ETHNOBOTANICAL STUDY OF MEDICINAL PLANTS USED BY THE PEOPLE OF TARMABER DISTRICT, NORTH SHEWA ZONE, AMHARA REGION, ETHOPIA

M.Sc. THESIS

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We here by certify that we have read and evaluated this Thesis entitled '**Ethnobotanical Study of Medicinal Plants Used by the People of Tarmaber District, North Shewa Zone, Amhara Region, Ethiopia'** Prepared under our guidance by **Abebe Ayele Haile**. We recommended that it be submitted as fulfilling the thesis requirement.

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Final approval and acceptance of the thesis is contingent upon the submission of its final copy to the council of Graduate Studies (CGS) through the candidate's department or school graduate committee (DGC or SGS).

DEDICATION

This thesis is dedicated to my uncle **Wendmagegnehu Zenebe Direse** and my brother **Eshete Ayele** for nursing me with affection and their giving love for my work and successes in my life.

STATEMENT OF THE AUTHOR

By my signature below, I declare that this thesis is my own work and all sources of materials consulted for this work have been duly acknowledged. I have followed all ethical principles of the research in data collection, analysis, the preparation and completion of this thesis. All scholarly matters that are included in the thesis have been given recognition through citation. I affirm that I have cited and referenced all sources used in this document.

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BIOGRAPHICAL SKETCH

Abebe Ayele was born on December 6, 1994 in Tarmaber district, in Wefwasha Kebele, North Shewa Zone in Amhara Regional State. He attended elementary school education at Genet Primary School (2001- 2008) and secondary school education at Debresina secondary School (2009- 2012). He joined Haramaya University and received his first degree in Biology in 2015. Then he directly joined the same University in 2015 to pursue Master's Degree in Botany.

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ACRONYMS AND ABBREVIATIONS

FL	Fidelity Level
IK	Indigenous Knowledge
ICF	Informant Consensus Factor
TMPs	Traditional Medicinal Plants
WHO	World Health Organization
TB	Tarmaber

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ETHNOBOTANICAL STUDY OF MEDICINAL PLANTS USED BY THE PEOPLE OF TARMABER DISTRICT, NORTH SHEWA ZONE, AMHARA REGION, ETHOPIA

ABSTRACT

Ethiopia has rich flora with different plant species having use in health care system based on local indigenous knowledge. In this study, plants of traditional medicinal use and their associated indigenous knowledge in Tarmaber district were investigated. A total of 100 informants (age≥20) were selected to collect information on medicinal plant use from four sampled kebeles. Of these, 30 key informants were selected purposively based on recommendation by local elders and authorities. Ethnobotanical data were gathered using semi-structured interviews, field observations and group discussions with local traditional medicine practitioners. Informant consensus factor, fidelity level and preference ranking were computed to analyze ethnobotanical data. Ethnomedicinal use of 97 plant species distributed in 91 genera and 51 families was documented. Highest numbers of species (9) were under family Asteraceae followed by Solanaceae (8) and Lamiaceae (7). Habit wise, 46.39%), were herbs followed by shrubs (35.05%) tree species (11.34%) and climbers (7.21%). Plants were used mostly in fresh for remedy preparation. Route of administration was mainly oral followed by dermal. Snake bite and poison, Dental, Rabies and Sensorial problems had the highest ICF value > 0.90. *Agricultural expansion, firewood collection, and use of plants for construction were reported as major threats to plants of the study area. In order to protect biodiversity erosion and loss of indigenous knowledge, local communities must be taught and involved in conservation and management of plant resources and their indigenous knowledge.*

***Key words*:** Ethnobotany, Indigenous knowledge, Key informants, traditional medicine, traditional medicine practitioners

1. INTRODUCTION

Human beings have evolved through the rhythms of nature and their civilization has always been accompanied with plants that sustain natural ecosystem. Till today, almost all the ethnic communities have developed their tradition, livelihood and cultural functions that rely mainly on plants (Jain, 1995). Ethnobotany accounts for the study of relationship between people and plants for their use as medicines, food, shelter, clothing, fuel, fodder and other household purposes (Samar *et al.*, 2015). Ethnobotany is also study about the local people's interaction with the natural environment: how they classify, manage and use plants available around them (Martin, 1995). Indigenous people have developed their own locality specific knowledge on plant use, management and conservation (Cotton, 1996).

The ethnobotanical approach is also important as it involves local communities in the conservation of biodiversity. This is based on the idea that the healthiest ecosystems of the world are under the control of local communities, and local communities manage many species for which science has little information (Mersha, 2011).

Traditional medicine is still the predominant means of health care in developing countries where about 80% of their total population depends on it for their wellbeing (Yayesh *et al.*, 2015). Knowledge of medicinal plants is, however, rapidly dwindling due to the influence of western lifestyles, reduction in the number of traditional healers and lack of interest of the younger generations to carry on the tradition and associated knowledge (Zewdu *et al.*, 2015).

From the developing countries, Ethiopia is one in which Traditional medical practices (TMPs) are widely used. Among these, some of them may be harmful and others can be useful. The type and degree of practices with their risks and benefits vary from place to place in the country requiring the need for researches (Elias *et al.*, 2013).

Medicinal plants have been used as a source of medicine to treat illness since time immemorial. In Africa up to 80% of the population uses traditional medicine to help meet their health care needs (Yayesh *et al.*, 2015). The use of traditional medicine is still wide spread in Ethiopia, where about 90% of the population use it for their health care needs. Which means, plants have provided a source of emerging modern medicines and drug compounds for medicines that derived from plants have made large contributions to human health and in the development of new drugs (Zewdu *et al.*, 2015).

The Ethiopian flora is estimated to contain between 6500 and 7000 species of higher plants of which about 12% are endemic (Ermias *et al*., 2013). It is, therefore, not surprising that some of these plants have chemical compounds of therapeutic value that may be used in the treatment of major diseases such as malaria, cancer, etc. In Ethiopia, the medicinal plants as well as related traditional knowledge are under threat mainly due to deforestation, degradation and cultural shift (Birhanu, 2011). The Ethiopian indigenous medicinal plant knowledge, which is available in rural communities and perpetuated by word of mouth within families and the communities, consists of fragile traditional skills that are likely to be lost when communities emigrate from rural areas to towns or to other regions with a different flora; and can also be lost by life style changes due to industrialization, rapid loss of natural habitats, drastic alteration of the local ecology (Getu *et al.*, 2015).

Therefore, the study of ethnobotanical research on medicinal plants and their associated indigenous knowledge are important to document and to identify the threatened plant species and to take appropriate conservation measures (Ermias *et al.*, 2008). In Ethiopia many researches (e.g.,Getu *et al.*, 2015; Yayesh *et al.*, 2015; Abebe Demissie, 1986) have been done on ethnobotany based on indigenous knowledge. However, there are also places where such studies are lacking.

One of such area is Tarmaber district, which is found in North Shewa, Amhara Region. Therefore, this study is designed to carryout ethnobotanical investigation on medicinal plants of this district with the following general and specific objectives.

General objective: the general objective of this study is to carryout ethnobotanical study of traditional medicinal plants in Tarmaber district.

Specific Objectives were to:

- collect, identify and document traditional medicinal plants used by people of Tarmaber district;
- record and document indigenous knowledge of the local people on medicinal plants;
- assess scoio-demographic factors affecting indigenous knowledge of medicinal plants

2. LITERATURE REVIEW

2.1. The Concept of Ethnobotany

Ethnobotany is the science of people's interaction with plants. This circumscription of the discipline makes no distinction between people in traditional or modern societies. Ethnobotany is an interdisciplinary field, combining the aspects of botany and ethnology as well as many others (Turner, 1995).

The relationship between humans and plants is as old as human existence on earth (Mersha, 2011). Tthe term Ethnobotany was coined and defined by Harshberger (1896), as the study of plants used by primitive and aboriginal peoples. Ethnobotany tries to find out how people have traditionally used plants, for whatever purposes, and how they are still doing so (Tesfaye and Sebsebe, 2009). Ethnobotany is human evaluation and manipulation of plant materials, substances, and phenomena, including relevant concepts in primitive (Von Reis and Schultes, 1995).

Ethnobotany is a broad science which includes studies of modern cultures, conservation and management system (Martin, 1995). According to the study of ethnobotany leads to know the function of plants as food, magic, rituals, household utensils and implements, medicine, fire wood, building, pesticides, clothing, shelter and other purposes and is also used to define local community plant resource needs, utilization and conservation (Cotton, 1996).

Generally ethnobotany serves as a tool to document knowledge of people on plant uses by merging different methodologies and disciplines. Documentation of the indigenous knowledge, which is part of the ethnobotanical studies, includes cultural use of plants as medicine, food preparation (food, spices and condiments) and their preservation and management (Zemede, 1997).

2.2. Traditional Medicinal Plants (TMPs)

In human history medicinal plants have been identified and used. Plants have the ability to synthesize a wide variety of chemical compounds that are used to perform important biological functions, and to defend against attack from predators such as insects, fungi and herbivorous mammals (Fasil, 2001).

Most traditional medical practices in Ethiopia rely on an explanation of disease that draws on both the “mystical” and “natural” causes of an illness and employ a holistic approach to treatment (Bishaw, 1991). Many of the common weeds that populate human settlements, such as nettle, dandelion and chickweed, have medicinal properties (Stepp, 2004).

Traditional medicine is the sum total of knowledge that the human being used to diagnosis, prevention and elimination of physical, mental or social imbalance and relying exclusively on practical experience and observation and that transfer from one generation to the next generation verbally or may be in written (WHO, 1978). The wide spread use of traditional medicine among both urban and rural population in Ethiopia could be attributed to cultural acceptability, efficacy against certain types of diseases, physical accessibility and economic affordability as compared to modern medicine (Haimanot, 2010).

2.3. Indigenous knowledge (IK)

Indigenous knowledge (IK) is the local knowledge that is unique to a given culture or society. IK contrasts with the international knowledge system generated by universities, research institutions and private firms. It is the basis for local-level decision making in agriculture, health care, food preparation, education, natural-resource management, and a host of other activities in rural communities (Warren, 1991). Indigenous Knowledge is the information base for a society, which facilitates communication and decision-making. Indigenous information systems are dynamic, and are continually influenced by internal creativity and experimentation as well as by contact with external systems (Giday Yirga, 2010).

