ADDIS ABABA UNIVERSITY

DIVERSITY OF MEDICINAL PLANTS AND USES IN SAYINT DISTRICT, SOUTH WOLLO, AMHARA REGION, ETHIOPIA

SINTAYEHU SHIFERIE

A thesis submitted to

Department of Plant biology and Bio diversity management

Presented in fulfillment of the requirements for the degree of master in Biology

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ADDIS ABABA UNIVERSITY

GRADUATE PROGRAMMES

This is to certify that the thesis prepared by Sintayehu Shiferie, entitled: Diversity of medicinal Plants and uses in Sayint District, South Wollo Zone of Amhara Regional State, Ethiopia and submitted in fulfillment of the requirements for the Degree of Master in biology (Plant Biology and Biodiversity Management) complies with the regulations of the University and meets the accepted standards with respect to originality and quality

Signed by:

Name	**Signature**	**Date**
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Dr. Bezawork Afework **(**Chairman)	_____	_____

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DECLARATION

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NAMES AND SIGNATURES OF THE EXAMINING BOARD:

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Diversity of Medicinal Plants and Uses in Sayint District, South Wollo, Amhara Region, ETHIOPIA

By: Sintayehu Shiferie

Addis Ababa University, 2021

Abstract

Study of diversity of medicinal plants and uses were conducted in Sayint district, South Wollo, Amhara region, Ethiopia. Data on medicinal plants were collected from 92 informants (53 male and 39 female). Data were collected through questionnaire, interview, market survey, field observation and group discussion. Data were analyzed quantitatively and qualitatively. A total of 75 medicinal plant species were identified and from natural vegetation 61 (81%) and home garden 14 (19 %) distributed in 68 genera and 42families. The abundance of medicinal plants was categorized as presently safe (40%), threatened (28%), sporadic (20%), endangered (6.7%) and vulnerable (5.3 %). A total of 53 ailments (35human, 11 livestock and 7 both) were identified to be treated by medicinal plants. From the total identified medicinal plants, 54 of them were reported for the treatment of human ailments and the remaining others were for livestock and both. The dominant life forms of medicinal plants were shrubs 37(50%), followed by herbs 21(28%), trees 10(13%) and climbers7 (9%).The most preferably used medicinal plant parts were leaves 41 (55%) followed by roots16 (21 %). The dominant method of medicinal plant part remedy preparation was pounding and squeezing 26 (35 %) followed by pounding 15(20 %). The most common preferable route of administration of medicinal plant remedy was reported to be oral 39 (52%) followed by dermal 24 (32 %). Drinking was the most frequently used method of application26 (35%) followed by painting or creaming 21(28%). The main sources of knowledge on medicinal plants reported to be elder people and used oral based transfer of knowledge. Anthropogenic factors such as farm land expansion, charcoal production, fire wood, construction, animal grazing and medicine and natural factors were found to be the threats for medicinal plants. Promoting tree growing project and the sustainable utilization and management of medicinal plants were recommended. Further studies towards cultivation of medicinal plants of the area were needed.

Key Words: Abundance, Ailments, Diversity, Species richness, Threats

1. Introduction

1.1. Background of the study

Medicinal plants have been used for primary means of treating diseases and infections in the world (WHO, 2002). They have been used for rich sources of effective and safe medicine for many years (Rusell *et al*; 2006). Medicinal plants are estimated from 35,000-50,000 species in the world and the number of species that have entered the world market of medicinal plants is 400-600 species (Farnsworth and Soerjarto, 1991).

In Africa traditional herbal medicine derived from plant forms are an integral part of life in many indigenous communities as a readily available alternative to allopathic medicines (wagate *et al.*, 2010). More than 70% of the people in Africa refer to traditional herbal healers concerning health issues (Tijjanic *et al*., 2009). According to World Health Organization (WHO, 2002), above 80% of Africa countries depends on traditional medicines and indigenous knowledge to overcome their health care problems. More than 800 plant species in Ethiopia are used for their medicinal purpose and new other medicinal plants species will be added when other investigation document from different cultures (TesemaTanto *et al.*, 2002). According to Endeshaw Bekele (2007) different plant types found in the different parts of Ethiopia accommodate different types of medicinal plants. He states that, 80% of the total population of Ethiopia treats different types of human and livestock ailments using the traditional medicines. Thus, plant diversity is important for a number of remedies preparations for health care system. The investigation of Fikadu Fullas(2007) also showed that medicinal plants are important in the treatment of different ailments in Ethiopia. People in Ethiopia depend on medicinal plants for their primary health care system (Ermias Lulekal *et al*., 2013). Ethiopia is rich with a variety of potentially useful medicinal plants compared from other parts of the world (GidayYirga, 2010).

Nowadays, anthropogenic factors such as deforestation, overexploitation, overgrazing, agricultural land expansion and firewood collection threats medicinal plants in Ethiopia and the knowledge associated with medicinal plants (Dawit Abebe, 2001; Kalayu Mesfin et al., 2013). The knowledge on medicinal plants of Ethiopia is now being lost since it has majorly been held in the elderly peoples and transferred from generation to generation orally (Mirutse Gidey and Tilahun Teklehaymanot, 2013). This study aims to document the wealth of medicinal plant species used to treat human and livestock ailments and compiles the threatening factors related to

the utilization and conservation of medicinal plants in Sayint district. The study also documents status and distribution of medicinal plants in the district. Furthermore, the study assesses marketable medicinal plants and knowledge associated with medicinal plants. Documentation of medicinal plant diversity in Sayint along with the knowledge on medicinal plants is used to preserve endangered and vulnerable species and the knowledge associated with medicinal plants.

1.2. Statement of the problem

In the district the use of locally available medicinal plants is believed to be an important for treating human and livestock ailment. But there is no documented source about the traditional medicinal plants usage and conservation practices. The knowledge on medicinal plants would transfer from generation to generation through oral system. Therefore, documenting and recording data about medicinal plants in the study area is needed. The finding of this study will help the local people to be aware of medicinal plant uses, threats and sustainable utilization and conservation. It also fills the gap in the documentation and records on medicinal plants because of oral based transfer of indigenous knowledge about medicinal plants.

1.3. Research questions

This study was concerned on investigating and documenting the diversity of medicinal plants and uses in the study area. Hence the results of this study will provide answers for the following research questions.

1. Is there species richness commonly used as traditional medicines in District?
2. Are there traditional medicinal plant species used by indigenous people to treat different ailments?
3. How traditional knowledge on medicinal plants is gained and transferred?
4. How do human activities influence access to traditional medicinal plants?
5. Are there marketable traditional medicinal plants?
6. Are there threatening factors and conservation methods for medicinal plants?

1.4. Objectives of the study

1.4.1. General objectives

To investigate and document medicinal plant diversity and uses in treatment of human and livestock ailments in Sayint District ,South Wollo Zone

1.4.2. Specific objectives

- To identify and document plant species that have medicinal purpose
- To differentiate the taxonomic diversity(growth forms) of medicinal plants
- To identify the types of medicinal plants used to treat human and livestock ailments
- To evaluate the impact of human activities on access to traditional medicinal plants
- To assess the causes of threats and conservation methods of medicinal plants
- To identify sources knowledge on medicinal plants and ways of transferring

1.5. Significance of the study

In the study area there were no documented sources about the diversity and uses of medicinal plants previously. This study was focused on investigating and documenting the diversity of medicinal plant species and uses. Therefore, the finding of this study will have significances for the local people to be aware of the different plant species that have medicinal values for human and livestock ailments, transfer of indigenous medicinal knowledge, the parts of plants used, method of preparation, mode of administration, threaten factors and ways of conservation and sustainable utilization of medicinal plants. It can be a basis for other further studies concerned on medicinal plants in the study area.

1.6. Scope and limitations of the study

This study was conducted in Sayint District which consists of 34 kebeles. The study was carried out only in eleven kebeles to investigate, document species richness, abundance and characteristics of commonly used as medicines, utilization of medicinal plants and influence of various factors on medicinal plants in study area. The scope of the study was delimited by unwillingness of sellers, healers and topography of the study area. These challenges were solved by clearly discuss the objectives of the study and by asking transport access from District administrator office.

2. Literature Review

2.1. Medicinal plant diversity and uses

The world we live in today biologically, economically, and culturally, is a living legacy of earlier plant and associated knowledge discoveries, and transfers (Voeks; 2011). A total of 35,000-50,000 medicinal plants are estimated in world and the numbers of medicinal plant have entered the world market of medicinal plants is about 400-600 species (Farnsworth and Soejarto, 1991). Traditional plant remedies are still the most important sources of therapeutics for nearly 80% of the people in the developing world (WHO, 2008). The majority of population (80%) in Africa health care depends on primarily on the use of traditional medicinal plants (WHO, 2002). According to Fassil Kibebew (2001), about 75-90 % of the rural population in the world (excluding western countries) relies on traditional medicines as their only healthcare system. The majority of the population in developing countries (for instance, 80% of the population in Africa), primarily rely on traditional medicinal plants for their healthcare (WHO, 2002). In northern Ethiopia, the major portion (87%) of the parts used in traditional medicine come from plant sources, while animal parts and minerals contribute only a small supply (Dawit Abebe and Ahadu Ayehu, 1993).

In Ethiopia there are about 6,500 species of higher plants and out of these 12% of them are endemic to the country and hence Ethiopia is one of the six plant biodiversity rich countries of Africa (Endeshaw Bekele, 2007). He states that greater diversity of medicinal plants is found in south and south western parts of Ethiopia. For example, in Bale mountain national park 337 medicinal plant species are recorded which are used as human and livestock medicines (Ermias Lulekal *et al;* 2008b). According to Worku Abebe (2016) near to 800 medicinal plant species in Ethiopia are used to treat different health problems. The same numbers of medicinal plants which have medicinal values are reported by other investigations (TesemaTanto *et al*., 2002). Several studies in Ethiopia showed that, Ethiopia has a long history of using medicinal plants for the treatment of various diseases (Fisseha Mesfin *et al*., 2014. Gonfa Kewessa *et al.*, 2015).

2.2 Traditional medicinal plants in Ethiopia

In Ethiopia, the long history of using traditional medicinal plants for combating various ailments can be confirmed by referring to the recent collection of medico-religious manuscripts of the Axumite kingdom (Fassil Kibebew, 2001). This manuscript addresses about 1,500 diseases, mentioned to be treated using 8,000 plants, 90 animals and 150 minerals.

