ETHNOBOTANICAL STUDY OF MEDICINAL PLANTS USED BY PEOPLE OF DANO WOREDA, WEST SHOA, OROMIA REGION, ETHIOPIA

M.Sc. THESIS

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MASTER OF SCIENCE IN BIOLOGY

By

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We here by certify that we have read and evaluated this Thesis titled **'Ethnobotanical Study of Medicinal Plants Used by People of Dano Woreda West Shoa, Oromia Region, Ethiopia'** prepared under our guidance by **Chala Tadesse Beshi.** We recommend that it be submitted as fulfilling the Thesis requirement.

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DEDICATION

I dedicate this manuscript to my beloved mother**, Kibitu Tucho,** my father **Tadesse Beshi,** and my wife **Gabaye Tadesse** who sacrificed a lot to bring me up to this level**,** nursing me with affection, and for their dedicated partnership in success of 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 compilation 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

The author, Chala Tadesse, was born to his father Tadesse Beshi and his mother Kibitu Tucho on September 5, 1987 in Tegi Galawo Kebele, Gulliso Woreda, West Wallega Zone, Oromia Regional State, Ethiopia. He attended his elementary and secondary school education at Horist Springs from 1995-2005. After completion of his secondary education in 2005, he joined Lalo Aira Preparatory School and after completion he joined Hawassa

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LIST OF ABBREVIATIONS /ACRONYMS

FL	Fidelity Level
ICF	Informant Consensus Factor
IK	Indigenous Knowledge
IUCN	International Union for Conservation of Nature
MP	Medicinal Plants
TM	Traditional Medicine
NMAE	National Meteorological Agency of Ethiopia
UNESCO	United Nations Educational, Scientific and Cultural Organization
WHO	World Health Organization

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ABSTRACT

*Ethnobotanical study of medicinal plants was conducted to document the indigenous plants based on medical knowaledge of people in Dano Woreda, West Shoa, Oromia Regional State, Ethiopia. A total of 60 informants (age≥25) were selected to collect information on medicinal plant use from six sampled kebeles. Of these, 10 key informants were selected purposively based on recommendation by local elders and authorities. The rest were selected randomly. Data were collected using semi-structured interviews, field observations and group discussions. Informant consensus factor (ICF) and fidelity level were calculated to assess the agreement of informants on the medicinal values of the plants. A total of 47 medicinal plant species distributed in 43 genera and 27 families were collected and identified. Out of these plants, 35 species (*74.47*%) were noted to treat only human ailments while 8 species (*17.02*%) were used to treat livestock ailments and 4 species (8.51%) were used to treat both human and livestock ailments. From the total medicinal plant species, 16 were trees, 16 shrubs, 11 herbs and 4 climbers. The common route of administration recorded was oral followed by dermal*

application. Disease categories such as goiter and tonsillitis had higher ICF values (0.97), suggesting high incidence of these diseases in the study area and agreement of people on their remedies. Agricultural expansion, firewood collection, and use of plants for construction were reported as major threats to plants of the study area.

Key words**:** *Ethnobotany, informant consensus factor, medicinal plants, indigenous knowledge, threats and conservation*

1. INTRODUCTION

Ethnobiology is an interdisciplinary study of how human culture interacts with and uses their native plants and animals. It is therefore, the scientific and humanistic study of the complex set of relationships of the biota to present and past human societies (Stephen and Justin, 2003).

Ethnobotanical studies are useful in documenting, analyzing and disseminating of knowledge on the interaction between the plant world and human society. It emphasizes on how diversity in nature is used and influenced by humans, how humans classify, manage and use plants available around them (Martin, 1995). Ethnobotanical studies are often significant in revealing locally important plant species especially for the discovery of crude drugs. Right from its beginning, the documentation of traditional knowledge especially on the medicinal use of plants has provided many important drugs to treat human and livestock ailments in modern day (Wright, 2005). Traditional medicine still remains the main source of medication for a large majority of the people in Ethiopia for treating health problems (Mekonen, 1990). Traditional medicinal consultancy including the consumption of the medicinal plants has a much lower cost than modern medicinal practice (Mekonen, 1990; Tesema *et al*., 2003).

