk continuously until recovery	Oral
50	*Lepidium sativum* L.	Feto	Brassicaceae	Seed Seed	Herb	Home garden/Mr.	Tonsillitis Stomachache	Seed of *Lepidium sativum* and bulb of *Allium sativum* are pounded together and given to human with honey for three to four days The seed is swallow without chewed	Oral Oral
51	*Embelia schimperi* Vatke	Enqoqo	Myrsinaceae	Fruit	Shrub	Home garden/Mr	Tape worm	Grounded, powdered dried seed, mixed with water and drunk	Oral
52	*Coffea arabica* L.	Buna	Rubiaceae	Seed	Shrub	Home garden/Mr	Fire burn	Roasted, crushed, powdered the seed and applied on injured part of the body	Dermal
53	*Nigella sativa* L	Tikurazmud	Ranunculaceae	Seed	Herb	Home garde	Mognbagegn	Pounded, powdered	Oral

						n/Mr		the seed mixed with water and drunk one glass	
54	*Taverniera abyssinica* Rich.	Dingetegna	Rubiaceae	Root	Shrub	Wild/ Mr	Dingetegna/sudden sickness	Chewed the fresh root and swallow the juice	Oral
55	*Helianthus annuus* L.	Sunflower / Suf	Asteraceae	Seed	Herb	Home garden/Mr	Cough	Crushed the seed boiled with water and drunk until recover	Oral
56	*Trigonella foenum graecum* L.	Abish	Fabaceae	Seed	Herb	Farm land	Stomachache	Powdered the seed immersed in water over night and stir then drunk	Oral
57	*Coriandrum sativum* L.	Dinbilal	Apiaceae	Seed	Herb	Home garden/Mr.	Cough	Roasted ,powdered the seed and boiled with water and drunk	Oral

Appendix 4 List of medicinal plants used to treat only Livestock ailments

Scientific name	Local name	Family name	Part used	Habit	Habitat	Disease	Mode of preparation	Rout of Administration
Solanecio gigas(Vatke)	Yeshikoko gomen	Asteraceae	Leaf	Shrub/ Tree	wild	Black Leg/ Abagorba	Crushed the fresh leaves and mixed with water give to drink for cattle	Oral
			Leaf			External parasites	Crushed the leaf and wash hair of calf to remove or killed lice	Dermal
Solanecio tuberosus (Sch.Bip.ex A.Rich.)	Wosele	Asteraceae	leaf	Herb	Wild	Anterax	Crushed fresh leaf mixed with water and give to drink for Cattle	oral
Cymbopogon citrates (Dc.) Stapf	Tegisar	Poaceae	leaf	Grass	Home garden	Dingetegna/Sudden sickness	Crushed fresh lives mixed with one letter of water and give to drink for Cattle	Oral
Epilobium stereophyllum Fresen.	Wonzadimik	Onagraceae	leaf	Herb	wild	Shoat pox/ Fentata	Ponded the dry leaf mixed with oil and apply on wound of livestock's	Dermal
*Nicotiana tabacum*L.	Tombaho	Solanaceae	leaf	Herb	Wild	Leech	Crushed the fresh leaf and squeezed added the fluid through the nose of livestock	Nasal
Millettia ferruginea (Hochst.) Bak	Biribra	Fabaceae	leaf	Tree	Wild	Leech	Crushed the fresh leaves squeezed the juice give to drink for animal	Oral

Lycopersicon esculentum Mill	Timatim	Solanaceae	leaf	Herb	Home garden	Leech	Crushing fresh leave mixed with water and give to drink for cattle	Oral
Acanthus polytachius Delile	Kosheshila	Acanthaceae	Leaf and root	Shrub	Road side	Skin disease	Crushed the root and leaf and smashed the body of animals	Dermal
			Root			Dingetegna	Crushed root together with root of *Verbacicum sinaiticum*, root of *Plectranthus amboinicus* and bulb of *Allium sativum* and mixed with one letter of water then give orally	Oral
Plectranthus amboinicus (Lour.)	Tejo	Lamiaceae	leaf	Herb	Wild	Skin disease	Crushed fresh leave and apply on skin of live stocks	Dermal

Appendix 5 List of medicinal plants for both Livestock and human ailments; Lv (Livestock),Hu (Human)