According to Mohammed Adefa and Berhanu Abraha (2011) Ethiopia is a country characterized by a wide range of climatic and ecological conditions possessing enormous diversity of flora and fauna, including wide range of potentially useful medicinal plants. The country possesses particularly wide range of potentially useful medicinal plants, more extensive indeed than available in many other parts of the world. Dawit Abebe (1986) estimated that 95% of traditional medical preparations in Ethiopia are of plant origin.

In Ethiopia, it is well known that traditional medicines are widely used especially in the low income rural parts of the country (Getachew Addis et al., 2002). It is reported that nearly 80% of the population in the country use plant-based traditional medicines as their healthcare system (Tilahun Teklehaymanot and Mirutse Gidey, 2007). Ethiopian traditional medical system is characterized by variation and is shaped by the ecological diversities of the country, sociocultural background of the different ethnic groups as well as historical developments which are related to migration, introduction of foreign culture and religion (Getachew Addis et al., 2002). Traditional uses of medicinal plants and associated knowledge in some particular cultural groups are addressed in recent publications by Ermias Lulekal *et al*. (2008a), Teferi Flatie *et al*. (2009), Mirutse Giday *et al*. (2010), Nasir Tajure Wabe *et al*. (2011), Girmay Zenebe (2012) and Ketema Tolossa *et al*. (2013). But according to Alem Habtu(2003) when compared to the occurrence of 84 different ethnic groups in Ethiopia, most of medicinal plants largely ethno medicinally unexplored.

2.3. Indigenous knowledge on medicinal plants

Around the world traditional people possess unique knowledge of plant resources on which they depend on for their utility and also tremendous botanical expertise (Martin, 1995). People use their indigenous knowledge of medicinal plants for the treatment of different ailments. Indigenous knowledge refers to health practices, approaches, knowledge and beliefs incorporating plant, animal and mineral based medicines, spiritual therapies, manual techniques and exercises, applied singly or in combination to treat, diagnose and prevent illness or maintain

well-being (Wole, 2010). The accumulation of indigenous knowledge that helped people to adapt to and survive in the environments in which they live comes from the immediate and intimate dependency of local people on natural resources. According to Thomas (1995) indigenous knowledge is unique to a given culture and the base for agriculture, healthcare, food preparation, education, environmental conservation and a host of other activities. This systematic body of indigenous knowledge is built up by a group of people through generation of living in close contact with nature. Indigenous knowledge of traditional medicinal plants and their uses has been passed from one generation orally in most developing countries.). According to Martin (1995), indigenous knowledge is a result of many generations', long years' experiences, careful observations and trial and error experiments. Therefore, indigenous people of different localities have developed their own specific knowledge on plant resource use, management and conservation over time (Cotton, 1996). But now days, most of the younger generation have low involvement in traditional knowledge of medicinal plants (Endashaw Bekele and Shigeta, 2008). This may be due to that indigenous knowledge involves time-tested practices that are developed in the processes of interaction of humans with their environment (Balick and Cox, 1996).

2.4. The role of medicinal plants in the treatment of human and livestock ailments

Traditional medicine is deeply rooted in history and culture. It is part of the traditions of a country, employing healing practices handed down from generation to generation. About 80% of the world's population uses plants to solve basic medical problems (Farnsworth and Soerjato, 1991). According to world health organization, more than 80 of Africans rely on traditional medicines and indigenous knowledge to meet their health care needs (WHO, 2001).

In Ethiopia about 80% the human population and 90% of livestock disease treatment depends on the use of medicinal plants (Dawit Abebe, 2001). Other investigations in Ethiopia indicated that 80% of the people use medicinal plants for the treatment of ailments (Asfaw Debela *et al*., 1999).

In Ethiopia the accessibility of modern health care services are insufficient. However, many young people today have little interest in traditional knowledge of medicinal plants (Endashaw Bekele and Shigeta, 2008). Indigenous knowledge includes time-tested practices that developed in the processes of interaction of humans with their environment (Balick and Cox, 1996). As a result of this and rapid population growth and culture of the people, the majority of the people relies the use of traditional medicinal plants (Dawit Abebe, 2001).

According to Mirutse Giday (2003), Ethiopia is rich in livestock population but because of poor health condition they have low productivity. He identified 27 livestock ailments that can be treated by 13 medicinal plant species. The types of diseases affecting livestock's health in Ethiopia were reported to be wound, cough, diarrhea and rabies. The rural communities in Ethiopia used medicinal plants for the treatment of their livestock ailments (Berhane kidane *et al*., 2014). The number of medicinal plants used to treat ailments varies from plant to plant species in Ethiopia.

A high diversity of medicinal plants at Mana Angetu district, Bale zone, was documented (Ermias Lulekal et al., 2008). He identified a total of 230 medicinal plants were for treating human and livestock ailments. In Konta special district a total of 120 medicinal plant species are recorded for the treatment of different ailments of human and livestock (Tesfaye Hailemariam *et al.,* 2009). Other studies among Oromo ethnic group in south western Ethiopia identified75 species of medicinal plants species which are used for treatment of 51 human ailments (Haile Yinger *et al.,* 2008). In Bench, a total of 35 medicinal plants are documented by (Mirutse Giday *et al.,* 2009). 27 species of medicinal plants are recorded by Giday Yirga2010) in Endarta district where 24 of the medicinal plants are used for treating 24 human ailments.

2.5. Threatening factors of medicinal plants

The current loss of medicinal plants in Ethiopia is due to natural and anthropogenic factors links with the loss of valuable indigenous knowledge associated with the plants (Ermias Lulekal *et al;* 2008). Hence, there exists an accelerated devastation of plant resources with loss of indigenous knowledge. In Ethiopia, traditional medicine as elsewhere in other developing countries is faced with a problem of sustainability and continuity mainly due to loss of taxa of medicinal plants, loss of habitats of medicinal and other category of plants, and cultures (Zemede Asfaw, 2001). Different factors of threats of medicinal plants leads to loss of medicinal plant diversity. According to Hamilton, the most proximate threats of medicinal plants are habitat loss, land degradation and over harvesting (Hamilton, 1997). Most of medicinal plant species for treatment of diseases collected from the natural habitats and hence many plant species have become extinct and others become endangered. Rapid population growth creates pressure on medicinal plants to fulfill demands from medicinal plants (Hamilton, 2003). Lack of systematic conservation, research, proper utilization and documentation are mentioned reasons for loss of plants and

associated knowledge (Kalayu Mesfin, 2013). As investigations in Ethiopia have shown plant resources which include medicinal plants are lost due to anthropogenic and natural factors. The anthropogenic factors are agricultural land expansion, firewood collection, charcoal production, and overgrazing and construction material. Other studies also reported that anthropogenic and natural factors as the major threats for environmental degradation and for loss of medicinal plants (Ermias Leulkal *et al;* 2008, Fisseha Mesfin *et al;* 2009). Most of the knowledge on medicinal plants use is stored by older people and they transfer their knowledge orally (Kalayu Mesfin *et al.,* 2013).

An increase in population number increases poverty and demand for agricultural farm land and forest products. These are maintained as major threats for the sustainable utilization of many land plant species (Ensermu Kelbessa *et al;* 1992. According to Zemede Asfaw (2001), different factors exposing medicinal plants under a problem of sustainability and continuity. He states that many plant species are used plants for food, medicine, clothing, shelter, fuel, timber, income generation and fulfillment of cultural and spiritual needs. Both traditional knowledge and plant diversity are being lost at an alarming rate by apparently inevitable forces such as economic globalization, climate change, habitat destruction and 'human progress' (Hamilton, 2003).

2.6. Conservation methods of medicinal plants

Around the world there is some conservation methods have been undertaken to protect threatened medicinal plants from losing (Cunningham, 1996). He stated that in-situ and ex- situ conservation measures are implemented to maintain genetic resource of medicinal plants.According to Zemede Asfaw (2001), domestication and management of some traditional plants is difficult and hence they have to be conserved in in-situ. In Ethiopia, amongst the species cultivated in home garden, about 6% are cultivated primarily for their medicinal role.

As studies carried out by Zemede Asfaw shown medicinal plants can be conserved by promoting their growth in special places such as churches, mosques, grave yards, seared grooves, farm margins, river banks, road sides, live fences of gardens and fields. For conservation of medicinal plants Ethiopian Biodiversity Institute is practicing in-situ and ex-situ conservation methods (Alemayehu Kefalew and Sara Sintayehu, 2017). For example, total of 1000 different medicinal plants have been conserved as a voucher specimen in the national herbarium of Ethiopia. According to Endeshaw Bekele(2007), Ethiopia is signed the Convention on Biological Diversity

which to guaranty indigenous people to maintain and conserve their indigenous knowledge associated with medicinal plants. He also recommends that propagating some medicinal plants in home gardens is one important step for the conservation of medicinal plants

3. Materials and methods

3.1. Description of the study area

The study was carried out Sayint district, found in South Wollo Zone, Amhara Regional state, Ethiopia. Sayint District is located 590km North of Addis Ababa (capital of Ethiopia) and 189km to East of Desse (South wollo zone) at 10^0 53' to $10^0$57' N and 38^0 54' to 39^0 49'E. The district is bordered in North by Mekidela district, in south by Densa district, West by Simada and East by Legambo district. The district includes 34 kebeles and has a total area of 144, 240.95 ha. The total population number of the Sayint is 171,927 people (Sayint District communication affairs, 2004). The total number of males is 84,024 and 87,903 are females. The majority of the inhabitants (99%) are Ethiopian orthodox Christian and 1% is Muslim. Most people are living by exploiting plant diversity for agricultural activities (Sayint district communication affairs 2018). Majority of the populations are living in rural area engaged mainly in subsistence agriculture and livestock production (District rural development office, 2017). The main crop plants cultivated in the study area are Wheat, Barley, Teff and Pea.