The current study of medicinal plants of Ethiopia, as documented for national biodiversity strategy and action plan by Tesema *et al*. (2002), shows that about 887 plant species being utilized in traditional medicine. Among these, about 26 species are endemic and they are becoming increasingly rare and rare and at the verge of extinction. Moreover, the indigenous knowledge about them is also equally threatened as the ethnobotanical information is not documented and remains in the memory of elderly practitioners. Ethiopian traditional medical system is shaped by the ecological diversity of the country, socio-cultural background of the different ethnic groups as well as historical developments, and previous studies showed the existence of traditional medical pluralism in the country. In Ethiopia knowledge from herbalists is passed either secretly from one generation to the next through words of mouth or their descendants inherit the medico-spiritual manuscripts (Jansen, 1981) and there are little

accessibility to written documents and records on medicinal plants. The knowledge of medicinal plants use is yet incomplete because there has not been a total inventory of medicinal plants that has been traditionally known to indigenous people (Mesfin *et al*., 2005). In addition to lack of ethnobotanical survey carried out in most parts of the country, there are also principal threats to medicinal plants that are involving in the loss of traditional medicinal plants in the country such as deforestation, over exploitation, population growth and expansion, migration from rural areas to towns and resettlement of people from drought-stricken regions to fertile areas (Abebe, 2001).

Literatures show that studies on medicinal plants have been conducted in different parts of Ethiopia. For example, studies on medicinal plants of south and south-west part have been reported (Dula, 2013; Yibrah, 2014; Birhanu *et al*., 2015). In central parts of Ethiopia studies on medicinal plants have also been reported (Birhan *et al*., 2011). Northern part of the country has also been assessed in terms of ethnobotany of medicinal plants (Gidey, 2010abcd; Giday and Teklehaymanot, 2013; Yigezu *et al*., 2014. Many researchers (e.g., Gidey and Samuel, 2012; Megersa *et al*., 2013) also reported studies on medicinal plants in the western part of the country. In particular, there is no any study in some parts of the western parts of the country including Dano woreda of Oromia Region, Ethiopia. According to Pankhurst, (2001), detailed information on medicinal plants could only be obtained when studies are taking place in the various areas where little or no botanical and ethnobotanical explorations have been made. Thus, this study was designed to carryout ethnobotanical investigation on medicinal plants of Dano woreda, Oromia Regional State, with the following general and specific objectives.

General objective

The general objective of this study is to investigate and document medicinal plants used by local people of Dano woreda to treat human and livestock ailments

Specific objectives

The Specific objectives of this study are:

- To collect and identify medicinal plants that are used by local people for the treatment of human and livestock ailments in the Dano woreda
- To identify plant part(s) used, methods of preparation and mode of administration of plant drugs used by the local people Dano woreda

2. LITERATURE REVIEW

2.1. Historical Development of Ethnobotanical Study

John Hershberger proposed the term ethnobotany for the first time in 1895 (Balick, 1996), however this term has been given different interpretations and definitions depending on the interest of workers involved in the study (Cotton, 1996). Currently, ethnobotany has become a more diversified and multidisciplinary subject that require expert in various fields of academic study such as Botany, Anthropology, Agriculture, Linguistics, Archeology and Economics (Martin, 1995; Alexiades, 1996; Balick, 1996). Ethnobotany is also a rapidly growing science, attracting people with widely varying academic backgrounds and interests (MacDonald, 2009) and now a days ethnobotany has tended to become more cross- disciplinary and multi- institutional (Hamilton *et al*., 2003).

2.2. Indigenous Knowledge

Indigenous knowledge (IK) is, broadly speaking, the knowledge used by local people to make a living in a particular environment (Warren, 1991). Terms used in the field of sustainable development to designate this concept include indigenous technical knowledge, traditional environmental knowledge, rural knowledge, local knowledge and farmers or pastoralist's knowledge. Indigenous knowledge also refers to the accumulation of knowledge, rule standards, skills and mental sets, which are possessed by local people on natural area (Quansh, 1998).