One of the indigenous knowledge is knowledge on the use of plants by humans as medicines. It is local knowledge that is unique to a given culture or society and the base for agriculture, health care, food preparation, education, environmental conservation and a host of other activities (Thomas, 1995). In the emerging global knowledge economy a country’s ability to build and mobilize knowledge capital, is equally essential for sustainable development as the availability of physical and financial capital.

According to Warren (1990), the basic component of any country’s knowledge system is its indigenous knowledge. It encompasses the skills, experiences and insights of people, applied to maintain or improve their livelihood.

Significant contributions to global knowledge have originated from indigenous people, for instance in medicine and veterinary medicine with their intimate understanding of their environments. Therefore, Indigenous knowledge is developed and adapted continuously to gradually changing environments and passed down from generation to generation and closely interwoven with people's cultural values (Kebu *et al*., 2004).

The tragedy of the impending disappearance of indigenous knowledge is most obvious to those who have developed it and make a living through it. But the implication for others can be detrimental as well, when skills, technologies, artifacts, problem solving strategies and expertise are lost (Amare, 1976).

2.4. Modern Study of Medicinal Plants

At least 7,000 medical compounds in the modern pharmacopoeia are derived from plants (Farnsworth,1985). In many medicinal and aromatic plants (MAPs), significant variations of plants characteristics have been ascertained with varying soil traits, and the selective recovery and subsequent release in food of certain elements have been demonstrated. Great attention must be paid to choose soil and cropping strategies, to obtain satisfactory yields of high quality and best-priced products, respecting their safety and nutritional value (Springbob *et al.*, 2009).

Digoxin is a purified cardiac glycoside that is extracted from the foxglove plant, *Digitalis lanata* which is widely used in the treatment of various heart conditions, namely atrial fibrillation, atrial flutter and sometimes heart failure that cannot be controlled by other medication. The use of herbs to treat disease is almost universal among non-industrialized societies (Farnsworth, 1994). Many of the pharmaceuticals currently available to physicians have a long history of use as herbal remedies, including opium, aspirin, digitalis, and quinine.

The World Health Organization (WHO) estimates that 80 percent of the population of some Asian and African countries presently use herbal medicine for some aspect of primary health care (WHO, 1978) . In fact, approximately 25% of modern drugs used in the United States have been derived from plants (Carrubba and Scalenghe, 2012).

From 120 active compounds currently isolated from the higher plants and widely used in modern medicine today, 80 percent show a positive correlation between their modern therapeutic use and the traditional use of the plants from which they are derived (Fabricant, 2001).

2.5. Traditional Medicinal Plants in Ethiopia (TMPs)

The use of medicinal plants in Ethiopia accounts a long history to treat a variety of ailments (Fasil, 2001). The introduction of modern medicine to Ethiopia dates back to the 16th century during the regime of Emperor Libne Dingel (1508- 1540) (Messay Wolde-Mariam *et al.,* 2015). The first government run modern health care was established in 1906 with the opening of Menelik II Hospital in Addis Ababa. However, the growth and development of modern health care in Ethiopia as a whole has been very stunted and to date, its coverage is less than 50% of the population (Yayesh *et al*., 2015).

According to WHO (2005) in Ethiopia from the total population, 90% of the population uses traditional medicine as their primary illness function. Traditional medicine has also draw backs as various authors stated (Amare, 1976; Dawit, 1986), Such as Lack of precision and standardization is one drawback for the recognition of the traditional health care system. Lack of precise dosage which could lead to toxicity is also the other drawback of traditional medicine (Dawit, 1986). The measurements used to determine the dosage are not standardized and depend on the age and physical appearance of the patient, socio cultural explanation of the illness, diagnosis and experience of individual's herbalist (Dawit and Ahdu, 1993).

The Ethiopian indigenous medicinal plant knowledge, which is available in rural communities and perpetuated by word of mouth within families and the communities, consists of fragile traditional skills that are likely to be lost when communities emigrate to towns or to other regions with a different flora; and can also be lost by life style changes due to industrialization, rapid loss of natural habitats, drastic alteration of the local ecology (Getu *et al.,* 2015).

Therefore, the study of medicinal plant through ethnobotany is crucial work to record, document and conserve based on the indigenous knowledge of the local people, it reflects the direct questions of the residents who receives from their parents (Dawit, 2001). So ethnobotanical study is baseline information for a particular plant by getting information from who live around them. In Ethiopia 80% of population still depends on traditional medicine for their health care practices and more than 95% of traditional medical preparations are of plant origin (Abebe, 2001).

2.6. Ethno-veterinary Plants in Ethiopia

Above 70% of Ethiopian people depend on livestock husbandry (Teshale *et al*., 2004). In Ethiopia 90% production of crop depends on the power of animal. Therefore, livestock are the most important factor for sustainable agricultural production (Mirutse and Gobena, 2003). Although Ethiopia is rich in livestock at the same time they are affected by disease. This lead to the reduction in crop production, so this factors lead to low GDP (Belay, 2013). So, the dependence of the people on the traditional medicinal plants to treat their livestocks (Mulugeta, 2014). In Ethiopia until 1908 in which modern medicine started , ethnoveterinary practice were the dominant one (Yigezu *et al*., 2014). Therefore, Ethno - veterinary medicine emphasizing on useful plants used for treatment of livestock has paramount importance to livestock management. In addition, proper documentation and understanding of farmer's knowledge, attitude and practices about the occurrence, cause, treatments, prevention and control of various ailments' is important in designing and implementing successful livestock production (Tafesse and Mekonen, 2001).

2.7. Management of Medicinal Plants

Medicinal plants are considered to be at conservation risk due to over use and destructive harvesting of parts (Zemede, 2001). According to Dawit and Ahadu (1993) found that many medicinal preparations use roots, stem and bark by effectively killing the plant in harvest and plant parts used to prepare remedies are different; however, root is the most widely used part.

The knowledge on traditional medicinal plants of Ethiopia which was developed for millennia is now subjected to loss since it has mainly been stored in the memories of elderly peoples and handed down mostly by word of mouth for successive generations (Tesema *et al*., 2002). Moreover, deforestation, overexploitation, overgrazing, habitat loss and degradation, agricultural land expansion and acculturation continuously threat Ethiopian traditional medicinal plants and linked knowledge (Engedasew *et al*., 2015).

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 (Mulgeta, 2014). The country also has developed policy and a guide line for intellectual property rights protection of traditional medicine. The policy encourages and promotes the appropriate use and protections of traditional medicine knowledge in Ethiopia taking into account the need of the traditional medicinal knowledge holders and the communities who benefit from the use of the knowledge. Medicinal plants fit in the development activities that support public efforts in meeting livelihood requirements (Endashaw, 2007).

3. MATERIALS AND METHODS

3.1. Description of the Study Area

3.1.1. Location

Tarmaber is one of the districts in Amhara Region, which is located at the eastern edge of the Ethiopian highlands in the Semen Shewa Zone. It is about 190 km away from the capital city of Ethiopia; Addis Abeba. Tarmaber is bordered on the south by Ankober distric, on the southwest by Basona Werana district, on the west by Mojana Wadera district, on the northwest by Menz Mam Midir district, on the northeast by Kewet district, and on the southeast by the Afar Region (Asmelash , 2012).

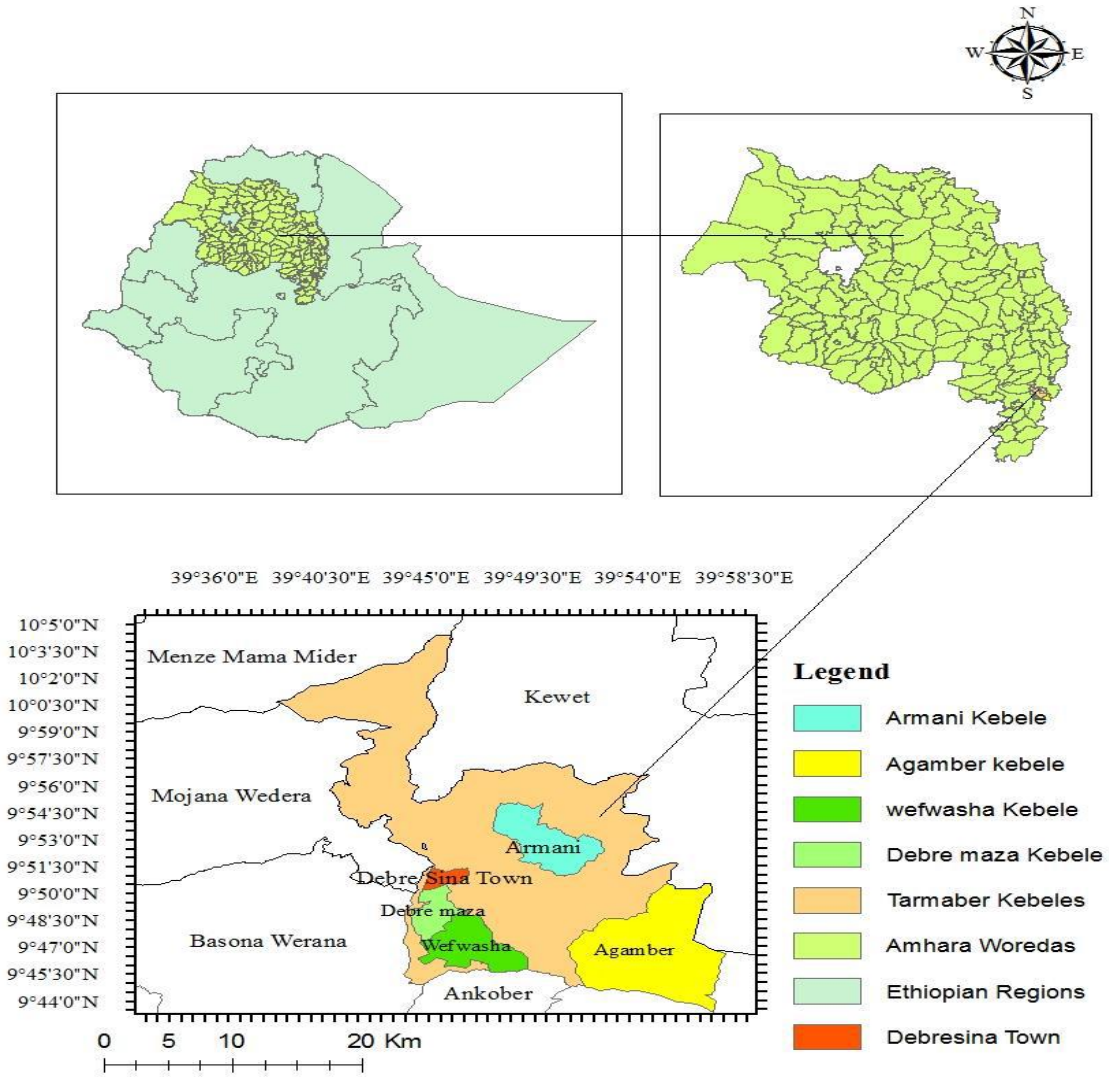

Figure1. Map of Study sites (GIS Software)

3.1.2. Demography and Medical Services

Based on the 2007 national census (CSA, 2007), Tarmaber district has a total population of 84,481, of whom 42,812 are male and 41,669 are female. The majority (97.27%) of the inhabitants follow Ethiopian Orthodox Christianity, while 2.73% of the population are Muslims. The three largest ethnic groups reported in Tarmaber are the Amhara (93.78%), the Oromo (3.11%), the Argobba (2.65%); and all other ethnic groups together 0.46% of the population. Amharic is spoken as a first language by 96.93%, and Oromiffa is spoken by 2.76%; the remaining 0.31% speak all other languages (CSA, 2007). According to the district health office centre there are 2 hospitals and in all 23 kebeles there is tena kela (health post) which treats primarily the residents and also the veterinary health clinics.