Scientific name	Local name	Family name	Parts used	Habit	Habitat	used	Disease	Mode of preparation	Rout of administration
Justica schimperiana (Hochst.ex Nees) T.Anders.	Sencel	Acanthaceae	Leaf	Shrub	Wild	Lv	Fasciol / Liver fluke	Crushed the fresh leaves mixed with water and give to drink for Sheep.	Oral
			Leaf			Lv			
							Anthrax	Crushed fresh leaf very well mixed with water and give to drink for cattle	Oral
			Leaf			Hu			
							Evil eye	Dried the leaf powdered mixed with water and drunk	Oral
Buddleja polystachya Fresen	Anfar	Loganjceae	Leaf	Shrub /Tree	Wild	Lv	Leech	Crushed the flesh leaf Squeezed and apply in to nose of animals.	Nasal
			Leaf			Hu	Wound	Pounded and powdered the leaf and applied on wound for Human	Dermal
			Leaf			Hu	Itch/scabies	Crushed the fresh leaf and applied on skin	Dermal
Salix substrata Willd.	Ahaya	Salicaceae	leaf	Small Tree	Beside river/ stream	Lv	Rabies	Crushed the leaf with latex of *Euphorbia abyssinica* and root of *Impatiens ethiopica* together dried and powdered , take 3 pinch of powder mixed with one glass milk then give orally for cattle	Oral

						Hu		within 17 days after infection for three continues days. 3 pinch of powder is mixed with little black teff powder and make kita then eat once for human then drunk Beso and coffee together for avoid its effect.	Oral
*Calpurnia aurea (Alt.)*Benth.	Digita	Fabaceae	Leaf and bark	Herb	Wild	Lv	Eye disease	Crushed and squeezed the leaf and dropped on eye of animals	optical
			Leaf			Lv	External parasites	Pounded fresh leaf mixed with water and wash the body of the animal every morning until the parasites are removed	Dermal
			Seed			Hu	Diarrhea	Roasted and pounded the seed ,mixed with water and drink one glass of areke or Chewed the fresh leaf and swallow for human	Oral
			Leaf			Lv		Pounded leaf mixed with water and give to livestock until recover from Diarrhea.	Oral

Pentas schimperiana (A.Rich.)	Woyn agift	Rubiac eae	Leaf Leaf	Shrub	Wild	Lv Hu	Eye disease Quaqucha	Crushed the fresh leaf squeezed and applied on eye of livestock Crushed the fresh leaf and brush the affected skin until recovery	Optical Dermal
Rumex abyssinicus Jacq.	Meki meko	Polygo naceae	Root Root	Herb	Field	Lv And Hu Hu	Retained placenta Hypertens ion	Crushed fresh Root mixed with boiled water give one cup for human and one letter for cattle Powdered dry root mixed with water and added sugar boiled and then drink	Oral Oral Oral
Datura stramonium	Astef aris	Solanac eae	Seed Leaf Seed	Shrub	road side	Lv Hu Hu	Skin disease Dandruff Toothache	Pounded the seed and applied on skin of livestock Squeezed fresh leaf and applied or creamed on head until recover. Roasted the seed on fire and Sniff the smoke to tooth surface	Dermal Dermal Sniff the smoke to tooth surface

Zehneria scabra	Aregresa	Cucurbitaceae	leaf Leaf	climber	Wild	Lv	Wound Hypertension	Crushed the fresh leaf and applied on wound for Livestock Crushed fresh leaf and squeezed the fluid then drink	dermal Oral
Terminalia scimperiana Rich.	Abalo	Combretaceae	Root leaf	Tree	Wild	Lv Hu	Wound Skin rash/Chife e	Crushed the leaf and applied on wound Crushed the fresh leaf together with leaf of *Osyris quadripartita* and leaf of *Dodonaea angustifolia* and applied on affected part	Dermal Dermal
Rumex nepalensis Spreng.	Tult	Polygonaceae	Root	Herb	wild	Lv	Anthrax	Crushed fresh root and given with water for cattle's	Oral
			Leaf Root Root			Hu Hu Hu	Ring worm/Chirt Quaqucha Stomachache	Crushed the fresh leaf and applied on affected part of human skin Crushed the fresh root and applied on affected part of skin and wash with soap Chewed and swallow the juice of fresh root	Dermal Dermal Oral
Croton macrostachyus Del.	Bisana	Euphorbiaceae	Bark	Shrub /Tree	roadside	Lv	Bloating	Grounded the bark of root mixed with water and give to drink for Livestock	Oral