The immediate and intimate dependency of local people on natural resources resulted in the accumulation of indigenous knowledge that helped to adapt to and survive in the environments in which they live. It is local knowledge that is the base for agriculture, health care, food preparation, education, environmental conservation and a host of other activities (Thomas, 1995). The complex knowledge beliefs and practices generally known as indigenous knowledge develops and changes with time and space. Hence, such knowledge includes time-tested practice that developed in the process of interaction of humans with their environment (Alcom, 1984). Therefore, it is the result of

many generations long year's experiences, careful observations and trial and error experiments (Martin, 1995). Indigenous knowledge is a body of knowledge built up by a group of people through generations of living in close.

It builds up on the historic experiences of people and adapts to social, economic, environmental, spiritual and political change (Warren, 1991). For instance, societies concerned with biological diversity will be most interested in knowledge about the environment; this information must be understood in a manner, which encompasses knowledge about the cultural economic political and spiritual relationships with the environment. It provides a distinctive worldview of which outsiders are rarely aware and at best can only incompletely grasp (Balick and Cox, 1996). Indigenous people of different localities have developed their own specific knowledge on plant resources, use, management and conservation (Cotton, 1996). Thus, systematic application of indigenous knowledge is important for sustainable use of resources and sustainable development (Thomas, 1995).

One of the widely used indigenous knowledge systems in many countries is the knowledge and application of traditional medicine. Such knowledge known as ethnomedicinal knowledge involves traditional diagnosis, collection of raw material, preparation of remedies and its prescription to the patients (Farnsworth, 1985).

Indigenous knowledge on remedies in many countries including Ethiopia, pass from one generation to the other generation orally (Jansen, 1981). Such secret and crude transfer makes indigenous knowledge or ethnomedicinal knowledge vulnerable to distortion and in most cases, some of the information is lost at each point of transfer (Amare, 1976). Hence, there is a need for systematic documentation of such useful knowledge through ethnobotanical research.

2.3. Traditional Medicine

Traditional medicine has been defined by the world health organization (WHO, 2008) as the practices whether explicable or not, used in the diagnosis, prevention and elimination of physical, mental or social imbalances and relying exclusively on practical experience and observation handed down from

generation to generation. This system of health care is also known as folk medicine, ethnomedicine, or indigenous medicine.

According to Fassil (2001), about 75-90% of the rural population in the developing world relies on traditional medicines as components of their health care. This is not only because of poverty where people cannot afford to buy expensive modern drugs, but, traditional systems are also more culturally acceptable and meet the psychological needs in a way modern medicine, does not. In Africa, traditional medicine plays a central role in health care needs of rural people and urban poor people. Here, it is said that, this situation would remain so long as modern medicine continues to be unable to meet the health care of the people of the continent effectively (Jansen, 1981). Their value and role of this health care system will not diminish in the future, because they are both culturally viable and expected to remain affordable, while the modern health care service is both limited and expensive (WHO, 1998). According to Kanno (2004), easily accessibility efficacy on treatment and affordable cost in getting health services are also main reasons in preferring traditional medicine to modern medication.

Traditional medicine has also draw backs as various authors stated (Amare, 1976;; Dawit, 1986). 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; Pankhurst, 1995).

2.4. Importance of Traditional Medicinal Plants in Human Health

Plants in general and medicinal plants in particular are important, fundamental and most useful to almost all life on earth. One of the most significant uses of plant is the contribution of medicinal plants to modern medicine, through providing ingredients for drugs or having played central role in drug

discovering, some drugs having botanical origin, extracted from plants (Haile *et al*., 2008).