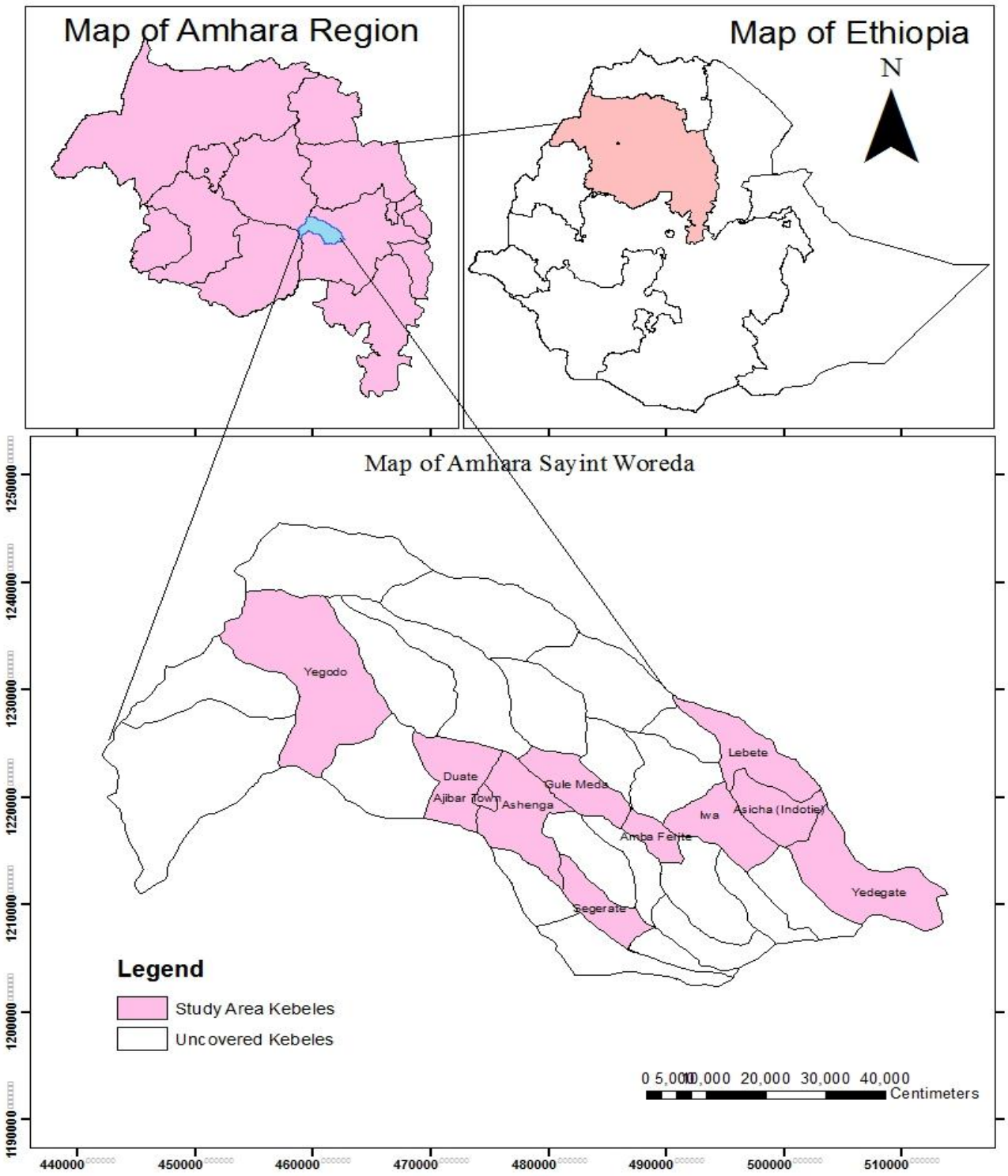

Figure1. Map of Ethiopia Showing Amhara region and Sayint District

3.2. Climate

Climatic data for the temperature and rain fall were taken from Kombolcha National Metrological Service Agency which is the nearest station. Accordingly, the district has bimodal pattern of rainfall. Sayint district gains high rainfall between months July to August and receives low rainfall from March to May. The dry months of the district are from October to February. The lowest monthly rainfall and the highest mean annual rainfall are 9.31mm and 724mm respectively. Amount and distribution of rainfall constrains livestock production and plant growth. The mean monthly minimum temperature was 5.2^0c and the maximum was 26.3^0c. The coldest month and the hottest months are October and August respectively. The average annual maximum temperature of Sayint district is 16.1^0c.

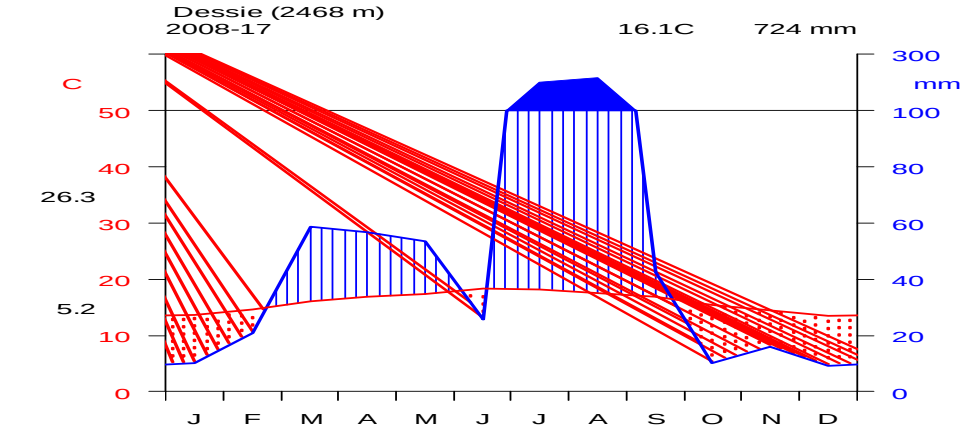

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Figure 2. Diagram showing rainfall and temperature of Sayint (Source: Kombolcha Meteorological Service Agency).

3.3. Vegetation types

Sayint district is covered by dry evergreen Afromontane vegetations. Dry evergreen montane forests are characterized by canopies usually dominated by *Podocarpus falcatus* with *Juniperus procera* as co-dominant species, followed by *Olea europaea* subsp. *cuspidata* (Sebsebe Demissew and Friis, 2009). Other studies also indicated that, Afromontane vegetations are characterized by *Oleae europaea subs, Juniperus procera, Prunus africana, Euphorbia spp. Carissa spinarum, Rosa abyssinca* (Friis *et al.*, 2011). In addition to these, *Eucalyptus globulus,*

Acacia abyssinica, *Cupressus lusitanica* and other shrubs and herbs are common vegetation types found in Sayint.

3.4. Reconnaissance survey

Reconnaissance survey of the district was conducted from October 2- 6/2020 and data collection followed till 28/2020 to select the study areas, to know location of traditional healers and bordering of each kebeles. Purposive sampling technique was used to select eleven (11) study areas out of 34 kebeles. Namely: Adjibar, Yegodo, Segerat, Ewa, Lebet, Yedegat, Gulmeda, Ascha, Ashinga, Ambaferit and Duat. This is because purposive sampling selects typical and useful cases only and also saves time. It is also used to identify vegetative areas sampled or vegetation types sampled.

3.5. Informant selection

The total number of population in Sayint district is 171,927, while the number of population who lived in the study area (11 kebeles) was 39836. The total population of Sayint District is 34 and out of these 11 kebeles were selected which covers 32% of the total kebeles. The representative sample size from the total population was determined by using the formula

$n=N/1+N\ (e)^2$ where;

N= total household population in the district

e= level of precision (margin of error) 1= probability of event occurring

n=sample size of the study area (Yamane's 1967) and used 95% confidence level

The frame reference sample size is determined by $n=171927/1+171927\ (0.05)^2 = 399$

The sample size of the study area was determined as n = 39836X399/171,927 = 92 and twenty four key informants (15males and 9 Females) were selected out of 92 informants. The key informants were selected with the nomination by elder and knowledgeable people i.e. key informants were selected, following the choice of informant selection as recommended by Martin (1995) and this is commonly systematic way and based on the recommendation of elders, local authorities and local farmers. The general informants were selected randomly during the visit in the study kebeles.

The sample size of each kebele was determined by using the derivation arithmetic formula:

$ni = n_2 * Ni/_{n1}$ where,

ni =sample size of each kebele

Ni = total number of population in each kebele

n_1= total population of study kebeles

n_2 = sample size of the study area

Table 1. Total population and sample size of each kebele

No	**Name of kebeles**	**Total number of population in each kebeles (Ni)**	**Sample size in each kebeles (ni)** $ni = \frac{Ni*n2}{n1}$		
			Male	Female	Total
1	Adijbar	10870	16	9	25
2	Yedegat	1056	1	1	2
3	Yegodo	2360	3	2	5
4	Ascha	2426	3	3	6
5	Ashenga	4145	6	4	10
6	Duat	2995	3	4	7
7	Gulmeda	3426	5	3	8
8	Ambaferit	2975	4	3	7
9	Segerat	3448	5	3	8
10	Lebet	2230	3	2	5
11	Ewa	3905	4	5	9
	Total	39836	53	39	92

3.6. Data collection methods

Data were collected by conducting semi- structure interview, market survey, field observation and group discussion. The semi- structure interviews (appendix 6) had two parts where part one was aimed at obtaining information about the respondents; while part two was designed to get

the responses for research questions which were administered in Amharic language and the responses were translated to English.

To identify the types of medicinal plants, their parts and functions found in market, market surveys of medicinal plants were carried out at five markets of the District namely Aste, Erobit, Hamusit, Dembella and Waro which are the main markets in the District. A total of 80 informants (16 per market) were asked about marketable medicinal plants type, source and functions. During market survey types, parts and functions of medicinal plants were recorded.

Field observations were conducted at each kebeles with the guide of traditional practitioners to document data about habits, sources and abundance of medicinal plants. A total of 24 group discussions were carried out with 64 informants (combination of key and general) to discuss on preparation methods, administration routes, major threatening factors and conservation practices of medicinal plants. Out of the 64 informants16 (10 male and 6 female) were key informants while 48(33 male and 15 female) were general informants. Focus group discussion allows for a variety of views to merge (Krueger and Casey, 2000).

3.7. Ethical consideration

Permission was obtained (asked) from the state holders (the District Administrative Office, kebele chairman and traditional healers) to conduct the study and collect data. The informants were told the objective of the study and hence they were Wiling.

3.8. Specimen collection and identification

All the required information of medicinal plants (local name, sources, habits, abundance) was recorded during the interview made and questionnaires administered. The sample specimens of medicinal plants were collected from October 29 - November 30 /2020 and from March 15-April 10/2020. Because of the current covid-19 and the distance far from the herbarium at Addis Ababa, the collected medicinal plant specimens were identified by using Flora of Ethiopia and Eritrea edited by different authors with help of biology teachers at Sayint preparatory school biology laboratory.

3.9. Data analysis

Data was analyzed both quantitatively and qualitatively following approaches of Martin (1995) and Cotton (1996). Data on medicinal plants and associated knowledge were analyzed using descriptive statistics such as percentage and frequency. The recorded information on medicinal plants and associated knowledge from the informants were number and percentage of species, genera, family, life forms (habits), sources, abundance, number of diseases treated by medicinal plants, parts used, preparation, administration, sources of knowledge and threatening factors which were all analyzed by using descriptive statistics. Excel spread sheet was applied to make charts, table, graphs, calculations and to determine proportions.