			Leaf			Hu			
			Bark			Hu	Ququcha	Crushed the leaf and applied on affected part of skin of human until recovery	Dermal
						Hu	Tape worm	Pounded bark mixed with water and drunk the filtered filud	Oral
			Leaf			Hu	Ring worm	Crushed and smashed the fresh leaf and Creamed on affected area.	Dermal
							Gonorrhea	Crushed the fresh leaf boiled with water and drunk	Oral
Asparagus africanus Lam.	Serity	Asparagaceae	Root	Shrub	Wild	Lv	Wound	Crushed fresh Root applied on wound of both animal and livestock	dermal
			Root			Hu	Rash/Itch	Crushed fresh root applied on affected part of human skin	Dermal
			leaf			Hu	Skin rash/Chiffee	Crushed fresh leaf and applied on affected part of human skin	Dermal
Achyranthes aspera L.	Telenig	Amrantaceae	Root	Herb	road side	Lv	Anthrax	Crushed the fresh root and mixed with water and give orally for	Oral

								livestock's	
			Root			Hu	Diarrhea	Cooked the fresh root or Leaf of *Achranthes aspera* with fresh root of *Verbena officinalis* filtered and drink for human	Oral
			Leaf			Lv	Bleeding	Crushed the leaf and tied on bleeding part of all livestock.	Dermal
Euphorbia abyssinica Gmel.	Kulkual	Euphorbiaceae	Latex	Tree	wild	Hu	Hemorrhoid	Cutting and applied milk on affected part of the body of human	Dermal
			Latex			Lv	Rabies	Cutting mixed latex with milk and given to Livestock	Oral
Verbacicum sinaiticum Benth	Yahiy ajoro	Scrophulariaceae	Root	Herb	road side	Lv	Black Leg/ Abagorba	Crushed the fresh root mixed with water and give orally for livestock	Oral
								Crushed the root of *Verbacicum sinaiticum* with root of *Salvia nilotica* mixed with water and applied on left ear of livestock's	Auricular
			Root			Hu	Sudden sickness/Dingetegna	Chewed the fresh root and swallow the juice for human	Oral
						Lv		Crushed the fresh root squeezed	

								give the fluid for livestock orally	Oral
Ricinus communis L.	Gulo	Euphorbiaceae	Fruit	Shrub	Wild	Lv	Anthrax	Dried and powdered the fruit mixed with water then give one cup for cattle	Oral
			Root			Lv	Bloating	Pounded fresh Root mixed with water and salt then give one cup for cattle	Oral
			Leaf			Hu	Hemorrhoid	Cutting the leaf and applied on affected part of human body	Dermal
Phytolaca dodecandra L.Herit	Endod	Phytolaceae	Leaf	Shrub	Wild	Lv	Leech	Crushed the fresh leaf and squeezed added the fluid through the nose of livestock	Nasal
						Hu	Dandruff	Crushed the leaf smashed the bare head and washed with water	Dermal

Appendix 6 List of Multiple uses of medicinal plants other than medicinal value

No	Scientific Name	Local Name	Family Name	Habit	Habitat	Other uses
1	*Acanthus polytachius* Delile	Kosheshila/ Yahiya dabo	Acanthaceae	Shrub	road side	Forage for donkey, Fire wood
2	*Achranthes aspera* L.	Teleng	Amranthaceae	Herb	road side	Forage
3	*Artemisia abyssinica* Sch.Bip.ex A.Rich.	chukugn	Asteraceae	Herb	farm field	-
4	*Asparagus africanus* Lam.	Serity	Asparagaceae	Shrub	wild	Fence
5	*Buddleja polystachya* Fresen	Anfar	Loganjceae	Shrub/Tree	wild	Fence Forage
6	*Calpurnia aurea* (Alt) Benth.	Digita	Fabaceae	Herb	Wild	Firewood
7	*Cheilanthes coriacea* Decne.	Demadrik	Sinopteridaceae	Herb	wild	Forage
8	*Clematis simensis* Fresen.	Azoareg	Ranunculaceae	Climber	wild	Forage
9	*Clutia abyssinica* Jaub.&Spach	Fiyelefej	Euphorbiaceae	Shrub/Herb	wild	Fire wood
10	*Croton macrostachyus* Del.	Bisana	Euphorbiaceae	Shrub/Tree	roadside	Fire wood, Charcoal, Furniture
11	*Cyphostemma cyphopetalum* (Fresen.)	Gindosh	Vitaceae	Climber	Wild	-
12	*Datura stramonium* L.	Astefaris/Astenagir	Solanaceae	Shrub	road side	-
13	*Dodonaea angustifolia* L.f	Kitikta	Sapindaceae	Shrub	wild	Fire wood, Fence, Teeth brush, Charcoal
14	*Dorstenia barnimiana* Schweinf.	Werq-bemieda	Moraceae	herb	wild	-