Traditional medicinal plant has remained as the most affordable and easily accessible source of treatment in the primary health care system of poor resource communities and the local therapy is the only means of medicinal treatment for such communities Kanno (2004). Like any other developing and less developed nations the available modern health care services are not only insufficient but also inaccessible and unaffordable to the majority (Haile *et al*., 2008). This is true in Ethiopia where nearly 80% of population still relies on plants to prevent and cure various health problems (Dawit and Ahadu, 1993). In developing countries leaning to and favoring traditional medicinal plants is mainly due to inaccessibility of modern medical system, economic and cultural factors (Abbiw, 1996). According to Kanno (2004), easily accessibility efficacy on treatment and affordable cost in getting health services are main reasons in preferring traditional medicine than modern medication.

Medicinal plants play typical role in the lives of many people in terms of health support, financial income and livelyhood security (Abdulhamid *et al*., 2004; Hamilton, 2004). And all these benefits of plants are directly or indirectly linked with health care (Hamilton, 2004; Kelbessa *et al.,* 2004). Therefore, health care and botany have evolved as inseparable domain of human activities since various plant products are paramount important in traditional health care systems. The world health organization estimates that about 80% of the world people rely chiefly on traditional medicine, mostly of plant origin to meet their primary health care needs (Duke, 1992; Farnsworth *et al*., 1985). According to Mekonen (1990) and Tesema *et al*. (2003), about 80% of human population and over 90% livestock in Ethiopia rely on traditional medicine. And thus, today in Ethiopia there is a large magnitude of use and interest in medicinal plant due to socio-cultural acceptability, accessibility, affordability and biomedical benefits of the traditional medicinal plants. In other words, 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 (Kanno, 2004; Mwambazi, 1996; WHO,

2000). It is also noted that since medicinal plants are often within easy reach compared to modern drugs that are dispensed in remotely located health institutions, so most people in Ethiopia rely on the medicinal plants for treating their livestock and themselves (Debela *et al.* (2004); Kanno, 2004).

2.5. Plants in Ethnoveterinary Medicine

In Ethiopia as well as in most developing countries animal disease remains one of the principal causes of poor livestock performances leading to an ever increasing gap between the supply of and the demand for livestock products (Teshale *et al*., 2004). Ethnoveterinary medicine and related study is one of the most important means of controlling livestock diseases. Ethnoveterinary medicine which refers to traditional animal health care knowledge and practices comprising of traditional surgical and manipulative techniques, traditional immunization, magico religious practices and beliefs, management practices and the use of herbal remedies to prevent and treat a range of disease problems encountered by livestock holders (Tafesse and Mekonen, 2001).

Ethnoveterinary medicine provides traditional medicines which are locally available and usually cheaper than standard treatments. Livestock offers in many harsh environments the only way of survival and constitutes a driving force for food security and sustainable development in developing countries like Ethiopia. Livestock raisers both farmers and herders have developed their own ways of keeping their animal health and productivity. They treat and prevent livestock's disease using sometimes ageold home made remedies, surgical and manipulative techniques. These indigenous local animal health care beliefs and health care practices constitute an ethnoveterinary medicine (Mirutse and Gobena, 2003). Livestock disease has often been described as serious of constraints to both macro level economic development in Africa and the well being of millions of poor livestock keepers (Andy, 1999). The document also stated that disease related economic losses have been estimated at 4 billion US dollar annually for Africa as a whole.

In Ethiopia, livestock production plays an important role in the livelihood and economy of majority of the population. Ethiopia is one of the leading countries of Africa in livestock population (Mirutse and Gobena, 2003). Although

Ethiopia is rich in its livestock population, it is one of the countries in the world with the lowest output (Tafesse and Mekonen, 2001). The poor health condition and of its livestock has partially been responsible for the low productivity (Mirutse and Gobena, 2003). The ever declining provision of animal health services related in the appearance of number of epizootic diseases reducing the economic efficacy of livestock production in Africa (Mirutse and Gobena, 2003). The study conducted by Wirtu *et al*., (1997), revealed as animal health care were provided by the owners, traditional healers, and veterinary professionals. Besides, most modern drugs are expensive and as a result, not affordable by the majority of Ethiopian farmers and pastoralists, most of them rely on their traditional knowledge practices and locally available materials (mainly plants) in the control of diseases of their domestic animals (Mirutse and Gobena, 2003). Inspite of its permanent importance as livestock health care systems, various traditional veterinary practices remained undocumented in Africa and Ethiopia (Dawit and Ahadu, 1993). Thus creation of awareness on ethnoveterinary 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).