The abundance of medicinal plants was determined on the basis of methods described by Chaudhuri and Sarkar (2003), where the abundance was grouped as: S= sporadic, i.e. species are growing scattered or in an irregular pattern, thus they need careful monitoring, T = threatened, i.e. species involve care for conservation; PS= presently safe but need conservation to maintain their survival; V= vulnerable species, i.e. the area easily destroyed by factors and E= endangered, i.e. the existence of species facing extinction. As the key informants reported, the abundance of medicinal plants in their environment facing different anthropogenic activities and hence they cannot find easily for a remedy preparation. During the time of specimen collection the abundance of some of the medicinal plants can be seen.

4. RESULTS

4.1. Demo graphic characteristics of respondents

The majority of the respondents surveyed were males 53(58%) while the females were 39(42%). Of the 92 respondents 35 (38%) were above 60 years of age 26 (28%) were aged between 45-60 years, while 19 (21%) were aged between 30-44 years and 12 (13%) were below 30 years.

4.2. Species richness

A total of 75 plant species belonging to 68 genera and 42 families were recorded in this study. *Asteraceae* was determined to be the most dominant family which contains 7 species belonging to 5 genera followed by *Solanaceae* which contributes 5 species, *Cucurbitaceae,Euphorbiaceae*, *Lamiaceae* and *Rosaceae* each represented by 4 species. *Moraceae* and *polygonaceae* contributes 3 species each. The remaining other 7 families were represented by 2 species and the other 27 families were represented by single species

Table 2.Distribution of medicinal plant species in different family and genera

No	Name of family	Number of genera	Percent	Number of species	Percent
1	*Asteraceae*	5	7.4	7	9.3
2	*Solanaceae*	5	7.4	5	6.6
3	*Lamiaceae*	4	5.9	4	5.3
4	*Rosaceae*	4	5.9	4	5.3
5	*Cucurbitaceae*	4	5.9	4	5.3
6	*Euphorbiaceae*	3	4.4	4	5.3
7	*Apocynaceae*	2	2.9	2	2.6
8	*Apiaceae*	2	2.9	2	2.6
9	*Fabacae*	2	2.9	2	2.6
10	*Rutaceae*	2	2.9	2	2.6
11	*Cupressaceae*	2	2.9	2	2.6
12	*Myrtaceae*	2	2.9	2	2.6
13	*Aloaceae*	1	1.5	2	2.6
14	*Moracaeae*	1	1.5	3	4
15	*Polygonaceae*	1	1.5	3	4
16	Other 27 families	40 genera	59	48 species	36
Total	**42 families**	**28 genus**	**100**	**75 species**	**99.99**

4.3. Classification of medicinal plants into dominant plants community

To indicate the distribution of medicinal plants in the study area with respect to the dominant tree species, careful visual observation was made and vegetation of the study area was classified into community types by taking the dominant species for naming the community. Based on the field observation with the help of traditional practitioners, dominant plant community types in natural habitat and home garden area were identified and documented. The most dominant plantation tree in study area was *Eucalyptus globulus* followed by *Duranata erecta***,** *Echinops giganteus* and *Rumex nevosus***,** where as the dominant plant type in the home garden was *Rhamnus prinoides* which was found in all study areas. As the informants reported and understand from the field observation most of the local people cultivate *Eucalyptus tree* around their home, farmland and grazing lands for construction and selling purpose. The roots and shade of *Eucalyptus globules* prevents growth of crop plants and other plants including medicinal plants.

Table 3. Medicinal plants distribution in dominant plant community types

Plant community type	Availability at each Kebele	Number of medicinal plants recorded	Percent
Eucalyptus globulus dominated community	10	4	11
Duranat erecta dominated community	9	9	25
Echinops giganteus	7	6	17
Rumex nervosus dominated community	4	10	28
Rhamnus pronoides dominated community	11	7	19

4.4. Frequency

In this study the most frequent medicinal plant were identified and documented. The most frequent medicinal plants were found almost in all study kebeles and were *Eucalyptus globules,Duranata erecta, Rumex nervosus, Echniops giganteus, Rhamnus pronoides, Ocimum urticifolium, Ruta chalepensis, Nicotiana tabacum and Allium sativum*. The local people cultivate these medicinal plants in around their home and water sources for different purpose like sources of food, construction material and medicine.

Table 4.Medicinal plants diversity of study kebeles

Name of kebeles	Number of medicinal plants recorded	Percent
Adjibar	48	7
Yedegat	52	7.8
Yegodo	55	8
Ascha	60	9
Ashinga	63	9.5
Duat	58	8.7
Ambaferit	64	9.6
Gulmeda	69	10
Segerat	61	9
Ewa	67	10
Lebet	66	10

The most diversified kebeles with medicinal plants were Gulmeda, Ewa and Lebet respectively and least number of medicinal plants was recorded in Adjibar. Topography of the area, management of kebele administrative and distribution of population were reported to be the reasons for diversity difference of each kebeles. The topography of Sayint is mountain, plain and undulated. Mountainous and undulated areas are more eroded and grazing by animals. The distribution of population is dense in some kebeles and sparse in others. The distribution of population has an effect on growth and survival of medicinal plants.

4.5. Habits (Life forms) of medicinal plants

In the study area, the identified habits of medicinal plants were 37 (50%) shrubs, 21 (28%) were herbs, 10(13%) trees and 7 (9%) were climber (Figure 3).

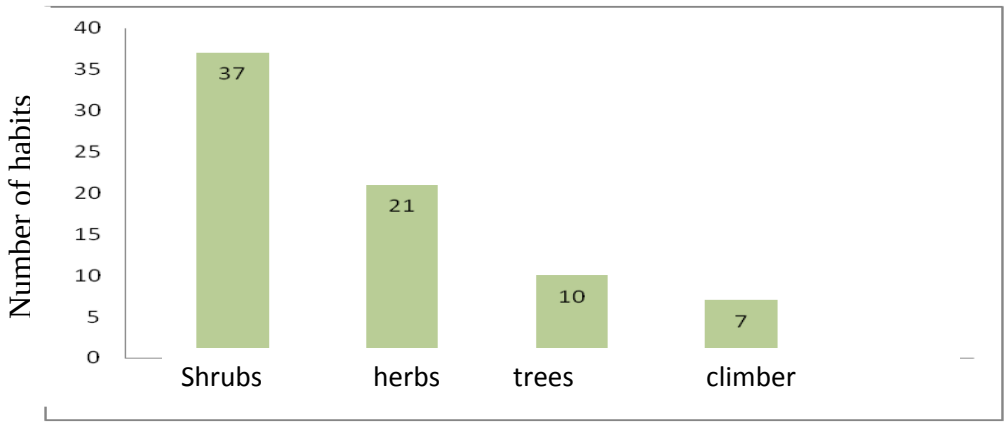

Figure 3. Habits of medicinal plants used in Sayint District

4.6. Sources of medicinal plants

The sources of medicinal plants were reported to be from the natural habitat (wild) and cultivated area (home garden). The most major sources of medicinal plant species were wild 61 (81%) and 14(19 %) were found in cultivated land (home garden). Traditional medicine practitioners reported that they found most of the medicinal plants from farm lands, forests, grazing lands and worship places. This indicates that traditional healers have no chances to get medicinal plants around their home in the required time for a particular diseases treatment.

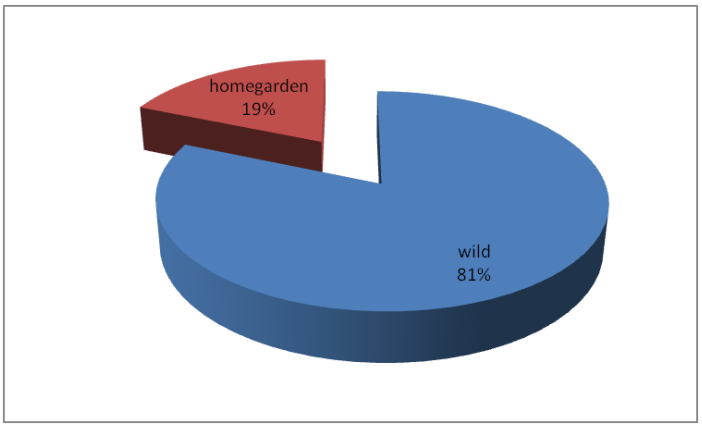

Figure 4. Sources of medicinal plants used in Sayint District

4.7. Species abundance

The information recorded from informants and field observation showed the medicinal plants abundance as presently safe (40 %), threatened (28%), sporadic (20%), endangered (7%) and

vulnerable (5%). In the field observations made by the researcher, the abundance of some medicinal plants was facing different threats such as overgrazing, farmland expansion, fire wood collection and soil erosion.

Table 5.Abundance of medicinal plants used in Sayint

Abundance of medicinal plants	**n = 75**	**Percent (%)**
Threatened	21	28
Sporadic	15	20
Presently safe	30	40
Endangered	5	7
Vulnerable	4	5

In the study area the abundance of some medicinal plants (20%) was in an irregular pattern which involves careful monitoring for their survival. The medicinal plants which are vulnerable (5%) can be attributed to the fact that they are easily destroyed and endangered medicinal plants (7%) can be attributed to the fact that their existence is facing extinction. As some of the informants agree, finding of some useful medicinal plants for treatment of diseases become a serious problem. This was because the local anthropogenic factors become challenges for survival of medicinal plants. Medicinal plants that were threatened in the study area likely led to loss in access to traditional medicinal plants. Therefore, medicinal plants those were presently safe (40%) and abundance of other medicinal plants need to be protected because of the effect of human activities such as agricultural land expansion building construction, firewood collection, and grazing livestock. Rapid population growth creates pressure on abundance of medicinal plants to fulfill demands from medicinal plants (Hamilton, 2003). Different factors are exposing medicinal plants abundance under a problem of sustainability and continuity (Zemede Asfaw, 2001). According to the study of Endeshaw Bekele (2007), environmental degradation, agricultural expansion, loss of forests and wood lands, over grazing, fire, urbanization, cultivation of marginal lands appear to be the main threats of abundance of medicinal plants

4.8. Sources of knowledge on medicinal plants

As the informants reported, the sources of knowledge on medicinal plants in the study area were knowledgeable elders (those who are above the age of 60 years), parents (those who are above 25 years), herbalists and sellers. The younger generations have less knowledge and practice on medicinal plants because of influence of modern education, unwillingness of the youths and oral transfer of knowledge from the sources. The information recorded from the informants indicated, some of the traditional healers hidden their knowledge of medicinal plants from their children and other customer. They collect and prepare medicinal plants remedies alone. This is because they believe in that if medicinal plants are known by all people, their source of income and healing ability of medicinal plants decreases.