15	*Epilobiuam stereophyllum* Fresen.	Wonzadimi k	Onagraceae	Herb	Wild	Forage,
16	*Eucalyptus globulus* Labill.	Nech bahirzaf	Myrtaceae	Tree	wild	Firewood, Furniture, Fence, Timber, Charcoal
17	*Euphorbia abyssinica* Gmel.	Kulqual	Euphorbiaceae	Tree	wild	Fence
18	*Euphorbia nubica* N.E.Br.	Kinchib	Euphorbiaceae	Tree	Wild	Fence
19	*Ficus capreaefolia* Del.	Beles	Moraceae	Shrub/small tr	wild	Fire wood
20	*Foniculum vulgare* Mill	Ensilai	Apiaceae	Shrub	wild	Flavoring Areke
21	*Hypericum gnidiifolium* A.Rich.	Ameja	Hypericaceae	Shrub/Tree	wild	Fire wood
22	*Impatiens ethiopica* Grey-Wilson.	Enshoshila	Balsaminacea e	Herb	wild	-
23	*Juniperus procera* Hochst ex.Engl.	Tid	Cuppressaceae	Tree	wild	Firewood, timber, Fence, Furniture, Charcoal
24	*Justica schimperiana* Hochst'	Senisel	Acanthaceae	Shrub	wild	Fire wood
25	*Laggera tomentosa* (Sch.Bip-ex A.Rich)	Keskesso	Asteraceae	Herb	wild	Sweeping floor
26	*Leonotis nepetifolia* (L.) R.Br.	Raskimir	Lamiaceae	Herb	roadside	Leaf used for washing a jar of tela (Gan)
27	*Maesa lanceolata* Forss K.	Kelewa	Myrsinaceae	Tree	wild	Firewood, charcoal, Fence Timber
28	*Malva parviflora* Hojer	Lut	Malvaceae	Herb	roadside	Forage
29	*Millettia ferruginea* (Hochst.) Bak.	Biribra	Fabaceae	Tree	wild	Fire wood
30	*Nicotiana tabacum* L.	Timbaho	Solanaceae	Herb	wild	-
31	*Ocimum lamifolium* Hochst.ex.Benth.	Damakesse	Lamiaceae	Shrub	Home garden	Fire wood

32	*Ocimum urticifolium* Roth.	Yemich medihanit	Lamiaceae	Herb	wild	Forage
33	*Oreophyton falcatum* (A.Rich) O.E.	Yemidir feto	Brassicaceae	Herb	wild	Forage
34	*Osyris quadripartita* Decn.	Keret	Santalaceae	Tree/shrub	wild	Fire wood,Fence
35	*Pentas schimperiana* (A.Rich)	Woynagift	Rubiaceae	Shrub	wild	Forage
36	*Physalis peruviana* L.	Nech Awut	Solanaceae	Herb	roadside	Fruit for food
37	*Phytolaca dodicandra* L.	Endod	Phytolaceae	Shrub	Wild	Washing of cloth
38	*Plantago lanceolata* L.	Yequra wosfe	Plantaginacea e	Herb	roadside	Forage
39	*Plectranthus amboinicus* (Lour.)	Tejo	Lamiaceae	Herb	wild	forage
40	*Ricinus communis* L.	Gulo	Euphorbiaceae	Shrub	wild	Leaf for rolling for butter
41	*Rosa abyssincia* Lindley.	Kega	Rosaceae	Shrub	rocky place	Fence, food for birds Fruit is edible
42	*Rubia cordifolia* L.	Enchibir	Rubiaceae	Herb	wild	Fence
43	*Rumex abyssinica* Jacq.	Mekimeko	Polygonaceae	Herb	field	Forage
44	*Rumex nepalensis* Spreng.	Tult	Polygonaceae	Herb	wild	Forage
45	*Rumex nervosus* Vahl.	Embacho	polygonaceae	Shrub	roadside	Fire wood ,Forage
46	*Salix subserrata* Will.	Ahaya	Salicaceae	Small Tree	Beside river/stream	Forage,Fire wood
47	*Salvia nilotica* Jacq.	Hulgeb	Lamiaceae	Herb	wild	Forage
48	*Senecio integerimus*	Huligeb	Asteraceae	Herb	wild	Forage
49	*Sida schimperiana* Hochst,ex A.Rich	Chifreg	Malvaceae	Shrub	wild	Forage,Sweaping Floor(Widima)