3.1.3. Topography and Climate

According to Asmelash (2012), tarmaber district covers about 54,000 hectare of lands and lies between 1500 and 3100 meter above sea level. The topography is dominated by chain of hills and rugged mountains; thereby 15.28 % of the district is mountainous, 32.78 % is plain lands, 6.29 % valleys and 45.65 % are rugged types. The average annual temperature and the mean monthly rain fall are about 15.5 ^{o}c and 1200 mm respectively (Asmelash, 2012).

3.1.4. Vegetation

In Tarmaber the scenery is greener with 3.4 % forestland and 9.9 % bushland in and around the Tarmaber escarpment and in the vicinity of Debre-Sina town and most of the vegetation are wood plantations and hillside enclosures. In this district many indigenous species, for example, *Croton macrostachyus, Cupressus lusitanica, Juniperus procera, Rhamnus prinoides* exist.

3.2. Reconnaissance survey and selection of study sites

Tarmaber district has 23 kebeles. Reconnaissance survey was conducted from April 1, 2016 to April 10, 2016 to select 4 potential kebels based on the availability of traditional medicine practitioners, traditional medicine use history, altitudinal variation between kebeles, etc.Based on this information, four kebeles were selected. These are Debre Maza (2587 m) and Wefwasha kebeles (2268 m) both are Dega, Armani (2050 m) is Woinadega) and Agamber (1515 m) is Kola.

3.3. Ethnobotanical Data Collection

Prior to ethnobotanical data collection, respondents were selected from the selected kebeles. Totally, 100 respondents (aged ≥ 20) of which 70 (49 men and 21 women) ordinary (non-traditional healers) residents and 30 (24 men and 6 women) available informants (traditional healers) participated in this study. Key informants were selected based on the information gathered from the local people while other respondents were randomly selected. Ethnobotanical data were collected from September 2016 to October 2016.

Data collection methods were through semi-structured interviews, group discussions, and guided field walks with key informants for field observations. Key informants were first interviewed individually to mention about the local names of the plants they use to treat diseases, diseases treated, part(s) of plants used, methods of preparation of remedies, route of application of the remedies, dosage, and factors that threaten medicinal plants.

Similar procedures were also being applied with randomly selected non-practitioners of traditional medicine. Voucher specimens were collected, pressed, and dried for identification. For some species, preliminary identifications were done in the field using illustrations. In addition, further identification of all specimens was done by comparison with authentic specimens, illustrations and taxonomic keys from Flora of Ethiopia and Eritrea and with the assistance of experts at Addis Ababa University, National Herbarium. The identified specimens were deposited in Haramaya University Herbarium.

3.4. Data Analysis

A descriptive statistical method (percentage and/or frequency) was employed to summarize ethnobotanical data.

Anova and t-test

Anova and t-test were used to analze socio demographic factor on medicinal plants and used to analysis of variance to compare more than two groups, while t-test apply to compare two variable.

Informant consensus factor (ICF) was calculated for categories of ailments to identify the agreements of the informants on the reported cures using the formula used by (Rodrigo, 2005) and (Teklehaymanot, 2007).

ICF wascalculated as follows: number of use citations for each ailment (nur) minus the number of species used (nt) for that ailment, divided by the number of use citations for each ailment minus one as indicated in the following formula.

$$ICF = \frac{nur - nt}{nur - 1}$$

Where **nur** is number of species used
Nt is nuber of use citation for each ailments

Fidelity level: The fidelity level (FL), the percentage of informants claiming the use of a certain plant for the same major purpose, was also calculated for the most frequently reported diseases or ailments using the following equation (Teklehaymanot, 2007).

$$FL\ (\%) = \frac{Np}{N} x\ 100$$

Where Np is the number of informants that claim the use of a plant species to treat a particular disease, and N is the number of informants that use the plants as a medicine to treat any given disease.

Preference Ranking: To compare the most effective medicinal plants used by community to treat particular disease, preference ranking was conducted following Martin (1995) and Cotton (1996) for most important medicinal plants used in treating a particular illness. For this, ten informants were selected to identify the best preferred medicinal plants species for treatment of Jaundice. Each informant was provided with the mentioned medicinal plants reported to cure the illness with leaves of medicinal plants used being paper tagged then was asked to assign the highest value for the most preferred species against the illness and the lowest value (1) for the least preferred plant in accordance of their order for the remaining one. The value of each species was summed up and the rank for each species was determined based on the total score. This help to indicate the rank order of the most effective medicinal plant used by the community to treat the disease.

4. RESULTS AND DISCUSSION

4.1. Socio - demographic Characteristics of Respondents and their Impact on Traditional Medicinal Knowledge

4.1. Age, Sex, Occupation and Marital Status of Respondents

Age and sex distribution of respondents of the study area is given in Table 1. Respondents were categorized into 3 age categories; 20-40, 41-60 and >61 years of age. Statistical analysis showed that there was a significant ($P<0.001$, ANOVA) difference between age categories in their traditional medicinal plant knowledge. Respondents of age above 61 years reported 7.7±0.45 medicinal plants while those of less than 61 reported about 5 plants on average. This suggests that knowledge on traditional medicinal plants is a long term cumulative. Gender also had significant ($P=0.043$, independent T-test) effect on traditional medicinal knowledge with males having reported 5.2±0.25 plants compared to 4.21±0.36 plants reported by females, suggesting knowledge transfer has bias more to males than to females.

Occupation wise, majority (77%) of the respondents were farmers getting their livelihood from crop and animal farming, whereas government employees, merchants and church administrators together constituted only 23% of the respondents. Eighty-four percent of the respondents of which 65% and 19% are male and female, respectively were married, whereas as 11% of whom 5 and 6% are male and female respectively were unmarried. Five percent (3% male and 2% female) of the respondents were divorced.

Table1: Age and sex distribution of respondents in the study area.

Age	Male	Female	Total
20-30	14	4	18
31-40	13	9	22
41-50	23	8	31
51-60	7	2	9
61-70	6	3	9
71-80	6	1	7
81-90	4	-	4
Total	73	27	100

4.2. Educational Status of the Respondents

As shown in the table 2, majority of the respondents had only elementary school (grade 1-8) education or illiterate, while 12% of them were high school graduates and very few of them were college level education (Table 2). Respondents were categorized into four educational level categories; illiterate, primary school complete, high school graduate and college level education. Comparison of number of medicinal plants reported by each educational level respondents showed statistically significant ($P<0.05$, ANOVA) difference between educational levels. Number of medicinal plants reported by each educational level category was in order of $5.2\pm0.37>5.1\pm0.28>4.0\pm0.33>3.25\pm0.25$ for illiterate, elementary school complete, high school graduate and college level graduates, respectively

Table 2: Educational status of the respondents

Level of education	Male	Female	Total
Elementary	43	13	56
High school	9	3	12
College	2	2	4
University	2	1	3
Illiterate	19	6	25
Total	75	25	100

4.3. Medicinal Plants in the Study Area

A total of 97 plant species distributed in 91 genera and 51 families were collected and identified from the study area (Table 3). Of these plants, 92.79% of them were reported to treat human ailment while 5.15% and 2.06% of them were used to treat livestock ailment and both human and livestock ailment, respectively. This shows that the local people have more experience in treating human ailments than livestock. Many studies (e.g., Amare, 1976; Dawit, 1986) show that about 85 % of Ethiopian society prefers traditional medicine to modern medicine.This is so because of cultural acceptability, accessibility, affordability and biomedical benefits that the traditional medicinal plants have. According to Eskedar (2011) in all regions of the country, traditional medicine has high acceptability since it is an integral part of the local culture and hence, people often rely on their efficient and less costly alternative health care (Eskedar, 2011).

In the study area, family *Asteraceae* contributed the highest number of species (9 spp) followed by *Solanaceae (*8*) and Lamiaceae (*7*), Euphorbiaceae* (5 spp*), Fabaceae (*4spp), *Apocynaceae, Brassicaceae,, Rutaceae, Ranunclaceae, Boraginaceae, Rosaceae, Polygonaceae (*3 spp each*), Crassulaceae, Poaceae, Asclepiadaceae,, Apiaceae, Cucurbitaceae, Oleaceae* (2 spp each) and the remaining 31 families had 1 sp. each.