2.6. Ethnobotanical Studies of Medicinal Plant Research in Ethiopia

Pharmaceuticals' industries and western researches on plant based drugs have been rediscovered that plants have much to contribute to the discovery of new effective, safe and profitable therapeutic agents (Pistorius and Van Wiik, 1993). Most pharmaceutical companies recently have developed mechanisms to involve indigenous people to collect plant samples on the recommendations of the traditional practitioners. This approach is reported to be more successful than random collections of sample of medicinal plants (Alexiades, 1996; Balick and Cox, 1996; Asfaw *et al*., 1999). World health organization established a worldwide program to promote and develop basic and applied research in

traditional medicine (WHO, 1998). Medicinal plants then have got special attention and regional offices were established by world health organization to coordinate basic and applied research activities on medicinal plants (WHO, 1998).

To preserve indigenous knowledge of plant use in general and traditional medicine in particular, an Ethnobotanical survey and study in socio-cultural group is very crucial. Also a limited number of papers dealt with specific socio-cultural groups in specific areas when compared to the countries varied flora and the socio-cultural diversity Ermias *et al.* (2008).

For ethnomedicinal uses 230 plants species were documented from Mana Angetu district which is found in Bale zone of oromia region. Of these 181(78.70%) were used as human medicine, 27(11.74%) as livestock medicine and the remaining were 22(9.7%) uses for treating both human and livestock ailments. Similar study by Mirutse (2001), on Zay people indicated as herbs stood first in which Zay people derive their medicine (55%), followed by trees and shrubs (33%). Whereas the study conducted by Debela *et al.* (2004) in Boosat around Welenchiti area stated that shrubs rank first with 59%, followed by herbs 14% by which indigenous people of Boosat derive their medicine and livestock remedies.

In addition to the above, ethnobotanical study of food and medicinal plants of Danio Gade (home gardens or remedies of Gamo people) by Belachew *et al.* (2003) revealed that the majority of medicinal plants were herbs (66.6%) followed by shrubs (22.2%) for this particular study. Moreover, the study explained that the most frequently utilized plant parts are the leaves (66.6%) followed by the roots (16.6%). In terms of their growth location the study showed that about 61.11% of the medicinal plants were wild while the remaining 38.9% where grown close to home. From this study finding, one can easily imagine that those grow close to homes provide good evidence for home gardens being useful as habitat for medicinal plants.

It was reported that, ethnoveterinary service is among the uses of medicinal plants (Debela *et al*., 2004), Ermias (2005) and Debela *et al*. (2013). Different

parts of plants are being derived for medicine in order to cure human or live stock diseases in Ethiopia. However, roots and leaves are widely utilized plant parts Tizazu (2005). Beside this, the study explained as 68.6% of herbal remedies were applied orally and 31.4% were applied externally. People use medicinal plant parts, to treat human or livestock ailments while they are fresh, dried or both. The study of Gidey (2010b) on central Tigray revealed as some of medicinal preparation were fresh or dried state, as these plants are used in both forms, the chance of using the medicinal plants under different seasons of the year is increased and traditional healers preserve the plant that they could not find in dry season in different ways like pounding and hanging the plant material. Related studies by Kebu *et al*. (2004) indicated that malaria, jaundice, cough and stomachache are among the human ailments treated with medicinal plants. It was also pointed out that veterinary problems due to leech, tsetse, anthrax, tick and intestinal worms were among the diseases treated with medicinal plants recorded in the Fentalle study area.