50	*Solanecio gigas* (Vatke) C.Jeffrey	Yeshikokogomen	Asteraceae	Shrub/Tree	Wild	-
51	*Solanecio tuberosus*(Sch.Bip.ex A.Rich.)	wosele	Asteraceae	Herb	wild	Forage
52	*Solanum campylacanthum* Hochst.ex A.Rich	Embay	Solanaceae	Shrub	wild	-
53	*Terminalia scimperiana* Rich.	abalo	Combretaceae	Tree	wild	Fire wood, Charcoal
54	*Urtica simensis* Stedel.	sama	Uticaceae	Herb	wild	Forage ,Food
55	*Verbacicum sinaiticum* Benth.	Yahiyajoro	Scrophulariaceae	Herb	roadside	-
56	*Verbena officinalis* L.	Atuch	Verbenaceae	Herb	wild	Forage
57	*Vernonia amygdalina* Del.	Girawa	Asteraceae	Shrub	wild	Fire wood, Fence
58	*Zehneria scabra* (Linn.f.) Sond.	Aregresa	Cucurbitaceae	climber	wild	-

Appendix 7 List of marketed medicinal plants and their other uses

	Scintific name	**Local name**	**English name**	**uses**
1	*Allium sativum* L.	Nech shinkurt	Garlic	food, spice
2	*Allium cepa* L.	Key shinkurt	Onion	food, spice
3	*Linum usitatissimum* L.	Telba	Linseed	food
4	*Guizotia abyssinica* (L.f.) Cass.	Nug	Niger seed	food
5	*Lepidium sativum* L.	Feto	Garden cress	Spice
6	*Coffea arabica* L.	Buna	Coffee	stimulant
7	*Nigella sativa* L	Tikur azmud	Black seed	Spice
8	*Helianthus annuus* L.	Suf	Sun flower	food
9	*Lycopersicon esculentum* Mill	Timatim	Tomato	food
10	*Trigonella foenum graecum* L.	Abish	Fenugreek	spice
11	*Coriandrum sativum* L.	Dinblal	Coriander	Spice Flavor food
12	*Eragrostis tef* (zucc.) Trotter	Tef	Teff	food
13	*Zingiber officinale* Roscoe	Zingibl	Ginger	Spice, Flavor food
14	*Echinops kebericho* Mesfin	Kebericho	-	Medicinal, Insecticide
15	*Embelia schimperi* Vatke	Enqoqo	-	medicinal
16	*Taverniera abyssinica* Rich.	Dingetegna	-	medicinal
17	*Otostegia integrifolia* Decn.	Tunjut	-	insecticide
18	*Silene macrosolen* A.Rich	Wogert	-	medicinal
19	*Hagenia abyssinica* (Bruce) J.F.Gm	Koso	Hagenia	medicinal
20	*Rhamnus prinoides* L.Hert	Gesho	Buckthorn	Flavor for local drinks
21	*Withania somnifera*(L.)	Gizawa	Winter cherry	Medicinal
22	*Ruta chalpensis* L.	tenadam	Rue	Spice
23	*Thymus schimperia* Ronniger.	Tosign	Abyssinica thyme	Spice, Food,
24	*Cymbopogon citratus* (DC.) Stapf.	Tegisar	Lemongrass	Aroma
25	*Artemisia rehan* Chiov.	Arity	Ethiopian wormood	Aroma

Appendix 8 List of human ailments with number of respondents and number of species of plants in study area