Table 3. Medicinal Plants identified in the study area

No	**Scientific name and Plant habit**	**Family name**	**Local name**	**Health problem Treated**	**Part(s) utilized and Mode of preparation of the remedies**	**Route of application**	**Collection number**
1	*Aeonium leucoblepharum*. A. Rich. **Herb**	Crassulaceae	Tibtiba	Rheumatism	Roots powder of *Aeonium leucoblepharum* and *Rumex nepalensis* will be pounded and applied on the affected body part.	Dermal	TB76
2	*Achyranthes aspera* L.*:* **Herb**	Amaranthaceae	Telenji	Stomachache	Roots of *Achyranthes aspera*will bemixed with pure water and drunk at empty stomach for three days.	Dermal	TB 81
3	*Acokanthera schimperi* (DC) Benth. Shrub	Apocynaceae	Mrenz	Asthma	Leaves and roots of *Acokanthera Schimperi* will be mixed with garlic bulb, boiled and drunk.	Oral	TB7
4	*Ajuga integrifolia* Buch- Ham ex-D. Don*:* **Herb**	Lamiaceae	Armagusa	Herpes	The root and leaf will be crushed, heated and applied on the affected body part.	Dermal	TB54
5	*Allium sativum* L*:* **Herb**	Alliaceae	Nechshinkurt	Asthma	Bulb of *A. sativum* will be boiled together with rhizome of *Zingiber officinale* and the filtrate will be drunk. Also the vapour of the boiled mixture will be inhaled through the nostrils.	Oral and nasal	TB65
				Stomachache	Bulb pounded mixed with lemon juice and consumed with injera.	Oral	

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6	*Aloe trichosantha* Berger*:* **Herb**	Aloaceae	Eret (wonde)	Wound	The sap will be applied onto the wound.	Dermal	TB67
				Snake bite	The sap/jelly of the leaf will be drunk.	Oral	
7	*Artemisia abyssinica* Schtz, Afra Jacq*:* **Herb**	Asteraceae	Chikugn	Diarrhoea	The root and leaves are crushed and mixed with water & drunk.	Oral	TB31
8	*Arundo donax* L.*:* **Herb**	Poaceae	Shembeko	Female sterilization	Roots of *Arundo donax* and *Solanum anguivi* seed powder will be fused by water and drunk a glass of tea for seven day and she became sterilization.	Oral	TB94
9	*Asparagus africanus* Lam*:* **Shrub**	Asparagaceae	Serity	Wounds	Powdered leaf and root will be applied onto the wound.	Dermal	TB69
10	*Berberis holstii* Engl. **Shrub**	Berberidaceae	Zenkila	Eye disease	Root powder of *Berberis holstii* will be mixed with butter and apply on diseased eye.	Eye	TB64
11	*Brassica nigra* (L.) Koch*:* **Herb**	Brassicaceae	Sinafch	Wound	The seed is pounded and mixed with Vaseline and creamed onto the wound.	Dermal	TB26
12	*Buddleja polystachya* Fresen**:* **Shrub**	Buddlejaceae	Anfar	Donkey Hemorrhoids	Roots and leaves of *Buddleja polystachya* will be crushed with bean bran, *Lepidium sativum* seed, cotton seed, and aloe sap and applied on the affected part.	Dermal	TB10

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13	*Calpurnia aurea* (Ait.) Benth. **Shrub**	Fabaceae	Digita	Snake bite	Leaf of *Calpurnia aurea* will be crushed and drunk with water.	Oral	TB42
				Jaundice	Leaves of *Calpurnia aurea* will be boiled steam bath take.	Nasal	
14	*Calotropis procera* (Ait) Ait. f.: **Herb**	Asclepiadaceae	Kinbo	Lymphatic Swelling	Milk of the *Calotropis procera* will be mixed with butter for seven days and round of the affected area is covered by honey and apply on the affected area.	Dermal	TB8
15	*Carissa spinarum* L :**Shrub**	Apocynaceae	Agam	Wound	Root and leaf of *Carissa spinarum* will be mixed with the root and leaf of *Solanum anguivi* powdered and applied onto the wound.	Dermal	TB24
16	*Carthamus tinctorius* L: **Herb**	Asteraceae	Habeshasuf	Heart disease	The powdered seed will be mixed with honey, boiled in water and drunk.	Oral	TB11

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17	*Catha edulis* (Vahl) Forssk. ex End :**Shrub**	Celastraceae	Chat	Asthma	Crushed leaves will be mixed with leaves of coffee, boiled and drunk with honey.	Oral	TB77
18	*Cayratia gracilis* (Guill. & Perr.) Sues: **Climber**	Vitaceae	Aserkush	Gonorrhoea	Roots of *Cayratia gracilis* and *Cucumis ficifolius* will be mixed with sparrow's meat and pounded and fuse by white honey and swallowed. To protect the animosity drink barley tella. Antidote drink milk and eat hen liver.	Oral	TB15
19	*Cicer arietinum* L.: **Herb**	Fabaceae	Shimbra	Snake bite	The seed powder will bake with *Sesamum angustifolium* and eaten.	Oral	TB92
20	*Cirsium englerianum* O. Hoffm: Herb	Asteraceae	Koshashle	Febrile illness	Crushed leaves and roots of Cirsium englerianum and Salvia nilotica juice is apply on all body part.	Dermal	TB84
21	*Cissampelos mucronata* A. Rich**: Climber**	Menispermaceae	Engocht hareg	Rabies	Roots of *Cissampelos mucronata*, *Solanum anguivi*, *Cucumis ficifolius* and *Phytolacca dodecandara* will be powdered, mixed with milk and drunk.	Oral	TB18
				Stomachache	Root of *Cissampelos mucronata* will be crushed mixed with water and the filtrate will be drunk	Oral	

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22	*Citrus aurantifolia* Burn. f. *:* **Shrub**	Rutaceae	Lomi	Stomachache	Fruit juice will be drunk.	Oral	TB22
				Headache	Tkur azmud bar of salt and mix by juice of lomi then add a drop through nose.	Nasal	
23	*Citrus medica* L.*:***Tree**	Rutaceae	Tringo	Bronchitis	Fruit of *Citrus medica* will be mixed with black goat bile and eat.	Oral	TB95
24	*Clematis simensis* Fres.*:* **Climber**	Ranunclaceae	Azohareg	Hemorrhoids	Stem of *Clematis simensis* will be heated on fire and held on the affected area.	Dermal	TB88
25	*Clutia abyssinica* Jaub. & Spach *:* **Shrub**	Euphorbiaceae	Fyele feje	Anthrax	Roots of *Clutia abyssinica, Carissa spinarum, Thalictrum rhynchocarpum, Dodonaea angustifolia, Tragia cinerea, Rhus retinorrhoea, Cucumis ficifolius,* and *Achyranthes aspera* will be mixed with tela then drunk.	Oral	TB19
				Stomachache	Roots of *Clutia abyssinica* will be chewed.	Oral	
26	*Combretum collinum* Fresen*:* Tree	Combretaceae	Abalo	Epilepsy	Fruit and roots of *Combretum collinum, Capparis tomentosa, Periploca linearifol, and Cissampelos mucronata* will be powdered mixed with Vaseline and creamed on affected part.	Dermal	TB32
27	*Cordia africana* Lam.*:***Tree**	Boraginaceae	Wanza	Involuntary urination in bed	Root bark and seed will be pounded together mixed with honey and swallowed.	Oral	TB27

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28	*Coriandrum sativum* L.*:* **Herb**	Apiaceae	Dinblal	Stomachache	Seed of *Coriandrum sativum* boiled in water and drunk.	Oral	TB5
29	*Crinum abyssinicum* Hochst. ex A. Rich: **Herb**	Amaryllidaceae	Yejib-Shinkurt	Rheumatism	Root of *Crinum abyssinicum* and *Crinum abyssinicum* will be mixed with *Allium sativum* and insert fire hold hot on the affected part. Or powder of *Crinum abyssinicum* and *Allium sativum* will be mixed with Vaseline and creamed on affected area.	Dermal	TB72
30	*Croton macrostachyus* Hochst. *:***Tree**	Euphorbiacea e	Bisana	Ascarisis	Root of *Hagenia abyssinica* will be powdered mixed with chick pea powder, baked as bread and eaten.	Oral	TB28
				Febrile illness	Young leaves of *Croton macrostachyus, Salvia nilotica* and *Ocimum lamiifolium* will be crushed and put the juice on hot cup of coffee and drunk.	Oral	
				Swash (Chrt)	Take seven twigs of *Croton macrostachyus* and smear on the patient.	Oral	
31	*Cucumis ficifolius* A. Rich. *:* **Herb**	Cucurbitacea e	Yemidiremb uay	Wound	Fresh stem of *Cucumis ficifolius* will be put on fire and hold on wound slowly.	Dermal	TB21
				Diarrhea	Root powder of *Cucumis ficifolius* will be mixed with supernatant liquid of tella and drunk by glass.	Oral	
				Stomachache	The root and leaf of *Cucumis ficifolius* are boiled in water, filtrate will be drunk.	Oral	

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32	*Cymbopogon citratus* (DC ex Nees) Stapf: **Herb**	Fabaceae	Tej sar	Stomachache	The root and leaf are boiled by water and drink the filtrate.	Oral	TB4
				Nasal bleeding	The leaves are crushed and inserted into the nostrils.	Nasal	
33	*Cynoglossum coeruleum* Hochst. Ex. A. DC. in DC. **Herb**	Boraginaceae	Fkrutena	Syphilis	The root and seeds are pounded, mixed with Vaseline and creamed on the affected area	Dermal	TB20
34	*Discopodium penninervium* Hochst :**Shrub**	Solanaceae	Ameraro	Jaundice	Roots and leaves of *Discopodium penninervium, Phytolacca dodecandara and Solanum marginatum are* crushed and the juice mixes with coffee then drunk.	Oral	TB36
35	*Dombeya torrida* (J. F. Gmel.) P.Bamps*:* **Tree**	Sterculiaceae	Wulkfa	Toothache	The root and leaf powder of *Dombeya torrida* is mix with *Periploca linearifolia* powder then apply on the tooth.	Oral	TB87
36	*Dovyalis abyssinica* (A. Rich.) Warb :**Shrub**	Flacourtiaceae	Koshm	Bigunji	The root leaves and seed are pound together and apply the powder on it.	Dermal	TB71
37	*Ehretia cymosa* Thonn. *:* **Shrub**	Boraginaceae	Gme	Mental disorder	Powdered leaf and root will be smoked.	Nasal	TB34
38	*Erica arborea* L.*:* **Tree**	Ericaceae	Asta	Lung disease	Crushed fresh flower and root will be mixed with e.g. butter and honey and consumed.	Oral	TB3