2.7. Threats and Conservation of Traditional Medicinal Plants

2.7.1. Threats to medicinal plants

People use many wild species of plants for food, medicine, clothing, shelter, fuel, fiber, income generation and the fulfilling of cultural and spiritual needs throughout the world (Zemede, 2001). In addition to the natural factors (earth quake, drought, bush fire and flood), different human activities are causing major global reduction of plant diversity including the medicinal plant species (IUCN, 1991). Africa's including Ethiopia's traditional medicine has faced with problems of sustainability (Ensermu *et al*., 1992). The primary causes of this problem are loss of taxa of medicinal plants, loss of habitats of medicinal plants and loss of indigenous knowledge. Human factors including rapid increase in population, the need for fuel, urbanization, timber production, overharvesting, destructive harvesting, invasive species, commercialization and habitat destruction, honey gathering and agricultural expansion are the most factors which caused threats to medicinal plants. Likewise natural causes include recurrent drought, bush fire, disease and pest out breaks (Ensermu *et al*., 1992). Like the other parts of Ethiopia, the problem is manifested in Oromia including the study area.

2.7.2. Conservation of traditional medicinal plants

Conservation is defined as the sustainable use of biological resources. According to Zemede (2001), medicinal plants are considered to be at conservation risk due to over use and destructive harvesting of parts. Plant parts used to prepare remedies are different; however, root is the most widely used part. Such wide utilization of root part for human and livestock ailments with no replacement has sever effect on the future availability of the plant. In a broad sense, conservation is achieved through *in-situ* and *ex-situ* means. In-situ conservation is conservation of species in the natural habitat. Some traditional medicinal plants have to be conserved *in-situ* due to difficulty for domestication and management (Zemede, 2001). Moreover, some plants fail to produce the desired amount and quantity of the active principles under cultivation out of their natural habitats. This is possible in places of worship (churches, mosques, grave yards, etc), scared grooves, farm margins, river banks, road sides, live fences of gardens and fields. According to Zemede (2001), medicinal plants can be conserved using appropriate conservational methods in gene banks and botanical gardens. These types of conservation of medicinal plants can also be possible in home gardens, as the home garden is strategic and ideal farming system for the conservation and production medicinal plants. Ethiopia has polices and strategies that support the development and utilization of plant resources in a sustainable manner (Endalew, 2007).

3. MATERIALS AND METHODS

3.1. Description of the Study Area

The study was conducted in Dano woreda, West Shoa, Oromia region, Ethiopia. Dano is located at 8º 39' 60" N and 37º 19' 60" E latitude and longitude, respectively. The average altitude of the study area is 1700 m above sea level. Its land mass coverage is about 65,919 hectares and subdivided into 24 *kebeles* of which one is woreda urban *kebele* and the rest 23 are rural kebeles. Dano is found at a distance of 275 km from Addis Ababa to the west.