	Local Name	English Name	Number of informants	Percent%	Number of plant species	Percent%
1	Chirt ,	Ring worm	22	28	6	
2	Shahign	Leshimaniasis	17	21	2	2.4
3	Ekek	Itch/Scabies	14	17	3	3.6
4	Kintarot	Hemorrhoid	28	35	5	6.0
5	Gunfan	Common cold	52	67	6	7.2
6	Chiffee	Skin rash/Eczema	8	10	5	6.0
7	Mich,	Feibrile illness	63	79	10	12.0
8	Demgifit	Hypertension	31	39	5	6.0
9	Yetirshimum	Toothache	25	32	4	4.8
10	Yegurorohimem	Tonsillitis	23	29	5	6.0
11	Ququcha	Tinea versicolor	31	39	3	3.6
12	Yengdehlig almewred	Retained placenta	21	26	3	4
13	Forefor	Dandruff	17	21	5	6
14	Yesatkatelo	Burning fire	9	12	2	2.4
15	Nesir	Bleeding nose	8	10	2	2.4
16	Tekimat	Diarrhea	15	19	5	6
17	kusil	Wound	13	16	3	3.6
18	Demmefises	Acut bleeding	6	8	2	2.4
19	Koso	Tapeworm	32	41	4	4.8
20	Yebid wishbeshta	Rabise	4	5	1	1.2
21	Yekulalitt teter	Kidney stone	5	6	1	1.2
22	Buda	Evileye	49	62	4	4.8
23	Chebit	Gonorrhoea	5	6	3	4
24	sal	Cough	26	33	4	4.8
25	Chegura himem	Gastrits	31	39	3	3.6
26	Hod kurtet	Stomachache	26	32	4	6
27	yemitefa	Skin rash of baby	2	3	3	3.6
28	Dingetegnii(Oromic)	sudden sickness	17	21	2	2.4
29	wosfat	Ascarise	2	3	1	1.2
30	rasmitat	Headache	3	4	1	1.2
31	Mognbagegn	Emergency	3	4	2	2.4
32	Yewof beshita	Jaudice	2	3	2	2.4

Appendix 9 List of livestock ailments with number of respondents and number of plant species in study area

No	Local Name	Livestock disease	Number of informants	Percent %	Number of plant species	Percent %
1	Odom(Oromic)	Fasciol/Liver fluck	30	38	1	1.2
2	Abagorba (Oromic)	Black Leg	10	13	2	2.4
3	Abbasangaa(Oromic)	Anthrax	22	28	3	3.6
4	dingetegna	Suddensikness	17	21	1	1.2
5	Fentata	Shoat pox	14	18	1	1.2
6	Alikit	Leech	32	40	4	4.8
7	Ayin Beshita	Eye disease	34	43	2	2.4
8	Kodabeshita	Skin disease	13	17	2	2.4
9	Hodmenfat	Retained placenta	8	10	1	1.2
10	YbidYewish beshita	Rabies	8	10	3	3.6
11	Kicham	External parasites	5	6	2	2.4
12	Kusil	wound	9	11	3	3.6
13	Hodmenifat	Bloating	1	1	1	1.2

Appendix 10 Format for collecting medicinal plants in formation (check list of semi structured interview prepared for data collection in the study area)

1 Date_____ Kebele_____

2. Name of respondent _____sex _____Age_____

2.1Occupation_____

2.2 Marital status_____

2.3 Religion_____

2.4 Educational background_____

3. What are the most common human health problems in your kebele?

A_____ B._____ C._____

D._____E_____

4. What are the most common livestock health problems in your Kebele?

A._____ B._____ C._____

D_____ E._____

5. Do you use traditional medicinal plants to treat disease_____ in your locality?

A. Yes_____ No_____

6. If your answer is yes

6.1 What is the name of plants_____-

6.2 Habitat of plants_____

6.3 Habit of the plant_____

6.4 Part of the plant you use_____

6.5 Preparation methods_____

6.6 Amount of used dosage_____

6.7 Application methods_____

6.8 Does dosage differ among sex, age groups?

A. yes B. No

6.8.1 If your answer is yes

6.8.1.1 Which age group of the local people use the medicinal plant frequently?_____

_____

7. Does it have adverse effects?

A. yes B. No

7.1 If your answer is yes

7.1.1 How do you prevent this adverse effect?_____

_____.

8. Where did you get this knowledge of traditional medicine?_____

9. How do you treat and conserve this medicinal plant?

10. Mention medicinal plants with other additional uses in addition to medicinal purposes.

11. How do you transfer your knowledge of medicinal plants for next generation?

Appendix 11 List of informants with their age, sex, Kebele, Marital status and occupation (Key informants=*)