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39	*Euclea racemosa* Hiern*:* **Shrub**	Ebenaceae	Dedho	Toothache	The leaf will be chewed.	Oral	TB30
40	*Euphorbia abyssinica* Gmel: **Shrub**	Euphorbiacea e	Kulkual	Ascarisis	Few drops of milky sap of *Euphorbia abyssinica* will be eaten with injera (local bread).	Oral	TB57
				Abortion (human being)	The root powder of *Euphorbia abyssinica* is mix with water and drunk.	Oral	
				Wound	The milk sap will be mixed with *Calotropis procera* and applied onto the wound.	Dermal	
41	*Euphorbia tirucalii* L. *:***Shrub**	Euphorbiacea e	Kinchb	Wound	The twigs together with leaves of *Clematis simensis* will be pounded, mixed with milk and applied onto the wound.	Dermal	TB93
				Jaundice	Root of *Euphorbia tirucalii* together with , twigs of *Phytolacca dodecandara, Solanum incanum Discopodium penninervium, Solanecio gigas* , Verbascum sinaiticum will be pounded, mixed with hot coffee and drunk.	Oral	
42	*Ficus carica* L. **Shrub**	Moraceae	Beles	Ear infection	Leaves will be crushed squeezed and few drops of the juice will be added into the ear canal.	Ear	TB2
				Tuberculosis	Root of *Ficus carica* will be boiled in milk and drunk.	Oral	

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43	*Foeniculum vulgare* Miller :**Herb**	Apiaceae	Inslal	Failure to urinate	The root will be chewed.	Oral	TB46
				Stomachache	The stem will be chewed.	Oral	
44	*Gossypium barbadense* L*:***shrub**	Malvaceae	Tit	Skin rash	The seeds will be pounded and placed on the affected skin.	Dermal	TB29
45	*Hagenia abyssinica* L. **Tree**	Rosaceae	Kosso	Tapeworm	The fruit will be pounded and drunk with milk.	Oral	TB40
				Stomachache	The fruit will be pounded and drunk with water.	Oral	
46	*Hypericum quartinianum* A.Rich*. *:* **Shrub**	Hypericaceae	Ameja	Stomachache for equine	The leaves are crushed by the stone and mix by water in the new acini the drenching.	Oral	TB17
47	*Inula confertiflora* A. Rich*:* **Shrub**	Asteraceae	Weynagift	Eye disease	The leaves are crushed and small drops of juice will be applied into the eye.	Eye	TB41
				Rabies	Roots of Solanum anguivi, Cucumis ficifolius all these are pounded and mixed well with coffee and honey then drink by a glass of tea.	Oral	
				Ring worm	The leaf will be rubbed onto the skin.	Dermal	

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48	*Jasminum abyssinicum* Hochst.exDC*:* **Climber**	Oleaceae	Tenbelel	Tuberculosis	Roots of *Jasminumabyssinicum* are pounded and apply the powder on the affected area.	Dermal	TB44
49	*Kalanchoe shimperiana* A. Rich: **Herb**	Crassulaceae	Endohahla	Leg swelling	Take the leaf and insert to the fire and hold the hot on the affected part.	Dermal	TB66
50	*Kanahia laniflora* (Forssk.): **Herb**	Asclepidaceae	Etse frindo	Hemorrhoids	Stem together with that of *Kanahia laniflora* will be heated on fire and put on the affected area.	Dermal	TB75
51	*Leonotis ocymifolia* (Burm.f.) Iwarsson : **Shrub**	Lamiaceae	Raskimr	Cough and common cold	Fresh leaves will be crushed and the juice will be placed in the nostrils.	Nasal	TB48
52	*Lepidium sativum* L*.:* **Herb**	Brassicaceae	Feto	Stomachache	The leaf and seeds will be powdered and drunk with water.	Oral	TB53
				Malaria	Powdered seeds will be drunk with water.	Oral	
				Hemorrhoids	The stem will be heated on fire and held on the affected area while hot.	Dermal	
				Bloody diarrhea	Seed powder of *Lepidium sativum* is mix with yoghurt and drink it.	Oral	
53	*Linum usitatissimum* L.: **Herb**	Linaceae	Telba	Gastritis	Seed will be boiled and the filtrate will be drunk.	Oral	TB50

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54	*Maesa lanceolata* Forssk. :**Shrub**	Myrsinaceae	Kelewa	Acne	Seed of *Maesa lanceolata* and *Discopodium penninervium* are pounded and the powder mix with Vaseline and apply on the affected place.	Dermal	TB56
				Itching	Powdered seed will be mixed with oil and creamed on the skin.	Dermal	
				Tapeworm	Powdered seed will be drunk with water.	Oral	
55	*Myrica salicifolia* Hochst. ex A. Rich: **Tree**	Myricaceae	Shinete	Tonsillitis	Dried bark powder will be drunk with water.	Oral	TB35
56	*Myrtus communis* L.*:* **Shrub**	Myrtaceae	Barsenet	Wound	Leaves of *Lepidium sativum* and *Ruta chalepensis* are pounded together and mixed with Vaseline and smear the powder on the affected area.	Dermal	TB33
57	*Nigella sativa* L.*:* **Herb**	Ranunclaceae	Tkur azmud	Stomachache	Seeds powder together with crushed bulbs of onion will be mixed with butter and honey and drunk with water consumed.	Oral	TB13
58	*Nicandra physaloides* (L.) Gaertn. *:* **Herb**	Solanaceae	Atefaris	Dandruff	Leaves of*Nicandra physaloides* are crushed and apply on affected part.	Dermal	TB39
59	*Nicotiana tabacum* L*.**Shrub**	Solanaceae	Tmbaho	Leech	Leaf of *Nicotiana tabacum* is crushed and mix with water then drink	Oral	TB58

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60	*Ocimum lamiifolium* Hochst. **Herb**	Lamiaceae	Damakesse	Febrile illness	Leaves of *Ocimum lamiifolium, Laggera crispate* and *Salvia nilotica* are crushed and mixedwithhot coffee and drunk.	Oral	TB74
				Headache	The leaves will crushed together with that *Salvia nilotica* put in coffee and drunk.	Oral	
				Eye disease	By crushing of the leaves of *Ocimum lamiifolium* and *Inula confertiflora* apply the juice on eye.	Eye	
61	*Olinia rochetiana* A. Juss.:**Tree**	Oliniaceae	Tfe	Hemorrhoids	Leaves powder of *Olinia rochetiana*and *Clematis simensis* are mixed and apply on the affected place.	Dermal	TB63
62	*Olea europaea sub.sp.cuspidata* L. **Tree**	Oleaceae	Weyra	Headache	Bark and leaves of *Olea europaea* will be boiled in water and the few drops of the filtrate will be placed in the ear. The filtrate will also be creamed on the head.	Dermal	TB51
				Tonsillitis	The leaf is rubbed and the juice is put on cup and drink.	Oral	
63	*Osyris quadripartita* Decn*:* Shrub	Santalaceae	Keret	Wound	The leaf and root are crushed together, boiled and the suspension will be applied onto the wound.	Dermal	TB52
64	*Periploca linearifolia* Quart.-Dill. & A.Rich: **Climber**	Apocynaceae	Tkur hareg	Wound	Leaf powder will be applied onto the wound.	Dermal	TB91

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65	*Phytolacca dodecandara* L'Herit:**Shrub**	Phytolaccaceae	Mekan endod	Jaundice	Roots of *Phytolacca dodecandara*, *Solanum dasyphyllum*, *Verbascum sinaiticum* and *Solanum marginatum* are crushed, fused with half of coca - cola and drunk.	Oral	TB6
				Rabies	Root powder will be drunk with water.	Oral	
				Dandruff	Wash the affected area of head by juice of *Phytolacca dodecandara* leaves.	Dermal	
66	*Plantago lanceolata* L :**Herb**	Plantaginaceae	Gorteb	Wound	The leaves are pounded and mixed with crushed *Alliumsativum* bulb and applied onto the wound.	Dermal	TB59
67	*Plectranthus spp.* **Herb**	Lamiaceae	Dibrk	Diarrhea	Roots and leaves of *Plectranthus spp* is crushed mixed with water and drunk the filtrate.	Derma	TB83
68	*Polygala abyssinica* Fres. *:* **Herb**	Polygalaceae	Etse libona	Wound	First the leaves of this plant are dry and pound then mix with tazmamar and apply on the affected part.	Dermal	TB47
				Stomachache	Roots are crushed and mixed with water and drunk.	Oral	
69	*Rhamnus prinoides* L'Herit *:* **Shrub**	Rhamnaceae	Gesho	Tonsillitis	For each take seven epicotyls of *Rhamnus prinoides*, *Solanum nigrum*, *Kalanchoe Shimperiana*and crushed together and mix with water drunk.	Oral	TB78
70	*Rhus retinorrhoea* Krauss *:* **Shrub**	Ancardaceae	Tlem	Jaundice	Leaves of *Rhus retinorrhoea* will be pounded boiled in water and drunk.	Oral	TB80

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71	*Rosa hybrid* L.**Shrub**	Rosaceae	Tsegereda	Ear infection	The leaves and flower of *Rosa hybrid* will be boiled in water and few drops of suspension will be dropped in to the ear.	Ear	TB79
72	*Rosmarinus officinalis* L. : **Herb**	Lamiaceae	Rosemeri	Hypertension	Root and leaves will be mixed with leaves of lemon, boiled in water and drunk.	Oral	TB55
73	*Rumex abyssinicus* Jacq. **Herb**	Polygonaceae	Mekmeko	Tuberculosis	The root will be pounded boiled in water and drunk.	Oral	TB25
74	*Rumex nepalensis* Spreng*:* **Herb**	Polygonaceae	Tult	Stomachache	Pounded roots of *Rumex nepalensis* well be mixed with water and drunk..	Oral	TB85
				Rheumatism	Roots powder of *Rumex nepalensis* and *Solanum anguivi* will be mixed with water and drunk the filtrate for seven days.	Oral	
75	*Rumex nervosus* Vahl : **Shrub**	Polygonaceae	Embuacho	Hemorrhoids	A whole part of this plant will be powdered and applied onto the affected area.	Dermal	TB49
				Dandruff	Fresh leaves will be rubbed on the affected area.	Dermal	
76	*Ruta chalepensis* L. **Herb**	Rutaceae	Tene adam	Stomachache	Fruit and stem will be boiled in water and drunk.	Oral	TB86
				Common Cold	The fruit and leaves are boiled in water and drunk.	Oral	