Table 6. Sources of knowledge on medicinal plants

Sources of knowledge	**Informants**	**Percent**
Elders	34	37%
Parents	23	25%
Herbalists	26	28%
Sellers	9	10%

4.9. Ways of transferring knowledge on medicinal plants

Oral means of transferring knowledge was reported to be the only way of transferring knowledge on medicinal plants which was secret. Traditional medicine practitioners transfer their knowledge orally to their son, daughter and other predilection. As the reports from the informants indicated, because of the oral transfer of knowledge and secrecy, the younger generation does not retain knowledge (information) and hence lost it through time. Boys were more knowledgeable than girls on medicinal plants. As the informants reported, boys have more approaches to gain knowledge from their parents. This is because in the local culture boys are believed to be followers of their parent compared to girls.

Table 7. Transfer of knowledge on medicinal plants used in Sayint District

Sources	Son	Daughter	Predilection
Elders(Parents)	43(47%)	35(38%)	14(15%)

4.10. Medicinal plants used in human and livestock diseases treatment

In the study area a total of fifty five diseases were reported to be treated by medicinal plants. Out of the recorded diseases 35 were human, 11 were livestock and 7 were both human and livestock diseases. Out of the identified 75 medicinal plants 54(72%) of them were used in human ailments treatment, 13 (17%) were for livestock and 8(11%) for both. The names of some diseases which were not named by informants named by health professionals at Sayint primary health center. Traditional practitioners of the study area diagnose human ailments by asking patients and visual inspection of visible symptoms. Most of the populations of the study area are inhabitants of rural area and have poor sanitation and use pod and river water which are some of the causes of diseases. The most common reported human diseases of the area were abdominal problems, febrile, evil eye, common cold. Some medicinal plant species were used to treat different diseases and some are used to treat a particular disease. Abdominal pain was local human disease which is treated by many plant species. As the reports of the informants showed that most people prefer *Schinus molle* to treat abdominal ailments followed by *Cucumis filicolious.*

Table 8 .The number of medicinal plants used in treatment of diseases used in Sayint District

Diseases of	Number of diseases identified	Number of medicinal plants used	Percent of medicinal plants
Human	35	54	72%
Livestock	11	13	17%
Human and livestock	7	8	11%

Table 9. Number of medicinal plant species treating human ailments used in Sayint District

Type of ailments	Number of species used	Percent	Type of ailments	Number of Species used	Percent
Abdominal problem	5	9	Wound	5	9
Hypertension	3	6	Malaria	1	1.8
Fibril	3	6	Kunchir	1	1.8
Bleeding	2	4	Bone fracture	2	4
Evil eye	2	4	Teeth pain	1	1.8
Constipation	2	4	Eye problem	1	1.8
Likift	2	4	Eczema	1	1.8
Tapeworm	2	4	Scabies	1	1.8
Common cold	2	4	Headache	1	1.8
Urinary retention	2	4	Heart problem	1	1.8
Jaundices	1	1.8	Wart	1	1.8
Night blind	1	1.8	Rabies	1	1.8
Yelijitila	1	1.8	Cough	1	1.8
Uvulitia	1	1.8	Dandruff	1	1.8
Tinea versicolor	1	1.8	Amoeba	1	1.8
Gastric	1	1.8	Diabetes	1	1.8
Ascarid	1	1.8	Anemia	1	1.8
RH factor	1	1.8			

Table 10. Number of medicinal plant species treating livestock ailments used in Sayint District

Types of aliments	Number of medicinal plant species	Percent
Eye problem	2	14.3
Korsissa	2	14.3
Leech	2	14.3
Wound	1	7.1
Rabies	1	7.1
Bloating	1	7.1
Diarrhea	1	7.1
Cough	1	7.1
Beter	1	7.1
Kurba	1	7.1
Tick	1	7.1

Table 11 Number of plant species treating both human and livestock ailments used in Sayint District

Types of aliments	Number of medicinal plant species	Percentage (%)
Leech	2	25
Eye problem	1	12.5
Wound	1	12.5
Febrile	1	12.5
Diarrhea	1	12.5
RH factor	1	12.5
Bone fracture	1	12.5

4.11. Medicinal plant Parts used for remedy preparation

The traditional healers collect leaves, roots, seeds, bark, latex and fruits, bulb and all parts of plants for remedies preparation as reported by the informants. But, the parts used depend on the type of animals and disease treated. The medicinal plants part used for the preparations of remedy for treatment of human ailments were reported to be leaves 28 (51%) followed by roots 11 (20%), fruit 7 (13%), latex 4 (7%), seed 2 (4%) bulb 1 (2%) bark 1 (2%) all part 1 (2%). For livestock ailments the parts of plants used in remedy preparation were leaf 9 (69%), root 3 (23%), and bark 1 (8%) and for human and livestock ailments the medicinal plant parts were leaf 4(57%), root 2 (29%) and Latex 1 (14%). The informants reported that, leaves are easy for remedy preparation, accessible in the required time for a particular disease treatm

Table 12.Parts of medicinal plants used in remedy preparation

Parts used	For human ailments	For livestock ailments	For both human and livestock
Leaves	51%	69%	57%
Root	20%	23%	29%
Bark	2%	8%	
Latex	7%		14%
Bulb	2%		
Fruit	13%		
Seed	4%		
All parts	2%		

4.12. Remedy preparation methods of medicinal plants

Different methods of remedies preparation of medicinal plants were reported in the study area. The methods of preparation are based on the type of diseases treated, symptom of diseases and the site where the diseases are treated. The methods of preparation reported were pounding and squeezing 26 (37%), pounding15 (20%), crushing 11(15%), Powdering 7(9%) mixing 5(7%), Chewing 4 (5%), drying 4(5%) and other methods 3(4 %).

Table13. Methods of remedy preparation of medicinal plants

Methods of preparation	**Frequency of preparation**	**Percent**
Pounding and squeezing	26	37
Pounding	15	20
Crushing	11	15
Powdering	7	9
Mixing	5	7
Chewing	4	5
Drying	4	5
Others	3	4

As the local healers reported, some remedy preparations involve mixing of different medicinal plants and others are prepared from single medicinal plant species. Preparations of some of medicinal plant involve additional substances for application.

4.13. Ways of application and routes of administration of medicinal plants

In this study different application methods of remedies to treat human and livestock ailments were documented. The reported application methods were drinking 26(35%) followed by creaming 21(28%) for skin infection, inhaling were 10(13%) eating 9(12%), suck 4(5%), Tying 3(4%) and others 2(3%) respectively. The application methods are based on the types of animal and type of ailments treated. The routes of administration of prepared remedies also vary based

on the type of diseases treated. The reported administration routes of prepared remedies of the study area were oral 40(53%), dermal 22(29%), nasal 19(12%) and others 4(5%).

Table 14. Ways of application and routes of administration of some medicinal plants

Medicinal plant remedy	**Application**	**Route of administration**	**Diseases treated**
Phytolacca dodecandra	Creaming	Dermal	Lice
Solanecio gigas	Drinking	Oral	Bloating
Nicotiana tabacum	Drink	Oral	Leech
Artemisia afra	Inhale	Nasal	Common cold
Euphorbia tirucalii	Creaming	Dermal	Wart
Rumex nervosus	Drink	Oral	Ascarid
Urtica urens	Eating	Oral	Constipation
Allium sativum	Eating	Oral	Malaria
Duranata erecta	Tying	Dermal	Bleeding
Echinops kebercho	Suck	Oral	Amoeba
Ocimum urticifolium	Drink and cream	Dermal and oral	Fibrillin
Citrus aurantifolia	Suck	Oral	Hypertension
Zehneria scabra	Cream	Dermal	Febrile

4.14. Marketability of medicinal plants

In this study market survey of medicinal plants in five market places (which are the main markets) was conducted. In the market some of the sellers and buyers of medicinal plants (14 per markets) were interviewed about the types of medicinal plants, sources, parts and roles. Based on the information gathered the types of medicinal plants which were marketable shown below (table15)

Table 15 . Parts and functions of marketable medicinal plants used in Sayint

Types of medicinal plants	**Parts**	**Functions**
Gesho	Stem and leaves	Food and medicine
Duba	Fruit	Food
Abish	Seed	Food and medicine
Kebercho	Root	Medicine
Nech shinkurt	Bulb	Food and medicine
Ades	Leave and stem	Medicine
Kundo berbere	Fruit	Food and medicine
Tosign	Leaf	Food
Tenadam	Fruit and leaf	Medicine
Gomenzer	Seed	Food
Lomy	Fruit	Food and medicine
Carrot	Root	Food
Shola	Fruit	Food
Tenbaho	Leaf	Medicine

4.15. Threatening factors of medicinal plants

Plants play a number of significant roles for other living organisms. They are the sources of food, clothes, shelter, construction materials and medicines. But in this study area various causes of threats of medicinal plants were recorded. As the informants reported that, the causes of threats of medicinal plants were grouped into natural and anthropogenic activities. The natural factors of threats in the study area were drought and soil erosion. As the reports of informants showed, the major causes of threats of medicinal plants were anthropogenic activities. This is because the increasing number of population in an area has highly linked with plant species diversity. People in the study area use plants for various purposes such as farm land expansion, charcoal production, fire wood, construction, animal grazing and medicine (table 16).

Table 16. Effect of anthropogenic activities on medicinal plants used in Sayint District

Threats	**Number of respondents**	**Percentage**	**Ranks**
Farm land expansion	19	21%	2nd
Over grazing	24	26%	1st
Charcoal	13	14%	5th
Fire wood	15	16%	3rd
Building materials	12	13%	4th
Natural factors	9	10%	6th

4.16. Conservation methods of medicinal plants

As the informants responded, some of the local people have belief on the role of medicinal plants. The medicinal practitioners of the study area cultivate medicinal plants in their home garden and protect in their natural habitat to get medicinal plants in the required time for a particular disease treatment.

Medicinal plants that were cultivated in the home garden of traditional healers and other local people include*Rutachalepensis, Ocimumurticifolium, and Rhamnusprinoides, Allium sativum, Nicotiana tabacum* and *Cucurbitapepo*.In the study area, some medicinal plants were found around church, mosque and some protected areas of the study sites. The religious places were protected by guards and hence no one is allowed to cut plants from these areas.