No	Name	sex	Age	Kebele	High school completed	Read and Write	Marital status	occupation
1	Solomon Teka	**M**	45	sura				**Farmer**
2	Mankul Jemaneh	M	36	Wegida				**Farmer**
3	Tirunesh Negashi	F	51	Abebut		Unread		Farmer
4	Tilahun Nega	M	41*	Mikewa				Farmer
5	Tirunesh Wodajo	F	47	Ejersa		Unread		Farmer
6	Wondimu Tsegaye	M	42	Yefo				Farmer
7	Yesh Wibayehu	F	36*	Abebut	Completed		Unmarried	Employee
8	Goshime Tefera	M	54	Fichegelila				Trader
9	Asrat Bedane	M	77*	Kokenesseber				Farmer
10	Asefa Negash	M	62*	Yefo			Unmarried	Farmer
11	Asefa Hailu	M	32	Wegide				Farmer
12	Armachew Ayele	M	53	Abebut			Unmarried	Farmer
13	Aregayew Ashebir	M	61	Fichgelila				Tader
14	Ayele Dinku	M	69	Wegida				Farmer
15	Eshetu Teka	M	37	Ejrisa				Farmer
16	Shimelis Bekele	M	42	Maru				Farmer
16	Zebenay Bekele	F	39	Mikewa			Unmarried	Trader
18	Moges Ayano	M	60*	Kokenesseber				Farmer
19	Abebe Tola	M	46	Gura		Unread		Farmer
20	Mulatu Negewo	M	27	Maru	Completed			Employee
21	Beshada Demissie	M	37	Sura			Unmarried	Farmer

22	Getu Seifu	M	45*	Maru				Farmer
23	Derese Tedila	M	31	Abebut				Farmer
24	Deriba Mamo	M	72	Wara		Unread		Farmer
25	Abebe Maru	M	37	Wara				Farmer
26	Adefiris Abebe	M	61	Yefo				Farmer
27	Bekelech Kasa	F	68	Maru		Unread	Unmarried	Farmer
28	Alem Ashebir	F	41	Kokenesseber			Married	Trader
29	Demirew Negesse	M	58*	Kokenesseber				Farmer
30	Wobishet Sefu	M	47	Kokenesseber				Farmer
31	Meseret Asegidew	F	38	Wara	Completed		Married	Farmer
32	Birhanu Mola	M	27*	Wara				Farmer
33	Dinke Girma	F	47	Gura			Married	Farmer
34	Genzeba Biru	F	37	Wegide			Unmarried	Farmer
35	Yeshi Worku	F	56	Wegida			Married	Farmer
36	Awoke Habite	M	67*	Yefo				Farmer
37	Mekuria Demirew	M	26	Ejersa	Completed		Unmarried	Farmer
38	Nega Zegeye	M	80*	Mikewa		Unread		Farmer
39	Bekelech Diriba	F	38	Wara			Unmarried	Farmer
40	Emishaw Wondimu	M	36	Ejersa				Farmer
41	Alimaz Teka	F	47*	Ejersa			Married	Farmer
42	Dereje Adefiris	M	32	Yefo			Unmarried	Farmer
43	Abebech Bekele	F	69	Sura			Married	Farmer
44	Teshome Arigaw	M	39*	Sura				Farmer
45	Belaynesh Mola	F	35	Sura			Married	Farmer
46	Alemayehu Demeke	M	40	Yefo				Farmer
47	Tsigareda Gebeyehu	F	48	Fichegelila			Unmarried	Employee