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77	*Salvia nilotica* Jacq: **Herb**	Lamiaceae	Hulegeb	Febrile illness	Leaves of *Salvia nilotica*, Cynoglossum coeruleum, and *Ocimum lamiifolium* are mixed together and insert their juice through ear.	Ear	TB37
				Nose bleeding	The leaves will be crushed and sniffed.	Nasal	
				Wound	The juices of leaf will be applied onto the wound.	Dermal	
				Headache	The leaves of *Salvia nilotica* and *Ocimum lamiifolium* together with that of will be crushed mixed with coffee and drunk.	Dermal	
78	*Satureja punctata* (Benth.)Briq: **Herb**	Lamiaceae	Lomishet	Hypertension	The roots of *Satureja punctata* and *Jasminum abyssinicum* are pounded mixed with fresh cow milk and drunk for seven days.	Oral	TB60
79	*Sesamum angustifolium* (oliv) Engl. **Herb**	Pedaliaceae	Selit	Deafness	Oil of *Sesamum angustifolium*, Oil of Nug, Holy Oil, goat milk, leaf of *Verbena officinalis* are mixed and add a drop of through ear.	Ear	TB14
80	*Solanum americanum* Miller:**Herb**	Solanaceae	Yayt awut/ Etse Eyesus	Snake bite	Shoot tips of *Solanum americanum* Will be chewed together with leaves of *Ocimum lamiifolium.*	Oral	TB43
81	*Solanum anguivi* Lam.**Shrub**	Solanaceae	Zerch enbuay	Eye disease	The juice of *Solanum anguivi*is added into the eye.	Eye	TB73
				Rheumatism	For human and cattle the root and leaf of *Solanum anguivi* are boiled and drunk the filtrate.	Oral	
				Syphilis	The berries of this plant are pounded and mixed with honey and swallowed.	Oral	

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82	*Solanecio gigas* (Vatke) C. Jeffrey: **Shrub**	Asteraceae	Shikoko Gomen	Jaundice	The leaves and roots are pounded, mixed with water drunk.	Oral	TB82
83	*Solanum incanum* L. *:* **Shrub**	Solanaceae	Yekola enbuay	Swellings	Fruit will be heated on fire and held on the swollen part.	Dermal	TB9
84	*Solanum marginatum*. f.*:* **Shrub**	Solanaceae	Geber enbuay	Swellings	Pounded root will be mixed with honey and applied onto the swollen body part.	Dermal	TB70
85	*Taraxacum spp*.:***Herb**	Asteraceae	Nechilo	Bone brocken	Leaf of *Taraxacum spp.* tied on the brocken body by bark of *Juniperus procera.*	Dermal	TB96
86	*Thalictrum rhynchocarpum* Dill. & A. Rich*:* **Herb**	Ranunculaceae	Sire bizu	Mfetehe Siray	Roots of *Thalictrum rhynchocarpum* and seven apexes of *Phytolacca dodecandara* and milk of *Euphorbia abyssinica* mixed with fresh cow milk and drunk at empty stomach.	Oral	TB8
87	*Thymus schimperi* Ronniger*:* **Herb**	Lamiaceae	Tosign	Hypertension	Leaves and seeds powdered and drunk with tea.	Oral	TB68
88	*Tragia cinerea* (Fax): **Herb**	Euphorbiaceae	Aleblabit	Stomachache	Roots of *Tragia cinerea*, *Jasminum abyssinicum* and *Solanum dasyphyllum* are pounded and fused with honey and swallowed.	Oral	TB45
89	*Trigonella foenumgraecum* L. *:* **Herb**	Fabaceae	Abish	Stomachache	The seed powder of *Trigonella foenumgraecum* is mixed with water and drunk at empty stomach for three days.	Oral	TB32
				Enteritis	Seed powder mixed with egg and honey and consumed.	Oral	

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90	*Triticum aethiopicum* Jakubz:**Herb**	Poaceae	Tkur sinde	Wound	Salt and *Allium sativum* are mix with powder of *Triticum aethiopicum* and tied on the affected place.	Dermal	TB12
91	*Verbascum sinaiticum* Benth*: **Herb**	Scrophulariaceae	Yahya joro	Snake bite	The leaf and/or root of this plant will be chewed.	Oral	TB1
				Anthrax	The root of *Verbascum sinaiticum* is crushed mix with water and drenching.	Oral	
92	*Vernonia amygdalina* Del.:**Tree**	Asteraceae	Girawa	Morbidity	Crushed leaves of *Vernonia amygdalinais* mixed with water and washed.	Dermal	TB97
93	*Withania somnifera* (L.) Dun *:* **Herb**	Solanaceae	Gzawa	Stomachache	Leaves and roots of *Withania somnifera* is crushed mixed with water and drunk the filtrate.	Oral	TB16
94	*Xanthium strumarium* L. **Herb**	Asteraceae	Yedorokus	Morbidity	Roots and leaves of *Xanthium strumarium*and *Ehretia cymosa* are crushed mixed by letwuha water (water is fetched at morning before drinking bird) and washed all body at Wednesday and Friday.	Dermal	TB23
95	*Zehneria scabra: **Climber***	Asteraceae	Etse sabek/ yebuhe hareg	Hemorrhoids	The stems of *Zehneria scabra* and *Periploca linearifolia* are together put on fire and hold the hot on the affected area.	Dermal	TB61
96	*Zehneria scabra* (Linn.f.) Sond.: **Climber**	Cucurbitaceae	Nechazohareg	Hemorrhoids	Cut the pain place by blade and the root and stem of *Zehneria scabra* is inserting in and fire hold the hot affected place.	Dermal	TB89
97	*Zingiber officinale* Roscoe*:* **Herb**	Zingiberaceae	Zingble	Common cold	Boiled *Zingiber officinale* and drink the filtrate by glass.	Oral	TB38

Key: * Livestock diseases treating species **TB = Tarmaber**

4.4. Habit of Medicinal Plant Species in the Study Area

Analysis of medicinal plants habit revealed that medicinal plants were dominated by herbs (45 spp) followed by shrubs (34 spp), trees (11spp) and climbers (7 spp) (Fig. 2). In most medicinal plant research studies, herbs account for the largest proportion compared to the rest of growth forms category from the rest of plant species habit. This is agree with other finding such as (Ermias *et al*., 2008; Eskedar, 2011). Relatively higher number of herbs and shrubs for medicinal purpose were also previously reported on similar research in Chelya Woreda, West Shoa by Endalew (2007), and Jima Rare district, Oromia Region, by Mulugeta (2014).

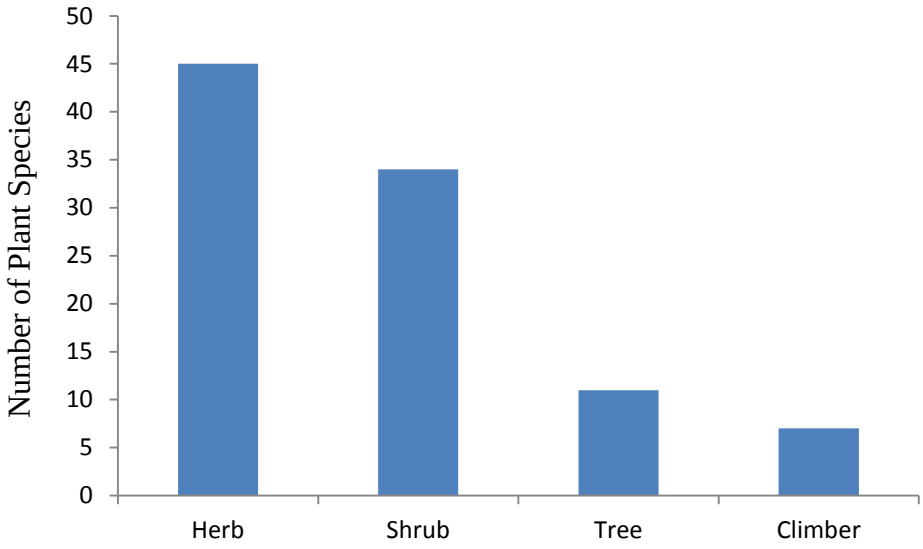

Figure 2. Distribution of medicinal plants growth forms in the study area

4.5. Plant Parts used and Remedy Preparation

In the study area people use different plant parts as a sole or in mixture for the preparation of traditional medicine. The most cited plant parts for remedy preparation were leaves 37 (29.5%) followed by roots 29 (21.6%). This is in accordance with some previous studies conducted in different parts of the country (e.g., Endalew, 2007; Haile and Delenasaw, 2007; Haile *et al*., 2008; Eskedar, 2011; Reta, 2013; Mirtuse and Tilahun, 2013; Mulugeta, 2014). Though dependency on leaves for remedy preparation seems to have less negative effect on plants' survival, a considerable exploitation of roots may cause damage to the plants and threatens their regeneration capacity (Mulugeta, 2014).

Pounding/powdering was the most widely used method of remedy preparation. Respondents claim that plants were used mostly in fresh form for remedy preparation, and there are times and seasons when to harvest medicinal plants.

4.6. Route of Administration and Dosage of Remedies

In this study, the most popular way of administration of herbal medicines were internal particularly oral 75 (55.97%), followed by dermal 49 (36.57%), nasal (3.73%) and other means (3.73%).This result agrees with many other finding (e.g., Eskedar, 2011; Mersha, 2011; Mulugeta, 2014).

Table 4: Route of administration of remedies

Route of administration	Percentage
Oral	55.97
Dermal	36.57
Nasal	3.73
Others	3.73
Total	100

According to the respondents, dosage of remedy varies with age and physical strength of the patients, especially care is given to pregnant women. However, there is no uniformity on the dosage given to a given patient between traditional healers. People of the study area use various units of measurement for example, tea cup as a means of determining the dosage that should be taken.

This, however, lacks scientific precision and may lead to negative impact. Such situation has also been reported by different researchers (e.g., Mersha, 2011; Mulugeta, 2014) who conducted similar study in different parts of the country. According to the respondents, when side effects such as vomiting and/or diarrhea occur due to the application of remedy, some antidotes will be taken for example, Milk, hen liver etc.

4.7. Informant Consensus Factor

Based on sources of the disease and body parts involved, all cited human diseases were categorized into 13 major disease categories (Table 5), and accordingly ICF was calculated. The highest ICF value (0.97) for Snake bite and poising indicates the presence of relatively high consensus between traditional healers on the treatment of these health problems with the medicinal plants of the area. A high ICF value (closer to one) indicates that the informants rely most on the same taxa to manage specific disease conditions, while a low value (close to 0) indicates that the informants disagree on the taxa to be used in the treatment of a given ailments (Teklehaymanot and Giday, 2007). It is also an indication of the effectiveness of the cited plant species against the disease(s) (Abbasi *et al*., 2013).