5. DISCUSSION, Conclusion and Recommendations

5.1. DISCUSSION

5.1.1. Species richness

The results of this study showed that a total of 75 plant species belonging to 68 genera and 42 families were identified. *Astereacae* was determined to be the most dominant family which contains 7 species belonging to 5 genera followed by *Solanaceae* which contributes 5 species. The dominance of family Astereacae in this study is the same with the findings of Endalew Amenu (2007) and Getu Alemayehu (2010) in which family Astereacae was the dominant in their study sites. This family was also the dominant family in the flora of Ethiopia and Eritrea. This is because of family *Asteraceae* are more abundant since they have advanced form of seed dispersal. The result of this study reveals that less diversity of medicinal plants in the area compared to the findings of other studies by Behailu Etana (2010) who identified 160 medicinal plants in Goma Wereda, Ermias Lulekal (2014) identified 151 in Ankober District, Seble W/Yohannis (2013) who reported 155 medicinal plants in Menz Gera Midir Distric and other studies in other parts of Ethiopia. This diversity difference may be due to the degree of the variations in climate, topography, threatening factors and conservation practices.

5.1.2. Classification of medicinal plants into dominant plants community

The most dominant plantation tree in study area was *Eucalyptus globulus* followed by *Duranata erecta, Echinops giganteus* and *Rumex nevosus,* where as the dominant plant type in the home garden was *Rhamnus prinoides* which was found in all study areas. The result showed that least number of (11%) medicinal plants was found from *Eucalyptus* plant community. The same result was reported by Behailu Etana (2010). About 19% of the medicinal plants were obtained from home garden (*Rhamnus prinoides*) and 81% of the medicinal plants were collected from natural habitat. *Duranata erecta* covers large areas of the study sites and found to be the main sources of medicinal plants as shown in (table 3)

5.1.3. Growth forms and sources of medicinal plants

The results of this finding showed that the most dominant life forms of medicinal plants in the study area were shrubs (50%) followed by herbs(28%) trees(13%)and climbers((9%). The results of other investigations in their study sites indicated that the number of herbs is greater than shrubs i.e. herbs are the dominant life forms (Endalew Amenu and Etana Tolasa, 2007, Seble W/Yohannis, 2013; Tilahun Teklehaymanot and Mirutse Giday, 2007). This indicated that naturally there are more shrubs and herbs in the study area.

As the results showed that majority of medicinal plants (81%) were found in their natural habitat and few of them (19%) were in home garden. This revealed that local people have less habit of cultivating medicinal plants in their home garden. Traditional medicine practitioners waste time in search of medicinal plants for a required disease treatment. Similar to result of this finding, other investigations documented that more medicinal plant are collected from wild habitat(Behailu Etana,2010 ; Ermias Lulekal *et al*., 2008 ; Getu Alemayehu ,2010 and Tesfaye Hailemariam *et al*., 2009).

5.1.4. Sources and ways of transferring knowledge on medicinal plants

In the present study, the major sources of knowledge on medicinal plants were knowledgeable elders (37%) followed by herbalist (28%), parents (25%) and sellers (10%). The results of investigation of Mirutse Giday (2003) and Ermias Lulekal (2013) agree with the results of finding of the study area where elder people are more knowledgeable than others. This involves awareness creating for young generation about the role of maintaining knowledge on medicinal plants for the next generation. Studies in other parts of Ethiopia have reported that parents were the major medicinal plant knowledge sources (Seble W/ Yohannis, 2013).

In the study area, the results showed that the knowledge on medicinal plants passed from the different sources orally. Parents pass more knowledge to their boys (47%) than girls (38%). In similar manner the investigation of Jansen (1998) indicated that knowledge on medicinal plants in many countries passes from generation to generation orally. The finding of SebleW/Yohannis(2013) also showed most of the knowledge of medicinal plants passed orally through secret in the family line from parents. This indicated information (knowledge) passed orally may lost through time and hence this involves systematic acquiring and documentation of this useful knowledge for the coming generation**.**

5.1.5. Medicinal plants used in human and livestock diseases treatment

The result of this study indicates that relatively high numbers of medicinal plants (72%) were recorded for the treatment of human ailments. People in the study area have more knowledge and attention about human ailments compared to livestock ailments. People in the study area use medicinal plants as a primary means of treating diseases. But most of the local people take their livestock to clinics rather than treating those using medicinal plants. The same results were reported by Behailu Etana (2010) in which people are more knowledgeable on human ailments than livestock ailments. This is because the availability, affordability, cheapness and cultural believe on medicinal plants. However, compared to the other investigations in Ethiopia, in the study area fewer numbers of human ailments are treated by medicinal plants, Etana Tolasa (2007) reported 77 medicinal plants used for 49 ailments and Seyoum Getaneh (2009) reported 78 medicinal plants for 50 ailments.

Traditional practitioners of the study area diagnose human ailments by asking patients and visual inspection of visible symptoms. Most of the populations of the study area are inhabitants of rural area and have poor sanitation and use pod and river water which are some of the causes of diseases. The most common reported human diseases of the area were abdominal problems, febrile, evil eye, common cold. Some medicinal plant species are used to treat different diseases and some are used to treat a particular disease. Abdominal pain was local human disease which is treated by many plant species. Most people prefer *Schinus molle* to treat abdominal ailments followed by *Cucumis filicolious.*

In the present study family Asteraceae was the dominant family which contributes 7 species to treat human ailments followed by Solanaceae contributing 5 species. The same result was documented in the study of Endalew Amenu (2007) and Seyoum Getaneh (2009) where the dominance of family Asteraceae for the treatment of human diseases was reported.

5.1.6. Medicinal plants parts used and remedy preparation methods

The result of the present study showed, leaves were the dominant parts of medicinal plants used in remedies preparation followed by roots to treat different ailments. This result is same with research findings of Mirutse Giday (2003); Getnet Chekole (2011); Behailu Etana (2010) and Seble W/Yohannis (2013). This may be due to healing ability of the chemical constituent, ease of preparation, accessibility of leaves in the required time. Roots were reported to be the

dominant medicinal plant parts used in remedy preparation by (Endalew Amenu, 2007; Ermias Lulekal *et al,* 2008; Fisseha Mesfin *et al*., 2009).

The results revealed that the dominant method of remedy preparation in this study was pounding and squeezing (37%) followed by pounding (20%), crushing 11(15%), Powdering 7(9%) mixing 5(7%), Chewing 4 (5%), drying 4(5%) and other methods 3(4 %). The result of the present study contrasts with the investigation of other studies elsewhere in their study sites Endalew Amenu (2007), and Behailu Etana (2010).

5.1.7. Ways of application and routes of administration of medicinal plants

Results reveal that drinking (35%) was the dominant method of application followed by creaming 21(28%), inhaling were 10(13%) eating 9(12%), suck 4(5%), Tying 3(4%) and others 2(3%). The same results were recorded in the study of other researchers Endalew Amenu (2007), Seble W/Yohannis (2013),and Behailu Etana (2010), where drinking is the most dominant application method. Application of some remedy preparation involves mixing of additional substances.

In the present study results indicated that oral route of administration was the most preferable route40 (53%) followed by dermal 22(29%), nasal 19(12%) and others 4(5%). Other studies in other parts of Ethiopia reported that oral route of administration is the most widely used (Mirutse Giday, 2003; EtanaTolasa, 2007; Endalew Amenu, 2007 and Behailu Etna, 2010).

5.1.8. Marketability of medicinal plants

The results of market survey of this study showed that parts of medicinal plants sold in the market were found to be leaves, seed, roots, stem and bulbs. Medicinal plants play a role as means of income for those poor economy people and treatment of different ailments besides their role as a food and medicine sources.

Sellers of medicinal plants collect medicinal plants from wild and home garden areas, but most of the marketable medicinal plants were collected from cultivated areas. According to Medhin Zewudu *et al.,* 2001, medicinal plants have various economic roles beyond their function in the world's population health care system. Medicinal plants are commonly traded in various forms in and between different countries (Lange, 1998). According to Dessalegn Dessissa (2001), in Ethiopia relatively large numbers of medicinal plants were involved in wide domestic trades.

5.1.9. Threatening factors and conservation methods of medicinal plants

In the study area, anthropogenic factors were found to be the major threats of medicinal plants. The major anthropogenic factor was found to be over grazing (26%) followed by farm land expansion (21%) and natural factor (10%) covers the least threat. Different results were recorded in the study of other investigations by Endalew Amenu (2007), Fisha Mesfin *et al* (2009) and Seble W/Yohannis (2013), where agricultural expansion was the major threat to medicinal plants in their study sites. According to results of investigations an increasing demand for farmland and products of forest due to the rapidly growing population and poverty of the rural people considered as a major threats to the survival of many of many species (Ensermu Kelbessa *et al.,* 1992).According to the study of Endeshaw Bekele (2007), environmental degradation, agricultural expansion, loss of forests and wood lands, over grazing, fire, urbanization, cultivation of marginal lands appear to be the main threats of medicinal plants.

In the present study results revealed that medicinal plants were cultivated in some of traditional healer's home garden, in religious places and conserved areas. Medicinal plants that were cultivated in the home garden of traditional healers and other local people include*Rutachalepensis, Ocimumurticifolium, and Rhamnusprinoides, Allium sativum, Nicotiana tabacum* and *Cucurbitapepo*.In the study area, some medicinal plants were found around church, mosque and some protected areas of the study sites. Home gardens are fenced and protected from grazing and cutting and are suitable places to conserve medicinal plants. According to Zemede Asfaw (2001), medicinal plants can be conserved by cultivating in special places such as churches, mosques, graveyards, scared grooves, farm margins, river banks, roadsides, live fences of gardens and fields. However, the conservation methods of medicinal plants in the study area are not enough and hence further conservation methods should be promoted in the study area. As the report of informants showed people did not deliberately conserve medicinal plants in in-situ and ex-situ conservation sites. The local people mainly cultivate medicinal plants for the purpose of food and other sources. In other parts of Ethiopia, studies have reported the same result (Mirutse Giday *et al,* 2003 and Fisha Mesfin *et al*, 2009).

5.2. Conclusion

Investigation of medicinal plants diversity and uses was conducted in Sayint. A total of seventy five (75) medicinal plants were recorded which belongs to 68 genera and 42 families. The result

showed that the study area was relatively less diverse in medicinal plants. The dominant family in area was *Astereacae* represented by 7 species followed by *Solanaceae.* The most dominant plantation tree in study area was *Eucalyptus globulus* followed by *Duranata erecta***,** *Echinops giganteus* and *Rumex nevosus***,** where as the dominant plant type in the home garden was *Rhamnus prinoides* which was found in all study areas. The most frequent medicinal plants were found almost in all study kebeles and were *Eucalyptus globulus,Duranata erecta, Rumex nervosus, Echniops giganteus, Rhamnus pronoides, Ocimum urticifolium, Ruta chalepensis, Nicotiana tabacum and Allium sativum*. The most diversified kebeles with medicinal plants were Gulmeda, Ewa and Lebet respectively and least number of medicinal plants was recorded in Adjibar. Topography of the area, management of kebele administrative and distribution of population were reported to be the reasons for diversity difference of each kebeles. The topography of Sayint is mountain, plain and undulated. Mountainous and undulated areas are more eroded and grazing by animals. Majority of the medicinal plants were found in their natural habitat and some of them were cultivated in home gardens. The dominant habits of medicinal plants of the area was found to be shrubs (50%) followed by herbs (28%). The abundance of some medicinal plants revealed that they were threaten, scattered, vulnerable and facing to extinction.