48	Belaynesh Ayele	F	27	Maru	Completed		Married	Trader
49	Getu Girma	M	50*	Mikewa				Farmer
50	Girum Tesfaye	M	37	Ejersa			Unmarried	Farmer
51	Fetene Yemane	M	48	Kokenesseber				Trader
52	Fikirte Shiferaw	F	65*	Yefo			Married	Farmer
53	Ayele W/Kidan	M	36	Abebut				Farmer
54	Gezahegn Ayele	M	68	Gura		Unread	Unmarried	Farmer
55	Kasa Wolde	M	28	Wegida	Completed			Farmer
56	Solomon Tegegn	M	56	Gura				Farmer
57	Bizuwork Yofiru	F	31	Ejersa			Married	Farmer
58	Amele Niguse	F	26	Fichgelila			Unmarried	Employee
59	Asegidew Awigichew	M	55	Fichegelila				Farmer
60	Bizuye Zeleke	F	34	Mikewa			Married	Farmer
61	Emishaw wondimu	M	36	Abebut				Farmer
62	Shewangizaw Tesfaye	M	29*	Fichegelila				Employee
63	Mekuria Demirew	M	27	Fichgelila	Completed		Unmarried	Farmer
64	Ayele H/Mariam	M	30	Yefo				Farmer
65	Goshime Tefera	M	67	Ejersa		Unread		Trader
66	Asefa Hailu	M	35	Wegida				Farmer
67	GetacheW Tafese	M	29	Abebut			Unmarried	
68	Worku Abebe	M	32*	Maru				Employee
69	Abirham Teka	M	44	Gura				Farmer
70	Fekadu Goshime	M	43	Gashu Amba/Abebut				Farmer
71	Alibasework	F	45	Kokenesseb			Married	Farmer

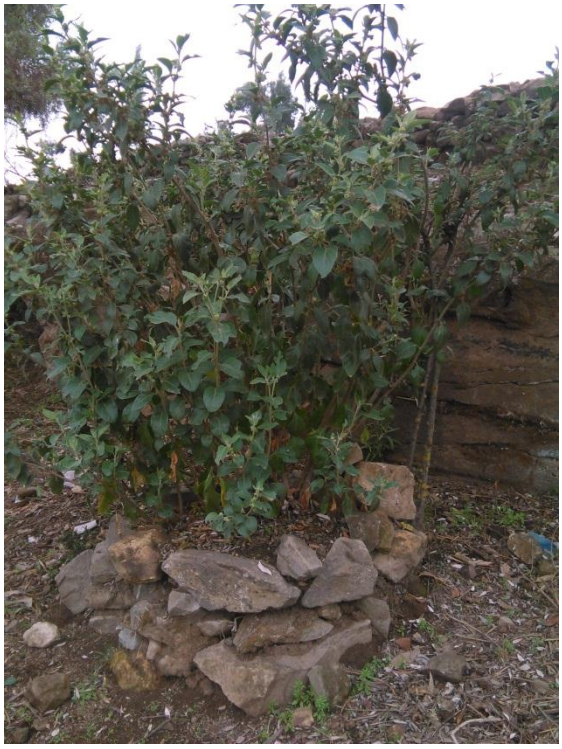
	Taye			er				
72	Misifin Belineh	M	64*	Abebut				Farmer
73	ShiferA Negash	M	37	Fichegelila				Trader
74	Balich Deribe	M	26	wara			Umarried	Farmer
75	Getachew Wodag	M	69*	Wegida				Farmer
76	Gebiru Tola	M	34	Wegide			Unmarried	Farmer
77	Getahun Bekele	M	36*	Abebut				Farmer
78	Niguse Tesfaye	M	33	Yefo	Completed		Unmarried	Farmer
79	Yeshi Tekle	F	56*	Mikewa				Trader
80	Addise Bantihun	F	36	Fichegelila				Trader

Appendix 12 Photographs illustrating during field activities

Photo courtesy by Grium Tesfaye(2019)

Photo courtesy by Grium Tesfaye(2019)

Photo courtesy by Grium Tesfaye(2019)



Ruta chalpernsis L

Withania somnifera (L)

Datura stramonium (L) *Nicotiana tabacum* L. *Verbascum sinaiticum* Benth.

DECLARATION

Declaration

I, Genet Shiferaw Negesse confirm that the work of presented in this thesis is my own, Where information has been derived other sources. I confirm that this has been indicated in the thesis. The material contained in this thesis has not previously been submitted for a degree at Addis Ababa University or any other University and all the sources of materials used for thesis are acknowledged.

Name Genet Shiferaw Negesse

Signature_____

Date-September 2019

Place-Addis Ababa University

This thesis has been submitted for examination with my approval as an academic advisor.

Advisor; Ermias Lulekal (PhD)

Signature_____

Date _____