Table 5. Informant consensus factor for major category of human ailments

Major health problem	**Nt**	**Nur**	**ICF**
Snake bite and poising	4	87	0.97
Dental problem	4	67	0.95
Rabies	4	41	0.93
Sensory problem	7	71	0.91
Mental disorder	10	83	0.89
Fever, Febrile illness and headache	13	102	0.88
Swelling and Hemorrhoids	15	97	0.85
Skeletomuscular problem	7	39	0.84
Respiratory system problem and throat infection	12	64	0.82
Lymphatic, blood and cardiovascular problem	11	49	0.79
Genitourinary and fertility problem	12	53	0.78
Dermatological problem	23	99	0.77
Gastrointestinal problem	27	106	0.75

Note: Nt = number of species use **Nur** = number of use citation for each ailments

4.8. Fidelity Level of Most Commonly Used Plants in the Study Area

Fidelity level (FL) is used to identify the most preferred species in the residents that used to treat some ailments. Plant species that effectively treat one ailment has 100% fidelity level, while plant species that treat more than one ailment, its fidelity level is decrease (Mulugeta, 2014). For example *Salvia nilotica* is widely used species to treat many ailments and its fidelity level is 80%. In the study area fidelity level is vary from 80% to 100% as shown in the table 6 below.

Table 6. Fidelity level of most commonly used medicinal plants in the study area

No	Species	Used to treat	NP	N	FL (%)
1	*Carissa spinarum*	Wound	55	55	100%
2	*Ehretia cymosa*	Mental disorder	42	42	100%
3	*Euclea racemosa*	Toothache	60	60	100%
4	*Hagenia abyssinica*	Tapeworm, Stomachache	58	61	95.1%
5	*Ruta chalepensis*	Common cold, Stomachache	56	60	93.3%
6	*Phytolacca dodecandara*	*Jaundice, Rabies, Dandruff*	69	75	92%
7	*Polygala abyssinica*	Stomachache, wound	55	61	90%
8	*Ocimum lamiifolium*	Febrile illness,Headache Eye disease	77	88	87.5%
9	*Rumex nepalensis*	Stomachache, Rheumatism	49	58	84%
10	*Salvia nilotica*	Febrile illness, Nose bleeding, Wound, Headache	66	82	80%

4.9. Preference Ranking of Medicinal Plants Used to Treat Jaundice

When there are different species prescribed for the same health problem, people show preference for one over the other. Preference ranking of six medicinal plants that were reported for treating Jaundice was conducted after selecting 10 key informants.

The informants were asked to assign the highest number (6) for the medicinal plant which they thought most effective in treating Jaundice and least score (1) for less preferred plant to treat Jaundice. Result showed that of the 6 reported plants, *Phytolacca dodecandara* scored a sum of 51 and ranked first indicating that it is the most effective in treating Jaundice followed by *Calpurnia aurea, Rhus retinorrhoea, Euphorbia tirucalii, Solanecio gigas* and *Discopodium penninervium* (Table 7).

Table 7. Preference Ranking of Medicinal Plants used to Treat Jaundice

List of Medicinal Plants	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	Total	Rank
Phytolacca dodecandara	6	5	5	6	4	6	4	6	5	4	51	1st
Calpurnia aurea	5	4	6	4	6	4	6	5	5	3	48	2nd
Rhus retinorrhoea	3	6	2	4	3	2	4	6	4	6	40	3rd
Euphorbia tirucalii	4	3	3	5	1	5	1	3	1	2	28	4th
Solanecio gigas	2	1	1	3	5	3	2	1	2	5	26	5th
Discopodium Penninervium	1	2	4	2	3	2	3	1	3	2	23	6th

Key: R= Key Respodents

5. SUMMARY AND CONCLUSION

In the study area a total of 97 plant species were identified and of them 92.79%, 5.15%, and 2.06% used to treat human ailments, livestock ailments and both human and livestock ailments respectively. The growth form of medicinal plants were mainly covered by herb 45 spp (46.39%) followed by shrubs 34 spp (35.05%) and trees 11(11.34%). In the preparation of medicinal plants parts leaves are cover the largest which accounted 37 (29.5 %) followed by root 29 (21.6%) and both root and leaves 15 (11.19%). Preparation of medicinal plants in this study area mostly by mixing the difference plant parts this leads to the potentiality of the remedy. The route of administration was mainly covered by oral 75 (55.97%) followed by dermal 49 (36.57%).

The results of the present study in tarmaber district provide evidence that medicinal plants continue to play an important role in the health care system of these study sites. The indigenous knowledge on herbal medicine for the treatment of various health problem are the main gateway of the residents specially poor people.This indigenous knowledge until now transfer from parents to child, but there is variation in which not all information transfer to young generation and less attention is give by the younger due to the introduction of modern medicine and the connect to religion and count as sin.

Also there is variation in transfer of knowedge on medicinal plants among male and female. In the society more attention is given for male to hold this indigenous knowledge and this practice is biased and not acceptable. There fore, to keep this indigenous knowledge of medicinal plants creat equality between geneder in transfer of knowledge and giving awareness about the residents to ward the medicinal plants to sustainable use.

5.1. Recommendations

Based on the current findings the following recommendations were forwarded:-

- Ethnobotanical knowledge is bias to males in the study area. So, special attention should be paid to the value of the ancestral knowledge possessed by women.
- Encourage the residents to cultivate medicinal plants in their homegardens and farmlands.
- Creat awareness to the local people toward medicinal plants manegment and conservation system.
- Teach the young generation toward medicinal plants how to use in sustainable way.
- Teach the young generation that don't attach with religion and traditional healer that not counted as sin.

6. REFERENCES

Abbasi, M. Khan, M. Ahmad, C.L. Quave, A. Pieroni. 2013. Botanical ethnoveterinary therapies in three districts of the Lesser Himalayas of Pakistan. *J.Ethnobiol. &Ethnomed., 9-84.*

Abebe Demissie. 2001. Biodiversity conservation of medicinal plants; problems and prospects. **In;** conservation and sustainable use of medicinal plants in Ethiopia. Proceeding of the National work shop on Biodiversity and sustainable use of medicinal plants in Ethiopia, 28 april-01 *may 1998 pp 56-64,* (*Medhin Zewdu and Abebe Demissei, eds). IBCR, Addis Ababa*.

Amare Getahun. 1976 . Some common medicinal and poisonous plants used in Ethiopian *Folk medicine.*Addis Ababa University. P.3-63.

Asmelash Abay. 2012. Soil defense and conservation , environmental vulnerability and hydrogeological protection in remote sensing and GIS-based mapping on landslide phenomena and landslide susceptibility evaluation of debresina Phd Thesis in Cagliari University in Italy.

Belay Duguma. 2013. Smallholder livestock production and marketing systems in the Haramaya District, Eastern Ethiopia. Basic Agriculture Science. Rev.;2:122–129.

Birhanu Zewudu. 2011. Ethno-botanical survey on medicinal plants used by ethnic groups of Denbia District, north-western Ethiopia. Jnr.; 11:119-123.

Bishaw Mengiste. 1991. Promoting traditional medicine in Ethiopia: a brief historical review of government policy. *Social Science and Medicine*, 33: 193-200.

Carrubba, A. and Scalenghe, R. 2012. Scent of Mare Nostrum — Medicinal and Aromatic Plants (MAPs) in Mediterranean soils. *Journal of the Science of Food and Agriculture 92 (6): 1150–1170. doi:10.1002/jsfa.5630.*

Cotton, C. M. 1996. Ethno botany: *principles and applications*. John Wiley and Sons, New York.

CSA. 2007. Population and Housing Census for Ethiopia, Statistical Report Results at

Country Level. Central Statistical Authority, Addis Ababa.

Dawit Abebe and Ahadu Ayehu. 1993. Medicinal plants and enigmatic health practices of Northern *Ethiopia, Berhanina selam printing Enterprise, Addis Ababa.*

Dawit Abebe. 1986. Traditional medicine in Ethiopia. The attempt being made to promote *it for Effective and better utilization. SINET: Ethiopian Journal of science.**9**:61-69*

Dawit Abebe. 2001. The role of medical plants in health care coverage of Ethiopia, the possible integration. In : conservation and sustainable use of medicinal plants in Ethiopia, proceeding of The National work shop on Bio diversity and sustainable use of medicinal plants in Ethiop, 28April -01.

Elias Ahmed, Tesfaye Gobena and Bizatu Mengistu. 2013. Community Medicine & Health Education Aspects of Common Traditional Medical Practices Applied for Under-Five Children in Ethiopia , Oromia Region , Eastern-Harargie District , Dadar (Vol. 3). https://doi.org/10.4172/2161-0711.1000237

Endalew Amenu. 2007. Use and Management of Medicinal Plants by Indigenous People of Ejaji area (Chelya Woreda), West Shoa, Ethiopia: an Ethnobotanical Approach. M.Sc.Thesis. Addis Ababa University.

Endashaw Bekele. 2007. Study on Actual Situation of Medicinal Plants in Ethiopia; Prepared for Japan Association for International Collaboration of Agriculture and Forestry, http://www.jaicaf.or.jp/publications/ethiopia_ac.pdf accessed on 06/03/20011.

Engedasew Andarge, Abraham Shonga, Mathewos Agize and Asfaw Tora. 2015.Utilizatio n and conservation of medicinal plants and their associated Indigenous Knowle dge (IK) in Dawuro Zone : *An ethnobotanical approach, 4*(3), 330–337.

Ermias Lulekal, Ensermu Kelbessa, Tamrat Bekele and Haile Yineger. 2008. An ethno botanical study of medicinal plants in Mana Angetu wereda, south eastern Ethiopia. *Journal of Ethno Biology Ethno medicine **4**:10.*

Ermias Lulekal, Zemede Asfaw and Ensermu Kelbessa. 2013. Ethnomedicinal study of plants used for human ailments in Ankober District , North Shewa Zone , Amhara

Region , Ethiopia. https://doi.org/10.1186/1746-4269-9-63.

Eskedar Abebe. 2011. Ethnobotanical study on medicinal plants used by local communities in Debark Wereda, North Gondar Zone, Amhara Regional State, Ethiopia.