In this study area, a total of 53 ailments were identified where 35 human, 11 livestock and 7 both human and livestock ailments. The 35 human ailments were reported to be treated by 54 medicinal plants. Traditional healers have more practices to treat human ailments than livestock ailments. This is because the availability, affordability, cheapness and cultural believe on medicinal plants. However, compared to the other investigations in Ethiopia, in the study area fewer numbers of human ailments were treated by medicinal plants. Traditional medicinal knowledge on medicinal plants was mainly held by elderly people and knowledge was mainly transferred to the other people by oral means. Modernization and a high degree of secrecy in passing knowledge on medicinal plants within the family circle only to elder sons, and lack of interest in traditional knowledge by younger groups might also explain the decline of indigenous knowledge going down the generation ladder in the District. The most frequently used part of medicinal plants in remedy preparation for human and livestock ailments were reported to be leaves followed by roots. The dominant method of remedy preparation of the area was pounding and squeezing followed by pounding. Oral route of administration was found to be the dominant

route. . Medicinal plants were found to be marketable for different purpose used by the local people. The market survey results indicated that the potential demand of marketable medicinal plants for addressing human and livestock ailments, beside their uses for non-medicinal purposes and income-generation in the District.

The main threat for medicinal plants in the area arises from anthropogenic factors (overgrazing, agricultural expansion, firewood, charcoal production, timber production and construction). Whereas threats that erode indigenous knowledge emanate from secrecy, oral based knowledge transfer, reluctance of young generation to gain the knowledge, unavailability of the species, influence of modern education and awareness factors are the major ones. Therefore, awareness rising should be made among the healers so as to avoid erosion of the indigenous knowledge and to ensure its sustainable use. Further biological studies should also be conducted on the reported medicinal plant species of the study area so as to utilize them in drug development. The result of this study indicated that the main threats for medicinal plants were anthropogenic activities such as overgrazing, farmland expansion, firewood collection and charcoal production. As the results revealed that the conservation practices of the area were not sufficient. The effort to conserve medicinal plants and their associated indigenous knowledge has not been done as desired. Only little effort by some traditional practitioners is made to cultivate medicinal plants in home gardens, worship places and conserved areas. The situation calls for a wide range of sustained governmental support to promote an overall complementary *in situ* and *ex situ* conservation strategy for medicinal plants of the District. Encouraging traditional practitioners to avoid loss of indigenous knowledge and promoting tree growing project for sustainable utilization of medicinal plants were recommended. Further investigations need be conducted in the area on medicinal plants to ensure sustainable utilization of medicinal plants.

5.3. Recommendations

On the basis of results of the study, the following suggestions were recommended:

- ✓ Kebele agricultural professional should encourage the local people to cultivate medicinal plant species in home gardens in their home garden and other special places such as around farmland, worship places, conserved areas.
- ✓ The District agricultural development office should promote tree growing project and sustainable utilization of the resources
- ✓ The District agricultural office should established Conservation sites in the district to conserve vulnerable and endangered species
- ✓ The District health office should be creating discussion forum for traditional medicine practitioners regarding to preparation, preservation and application of traditional medicine
- ✓ The District health office should create awareness for traditional practitioners not to hidden their indigenous knowledge on medicinal plants for their families and other local communities so that the knowledge can transferred to the next generation.
- ✓ The local people should be educating about the sustainable utilization and management of medicinal plants.
- ✓ The District's Culture and Tourism Office should give attention to take responsibility in compiling, promoting and conserving of the millennia-old culture of using ancestral medical traditions by indigenous people in the District;
- ✓ Kundoberbere(*Schinus molle*) was the most preferable medicinal plant to treat abdominal ailments. Since its abundance was threatened, the District agricultural office should encourage the local people to cultivate the plant in their home garden for sustainable utilization
- ✓ *Kalanchoe petition* is the most endangered medicinal plant in the study area and hence needs cultivation in home garden by the local people to ensure its sustainable use.

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Appendix 1. Medicinal plants, local name, scientific name, habit, habitat and abundance

No	Local name	Scientific name	Family	Habit	Habitat	Abundance
1	Telenj	*Achyranthesaspera L.*	Amaranthaceae	H	W	Threatened
2	Merenz	*Acokantheraschimperi (A.DC.) Schweinf*	Apocynaceae	S	W	Sporadic
3	Nechshinkurt	*Allium sativum L.*	Alliaceae	H	HG	Sporadic
4	Wonderet	*Aloe debranapulcherrima*	Aloaceae	H	W	Threatened
5	Seteeret	*Aloe pulcherrima Gilbert and sebsebe (ined.)*	Aloaceae	H	W	Sporadic
6	Chikugn	*Artemisia afraJacq ex Willd*	Asteraceae	H	W	presently safe
7	Yesietkest	*Asparagus africanus Lam.*	Asparagaceae	S	W	Sporadic
8	Gomenzer	*Brassica carinata A. Br.*	Brassicaceae	H	HG	Presently safe
9	Yedagaabalo	*BruceaantidysentericaJ.F.Mill.*	Simaroubaceae	S	W	Endangered
10	Anfar	*BuddlejapolystachyaFresen.*	Loganiaceae	S	W	Sporadic
11	Digta	*Calpurnia aurea (Ait.) Benth*	Fabaceae	S	W	Sporadic
12	Gumero	*Capparistomentosa Lam*	Capparidaceae	S	W	Sporadic
13	Agam	*Carissa spinarum L.*	Apocynaceae	S	W	Threatened
14	Lomy	*Citrus aurantifolia (christm.) swingle*	Rutaceae	S	HG	Presently safe
15	Yeazohareg	*Clematis simensisFresen.*	Ranunculaceae	Cl	W	Threatened
16	Fiyelefej	*ClutiaabyssinicaJaub. &Spach.*	Euphorbiaceae	S	W	presently safe
17	Bisana	*Croton macrostachyus Del.*	Euphorbiaceae	T	W	Vulnerable
18	Yemidirenbuay	*Cucumisfilicolious L.*	Cucurbitaceae	Cl	W	presently safe
19	Duba	*Cucurbitapepo L.*	Cucurbitaceae	Cl	HG	Presently safe
20	Yeferengetid	*Cupressuslusitanica Mill.*	Cupressaceae	T	HG	Threatened
21	Aserkush	*Cyphostemmapannosumvollsen*	Vitaceae	Cl	W	Endangered
22	Astenagir	*Daturastramonium L.*	Solanaceae	H	W	presently safe
23	Karrot	*Daucuscarota L.*	Apiaceae	H	HG	Presently safe

24	Ameraro	*DiscopodiumpenninerviumHochst*	Solanaceae	S	W	presently safe
25	Kitkita	*DodonaeaangustifoliaL.f.*	Sapindaceae	S	W	Threatened
26	Muatesh	*Durantaerecta*	Verbanaceae	S	W	Presently safe
27	Kusheshelie	*Echinopsgiganteus A. Rich*	Asteraceae	S	W	presently safe
28	Kebercho	*EchinopskeberichoMesfin*	Asteraceae	H	W	Threatened
29	Nechbahirzaf	*Eucalyptus globulusLabill.*	Myrtaceae	T	HG	Presently safe
30	Kulkual	*Euphorbia abssinicaGmel.*	Euphorbiaceae	T	W	presently safe
31	Kinchib	*Euphorbia tirucalii L.*	Euphorbiaceae	S	W	presently safe
32	Beles	*Ficussycomorus.*	Moraceae	S	W	Sporadic
33	Sholla	*FicussurForssk.*	Moraceae	T	W	Threatened
34	Warka	*FicusvastaForssk.*	Moraceae	T	W	Threatened
35	Enslal	*Foeniculumvulgare*	Apiaceae	H	W	Endangered
36	Mech	*Guizotia scabra(vis) chiov.*	Asteraceae	H	W	Presently safe
37	Koso	*Hageniaabyssinica (Bruce) J.F. Gmel.*	Rosaceae	T	W	Threatened
38	Amujia	*Hypericumrevalitum*	Hypericaceae	S	W	Threatened
39	Weyinagift	*Inulaconfertiflora*	Asteraceae	S	W	Sporadic
40	Yeabeshatid	Juniperusprocera L.	Cupressaceae	T	W	Threatened
41	Sensel	*Justiciaschimperiana (Hochst.exNees) T. Anders.*	Acanthaceae	S	W	Sporadic
42	Endahula	*Kalanchoe petition A. Rich*	Crassulaceae	H	W	Endangered
43	Alashumie	*Laggeracrispata (Vahl) Hepper& Wood*	Asteraceae	H	W	presently safe
44	Ferezeng	*Leonotisocymifolia (Burm.f.) Iwarsson*	Lamiaceae	S	W	presently safe
45	Atat	*Maytenusarbutifolia. (A. Rich.) Wilczek*	Celastraceae	S	W	Threatened
46	Yekurahareg	*MomordicafoetidaSchumach*	Cucurbitaceae	Cl	W	Threatened
47	Ades	*Myrtuscommunis L.*	Myrtaceae		HG	Threatened
48	Tinbaho	*Nicotianatabacum L.*	Solanaceae	S	HG	Presently safe