Fabricant, F. N. 2001. March . The value of plants used in traditional medicine for drug discovery. Environmental and Health Perspective. 69–75. doi:10.1289/ehp.01109s169. PMC 1240543. PMID 11250806.

Farnsworth, N.R., 1994. Ethnopharmacology and drug development **In:** Ciba Foundation eds. ethnobotany and search for new drugs. Ciba foundation symposium 185 chic ester, UK John Wiley and Sons. 42-59.

Farnsworth, N.R. 1985. Plants and modern medicine: Where science and Folklore Meets. World Health Forum.**6 (1):** 76-80.

Fassil Kibebew. 2001. The status and availability of oral Witten knowledge on traditional health care in Ethiopia. In conservation and sustainable use of medical plants in Ethiopia proceeding of the national work shop on biodiversity and sustainable use of medicinal plants in Ethiopia, 28 aprial-01may 1998,PP.168-175,(Medhin Zewdu and Abebe Demisseie, eds). Institute of biodiversity Conservation and research Addis Ababa.

Getu Alemayehu, Zemede Asfaw and Ensermu Kelbessa. 2015. Ethnobotanical study of medicinal plants used by local communities of Minjar-Shenkora District, North Shewa Zone of Amhara Region , Ethiopia, *3*(6), 1–11.

Gidey Yirga. 2010. Assessment of indigenous knowledge of medicinal plants in Central Zone of Tigray, Northern Ethiopia, *African Journal of Plant Science* 4: 006-011.

Haile Yineger and Dilnesaw Yewhalaw. 2007. Traditional medicinal plant knowledge and use by local healers in Sekoru District, Jimma Zone, Southwestern Ethiopia, *Journal of Ethnobiology and Ethnomedicine,* 3: 1-7.

Haile Yineger, Delenasaw Yewhalaw and Demel Teketay. 2008. Ethnomedicinal plant knowledge and practice of the Oromo ethnic group in south western Ethiopia; *Journal of Ethnobiology and Ethnomedicine,* 4:1-10.

Haimanot Reta. 2010. An ethnobotanical study of useful plants of the farming site in Gozamen Wereda, East Gojjam Zone of Amhara Region, Ethiopia unpublished thesis. Addis Abeba University.

Harshberger, J. 1896. Purposes of ethnobotany. Botanical Gazette 21, 146-154.

Jain, S. P. 1995. Ethnobotany. Neutronal Botanical research Institute, Lucknow, India, 1873–1875.

Kebu Balemie, Ensermu Kelbessa and Zemede Asfaw. 2004. Indigenous medicinal plant utilization, management and threats in Fentalle area, Eastern Shewa, Ethiopia. *Ethiopian Journal Biological Scince,* 3: 37-58

Martin, G. 1995. Ethnobotany: A Method Manual. Chapman and Hall, Londone.

Mengistu Gebrehiwot. 2010. An Ethnobotanical Study Of Medicinal Plants In Seru Wereda, Arsi Zone Of Oromia Region, Ethiopia. MSC Thesis Unpublished Addis Abeba University.

Mersha Ashagre. 2011. Ethnobotanical Study of Medicinal Plants in Guji Agro-pastorilists, Blue Hora District of Borana Zone, Oromia Region, Ethiopia. MSC Thesis unpublished Addis Abeba University.

Messay Wolde-Mariam, Yayesh Limenih, Shemsu Umer. 2015. Ethnobotanical Study On Traditional Medicinal Plants In Dega Damot Woreda, Amhara Region, North Ethiopia. International Journal of Research in Pharmacy And Chemistry Issn: 2231- 2781**.**

Mirutse Giday and Gobena Amene. 2003. An ethnobotanical survey on plants of veterinary importance in Two Woredas of Southern Tigray. Northern Ethiopia. *SINET*: *Ethiopian Journal Scince,* 26: 123-136.

Mirtuse Giday and Tilahun Teklehaymanot. 2013. Ethnobotanical Study of Plants Used in Management of livestock health problems by Afar people of Ada'ar District,

Afar Regional State, Ethiopia. *Journal of Ethnobiology and Ethnomedicine* 9-8.

Mulugeta Kuma. 2014. Use and managment of medicinal plants by indigenous people of Jima Rare District in Oromia Region, Ethiopia. MSC Thesis. Haramaya University.

Rodrigo, S. 2005. Knowledge and use of medicinal plants by local specialist in an region of Atlantic Forest in the state of Pernambuco (Northeastern Brazil). *Journal of Ethnobiol Ethnomed*, 1:9

Reta Regassa. 2013. Assessment of indigenous knowledge of medicinal plant practice and mode of service delivery in Hawassa city, Southern Ethiopia, *Journal of Medicinal plants Research*, vol. 7, no 9, pp. 517 - 535.

Seifu Tesfaye. 2004. Ethnobotanical and Ethnopharmaceutical studies on medicinal plants of Chifra District, Afar Region, North Eastern Ethiopia, (M.SC thesis unpublished).

Samar, R., Shrivastava, P. N., & Jain, M. 2015. Ethnobotanical Study of Traditional Medicinal Plants Used By Tribe of Guna District , Madhya Pradesh , India, *4*(7), 466–471.

Stepp, J. R. 2004. The role of weeds as sources of pharmaceuticals. *Journal of Ethnopharmacology 92 (2–3):* 163–166. doi:10.1016/j.jep.2004.03.002. PMID 15137997.

Tafesse Mesfine and Mekonen Lemma. 2001. The role of traditional veterinary herbal medicine and its constrains in animal health care system in Ethiopia. **In:** proceeding of the national work shop on biodiversity conservation and sustainable use of medicinal plants in Ethiopia April-01; May, 1998, PP.23-33,(Medhin Zewdu and Abebe Demissie, ed). Institute of biodiversity *Conservation and research, Addis Ababa.*

Teshale Sori, Merga Bekana, Girma Adugna and Ensermu Kelbessa. 2004. Medicinal Plants in the Ethnoveterinary Practices of Borana Pastoralists, Southern Ethiopia;

International Journal Applied Research Veternerian Medicine, 2: 220-225

Teklehaymanot Tilhun and Mirtuse Giday. 2007. Ethnobotanical study of medicinal plants used by people in Zegie Peninsula, Northwestern Ethiopia. *Journal of Ethnobiology and Ethnomedicine* 3:12.

Tesema Tanto, Mirutse Giday and Negesu Aklilu. 2002. National Biodiversity Strategy and Action plan (BSAP) project: Resource Base of medicinal plants of Ethiopia. Institute of Biodiversity and Conservation, Addis Ababa.

Tesfaye Seifu. 2004. Ethnobotanical and Ethnopharmaceutical studies on medicinal plants of Chifra District, Afar Region, North Eastern Ethiopia, (M.SC thesis unpublished)

Tesfaye Awas and Sebsebe Demissew. 2009. Ethnobotanical study of medicinal plants of Indigenous Knowledge, Emancipation and Alienation**.** *Journal of Kafficho people, southwestern Ethiopia, 711–726. knowledge Transfer and utilization 8: 63-73.*

Turner, N. 1995. Ethnobotany today in northwestern North America. Ethnobotany: Evolution of a discipline. Dioscorides Press, Portland. 264-283

Von Reis, S. and R. E. 1995. Ethnobotany: Evolution of a Discipline. Portland, USA: Dioscorides Press.

Warren, D. M. 1990. Indigenous Knowledge Systems and Development. Background paper for Seminar Series on Sociology and Natural Resource Management. The World Bank, Washington, D.C. December 3, 1990.

Warren, D. M. 1991. The Role of Indigenous Knowledge in Facilitating the Agricultural Extension Process. Paper presented at International Workshop on Agricultural Knowledge Systems and the Role of Extension. Bad Boll, Germany, May 21-24, 1991.

WHO. 1978. The promotion and development of traditional medicine Technical report series, *WHO and Geneva, 622 PP*.

WHO. 2005. Traditional Medicine Strategy: World Health Organization; Geneva. 189pp.

Yayesh Limenih, Umer Shemsu and Messay Wolde-Mariam. 2015. Ethnobotanical study on traditional medicinal plants in Dega Damot Woreda, Amhara Region, North Ethiopia, *5*(2), 258–273.

Yigezu Yared, Haile Berhanu and Ayen Yenet. 2014. Ethnoveterinary medicines in four districts of Jimma Zone, Ethiopia: cross sectional survey for plant species and mode of use. *Biomedical central veterinary Research*, 10: 76.

Zemede Asfaw. 1997. Survey of indigenous food plants, their preparation and home gardens in Ethiopia. In: Bede Nand Okigbo BN (eds), Indigenous African Food crops and useful plants, ICIPE sciences press, Nairobi.

Zemede Asfaw. 2001. The role of home garden in production and conservation of medicinal plants. **In:** conservation and sustainable use of medicinal plants in Ethiopia, proceeding of the National workshop on Biodiversity and sustainable use of medicinal plants in Ethiopia, 28 April-01 May 1998,PP.76-91,(Medhin Zewdu and Abebe Demise, eds). Institute of Biodiversity Conservation and Research, Addis Ababa.

Zewdu Birhanu, Abyot Endale and Zewdineh Shewamene. 2015. An ethnomedicinal investigation of plants used by traditional healers of Gondar town, North-Western Ethiopia, *3*(2), 36–43.

7. APPENDICES

Background information

1. Date……residence area(village)……..

2. Name of respondent ……..sex……age……

2.1 Marital status…….occupation……..

2.2 Religion: orthodox……..protestant……..Muslim……others…..

1. List the main human health problems in your kebele?

2. What are the main livestock health problems?

3. How do you treat each health problem?

General outline on medicinal plants questionnaire format for traditional and non traditional healers in the study area that treat human and livestock ailments.

Scientific name of medicinal plants	Plant habit	Family name of plant	Local name Of plant	Health problem Treated	Part(s) utilized and Mode of preparation of the remedies	Route of application	Collection number

Group discussion question on medicinal plants

1. Which human health problem is common in your area?

   _____

   _____

   _____

   _____

   _____

2. List the common livestock problem in your village?

   _____

   _____

   _____

   _____

3. Do you use plants to treat the above health problems?
4. List those plants with
   - Local name of plants
   - Habitat of plants
   - Parts of plants used
   - Method of preparation
   - Way of administrator of the remedy
5. How do you conserve the medicinal plants?
6. Way of management system for sustainable use of this medicinal plants?