49	Damakesie	*Ocimumurticifolium Roth*	Lamiaceae	S	HG	Presently safe
50	Woyira	*Oleaeuropaea L.*	Oleaceae	T	W	Threatened
51	Beles /kulkual	*Opuntiaficus-indica (L.) Miller*	Cactaceae	S	W	Sporadic
52	Keret	*OsyrisquadripartitaDecn.*	Santaleceae	S	W	presently safe
53	Tunjut	*OtostegiaintegrifoliaBenth.*	Lamiaceae	S	W	presently safe
54	Mehanendod	*PhytolaccadodecandraL'Hérit*	Phytolaccaca	S	W	Threatened
55	Worteb	*Plantagolanceolata*	Plantaginaceae	H	W	Sporadic
56	Zigba	*Podocarpusfalactus*	Podocarpaceae	T	W	Vulnerable
57	Kok	*Prunuspersica (L.) Batsch*	Rosaceae	S	W	Threatened
58	Gesho	*RhamnusprinoidesL'Herit.*	Rhamnaceae	S	HG	Presently safe
59	Tsegereda	*Rosa x richardiiRehd.*	Rosaceae	S	HG	Presently safe
60	Enjori	*RubussteudneriSchweinf.*	Rosaceae	H	HG	Presently safe
61	Mekmeko	*RumexabyssinicusJacq.*	Polygonaceae	H	W	Threatened
62	Enbuacho	*RumexnervosusVahl*	Polygonaceae	S	W	presently safe
63	Tult	*RumexnepalensisSpreng.*	Polygonaceae	H	W	Threatened
64	Tenaadam	*Rutachalepensis L.*	Rutaceae	H	W	Presently safe
65	Kundoberbere	*Schinusmolle L.*	Anacardiaceae	S	W	Threatened
66	Yashikokogomen	*Solaneciogigas (Vatke) C.Jeffrew*	Astraceae	S	W	Presently safe
67	Enbuay	*SolanummarginatumL.f.*	Solanaceae	S	W	presently safe
68	Yeaithareg	*Stephaniaabyssinica (Dill. & A. Rich.) Walp.*	Menispermaceae	Cl	W	Sporadic
69	Tosign	*Thymus schimperiRonniger*	Lamiaceae	H	W	Threatened
70	Abish	*Trigonellafoenum- graecum L.*	Fabaceae	H	HG	Presently safe
71	Sama	*Urticaurens L.*	Urticaceae	H	W	Vulnerable
72	Ketetina	*VerbasicumsinaiticumBenth*	Scrophulariaceae	S	W	vulnerable
73	Giziewa	*Withaniasomnifera (L.) Dunal in DC.*	Solanaceae	S	W	Endangered
74	Enkoy	*Ximeniaamericana L.*	Olacaceae	S	W	Sporadic
75	Haregresa	*Zehneriascabra (Linn. f.) Sond.*	Cucurbitaceae	Cl	W	Sporadic

S = shrub, H = herb, T = Tree, CL = climber, W = wild, HG = home garden

Appendix2.Medicinal plants part, preparation, and application to treat human ailments

№	Type of ailments	Name of medicinal plants	Parts used	Preparation	Route of Administration and Application)
1	Abdominal problems	yemiderenbuay	Root	chewing the dry and fresh root	Suck the juice
		Kundoberbere	Fruit	Dry the fruit	ate with foods during the day time
		Kebercho	Root	Crushed dry or fresh root, mix with water	Drunk
		NechBiharzaf	Leaf	pounded and squeezed the leaf and mix with water	Drunk the mix juice
		Amuja	Leaf	chewing the fresh leaf	Drunk
2	RH factor	Yesetkest	Root	The root is powdered	Ate with fatira of gebs
3	Tape worm	Koso	Fruit	Fruit is powdered	drink half cup with honey
		Mech	Leaf	Pounded the fresh leaf and mixed with *Hageniaabyssinica*	Drink the juice with coffee
4	Rabies	Mehanendode	Root	Dry, powdered and mix with *Stephaniaabyssinica*	Ate with honey
5	Jaundice	Gomenzer	Leaf	The fresh leaf is pounded	ate with honey
6	Bleeding	Telenj	Root	Circle the fresh and dry root	tied around the neck
		Muatesh	Leaf	The fresh leaf is pounded	Placed in the nose
7	Yelijtila	Digita	Leaf	The fresh leaf is mixed with *Justiciaschimperiana*, pounded them	tied around the Bit area
8	Wound	Ameraro	Ieaf	The fresh leaf is pounded	creamed on the infected part
		Endahula	Leaf	The fresh leaf is pounded	creamed on the infected part
		Enkoy	Leaf	The fresh leaf is pounded	Creamed on the affected area
		Keret	Leaf	The fresh leaf is	tied on infected part

				pounded	
		Worteb	Leaf	The fresh leaf is pounded	Creamed on affected parts
9	Scabies (ekek)	Agam	Root	The fresh root is mixed with the root of *Acokantheraschimperi* and pounded them	creamed on the affected part
10	Tineaversicolor	Mekemeko	Root	pounded the fresh leaf	Creamed on the affected area
11	Kunchir	Kulkual	Latex	The latex is extracted and mixed with duff	creamed on affected part
12	Hypertension	Azamir	Leaf	Dry the leaf and powder it	Drunk with tea
		Tosign	Leaf	The leaf is dry and grind	Drunk with tea
		Lomy	Fruit	The fresh fruit is taken	Suck the juice
13	Evil eye	Misrich	Root	The root is dried	put on fire and inhaled the smoke
		Gumero	Root	The root is dried	put on fire and inhaled the smoke
14	Night blind	Karrot	Root	The root is cleaned	Eat the fresh root
15	Gastric	Atat	Leaf	The fresh leaf is pounded	The squeezed is drunk with water
16	Constipation	Shoal	Fruit	Remove the internal seed and clean it	ate the fruit part
		Sama	Leaf	The fresh leaf is taken, boiled and mixed with gebsduket	Drunk it
17	Anaemia	Enjory	Leaf	The dry or fresh leaf is boiled	Drunk it
18	Bone fracture	Abish	Seed	The seed is dried, grind and mixed with butter	Creamed the whole part of babies
		kitikta	leaf	Using the fresh leaf	Tying the affected area with

					leaf and stick
19	Malaria	Nechshinkurt	Bulb	The fresh or dry bulb is crushed	ate with injera
20	Common cold	Chikugn	Leaf	Crushed the fresh leaf	Placed in nose
		Alashumie	Leaf	The fresh leaf is pounded and boiled	Inhaled the smoke
21	Teeth disease	Astenagir	Seed	Seeds are dried, crushed and mixed with butter, placed on burnt metal	Inhaled the steam with hallo materials
22	Eye disease	Woyra	Leaf	pounded and squeezed the leaf	Drop the juice into the eyes
23	Eczema	Bisana	Latex	Take the latex from the attachment of the leaf	Creamed on affected part
24	Likift	Zigba	Bark	Dry the bark and powdered	Inhaled the smoke
		Tinjut	All parts	Dry all parts of plants	Inhaled the smoke
25	Headache	Duba	Fruit	The fruit is pounded	Tied on the head
26	Heart failer	Beles	Fruit	Peel the fruit	Ate at the morning
27	Wart	Kinchib	Latex	Take the latex	Creamed on affected part until recovery
28	Urinary retention	Inslal	Leaf	Dry the leaf and powdered	Drink with tea for a long period of time

		Giezewa	Leaf	pounded and squeezed the leaf and mix with water	Drink the mixed juice
29	Fibril	Haregresa	Leaf	The fresh leaf is pounded and sequeezed	Drunk with tea or coffee
		Yekurahareg	Leaf	The fresh leaf is pounded and sequeezed	Drunk with tea or coffee
		Damakessie		pounded and squeezed the leaf	Drunk the juice with tea or coffee and cream body parts
30	Dandruff	Ades	Leaf	dried, powdered the leaf and mix with butter	Cream the mix on the head
31	Ascarid	Enbacho	Leaf	pounded and squeezed the leaf	Drunk the prepared juice
32	Amoeba	Kebercho	Root	crushed and squeezed the leaf	Drunk the juice
33	Uvulitia	Gesho	Leaf	pounded and squeezed the leaf	drunk the juice
34	Diabetes	Wondeeret	Latex	The latex is taken	Drunk with honey
35	Coughing	Tenaadam	fruit	Dry the seeds and powdered	Drink with tea

Appendix 3.Medicinal plants parts, preparation, and application to treat livestockailments

No	Type ailments	Type of medicinal plant	Parts used	Method of preparation	Route of Administration (Application)
1	Rabies	Kusheshelie	Root	the fresh root is Pounded	Ate with fatira
2	Tonsils	Yeazohareg	Leaf	The fresh leaf is pounded and removed the tonsils	Creamed the squeezed on affected part
3	Wound	Yedegaabalo	Leaf	The fresh leaf is pounded and squeezed	Creamed on the affected part
4	Lice	Endod	Leaf	pounded and squeezed the leaf	Cream the affected body part
5	Diarrhea	Kok	Leaf	pounded and squeezed the leaf	Drunk the juice
6	Bloating	Yeshikokogo men	Leaf	pounded the leaf mix with water	Drink the juice
7	Korssisa	Yeferengtid	Leaf	pounded and squeezed the leaf and mix with hen faces	Drink the juice
		Yeabashatid	Leaf	pounded and squeezed the leaf and mix with faces of hen	the juice taken by dinking
8	Kurba (antrax	Enbuay	Root	pounded and squeezed the root	the affected area is creamed

9	Eye problem	Warka	Latex	Using the latex	Drop into the eye
		Tsegereda	Leaf	The fresh leaf is pounded and squeezed	Drop the juice in to the eye
10	Leech	Anfar	Leaf	The fresh leaf is pounded and squeezed.	Drunk the juice
11	Beter	Tult	Root	The fresh or dry root is pounded and squeezed	Drunk the juice

Appendix 4. Medicinal Plants parts, preparation, application to treat human and Livestock ailments

№	Type of ailment	Name of medicinal plants	Parts used	Preparation methods	Route of Administration (Application)
1	Leech	Tinbaho	Leaf	pounded and squeezed the fresh leaf	Drink the juice
2	Eye diseases	Telenji	leaf	The fresh leaf is dried and crushed	creaming the infected eye part
3	Wound	Setie-eret	Latex	Squeezed the latex	the wound is creamed with latex
4	RH factor	Ketetina	Root	Take the fresh root	Eating
5	Bone fracture	Feyelefeg	Leaf	Take the fresh leaf	tied the leaf with stick
6	Fibrillin	Aserkushtebet ebkush	Root	Pounded and squeezed the root	Drink the juice
7	Diharrhea	Fereszeng	Leaf	pounded and squeezed the fresh leaf	Drink the juice

Semi structure interview

Part one: Back ground personal information of respondents

1. Name of respondent _____

Sex: 1. Male_____2. Female _____

Age: 1. < 30 2. 31-- 44 3. 45 -- 60 4.> 60

2. Marital status A single B Married C Divorced

Part Two:

1. What are medicinal plants used by the people to treat diseases in your environment?

2. Where do medicinal plants grow or found?

3. What are the life forms /habits/ characteristics of medicinal plants?

4. How do you prepare medicinal plants for treatment of ailments?

5. How do you apply and administer remedies of medicinal plants?

6. From what sources do you gain knowledge on medicinal plants and how?

7. What parts of medicinal plants do you used to prepare remedies for treatment of aliments?

8. What are the threatening factors of medicinal plants?

9. What are the local conservation practices for medicinal plants?

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