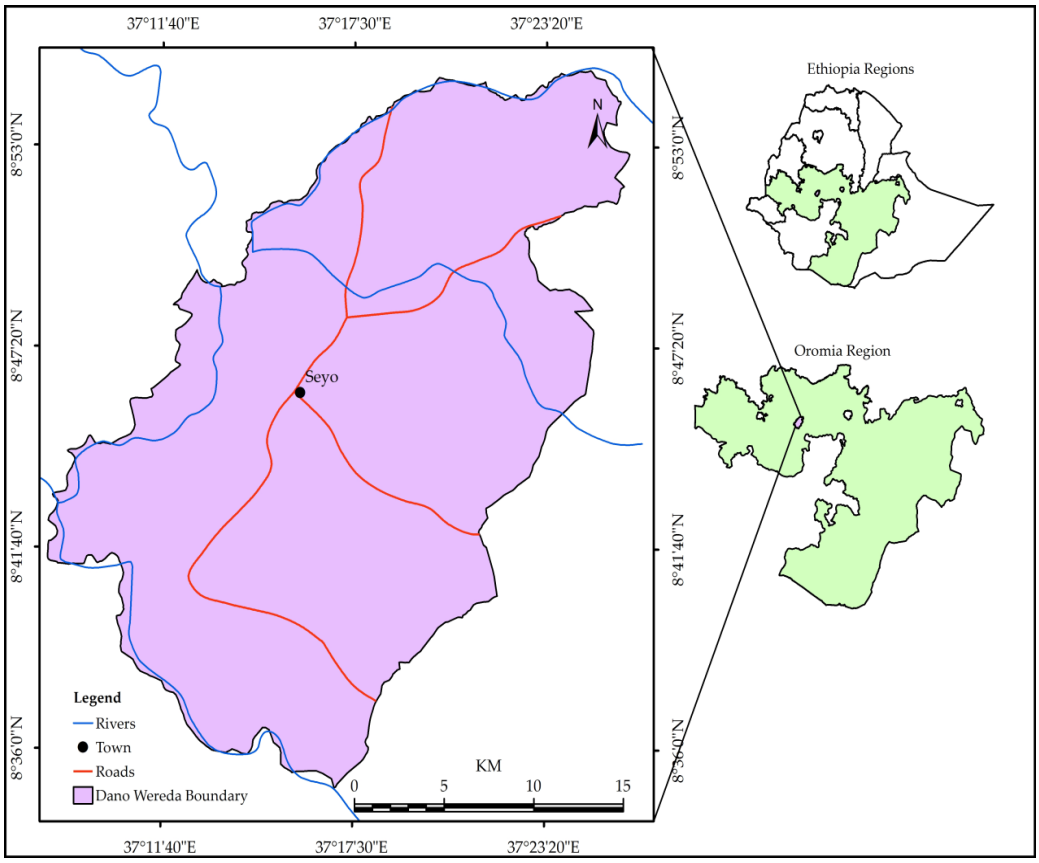

Figure 1. Map of the study area.

3.2. Population

Based on the 2016, Dano wereda had a total population of 277,560. Out of this, 149,292 were men and 128,268 were women. While 55.78% are urban inhabitants, 44.22% are rural (Health office of Dano Woreda, 2016). Because of shortage of health care service and the high cost of modern drugs, people in the study area use traditional medical system to treat themselves and the livestock ailments.

3.3. Reconnaissance Survey and Selection of Study Sites

Reconnaissance survey was conducted from March 22 to 30, 2017 to select 6 *kebeles*, which included: Seyo 01, Dano Rogge, Bake Sirba, Babo Gasaso,

Seyo Gudatu and Kara Garjeda for ethnobotanical data collections. These *kebeles* were purposively selected based on the availability of traditional medicine practitioners.

3.4. Ethnobotanical Data Collection

Prior to ethnobotanical data collection, respondents were selected from the selected *kebeles*. Totally, 60 respondents, 10 from each *kebeles* (aged ≥25), 50 ordinary (non-traditional medicine practitioners) residents and 10 key informants (traditional medicine practitioners) from four *kebeles* two each and from two *kebeles* one each participated in this study. Key informants were selected by purposive sampling techniques from the study *kebeles* based on the information gathered from the local people while the other 50 respondents were randomly selected.

Ethnobotanical data were collected between April, 2017 and May, 2017 by two field trips made to the sites. Data collection was done through semi-structured interviews, group discussions and guided field walks with key informants for field observations.

Key informants were first asked individually to mention about the local names of the plants that they use to treat diseases, diseases treated, part(s) of plants used, methods of gathering, methods of preparation of remedies, route of administration of remedies, application of the remedies, dosage, side effects of the treatment, use of the plants other than medicine, types of threat and conservation problems. Thereafter, discussion was made with them based on the checklist of questions and asked for field walk for onsite observation of the plants. Similar interviews were also applied with randomly selected non-practitioners of traditional medicine. Voucher specimens were collected, pressed, and dried for identification. For some species, preliminary identification was done in the field using available literatures and 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 assistance of experts at Haramaya University, Herbarium.

3.5. Data Analysis

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

Jaccard's Similarity Coefficient (J) was calculated to determine species composition similarity among four different areas. It was calculated between paired habitats (the study area with other areas which were studied by others in different parts of the country). Jaccard's Similarity Coefficient was calculated as follows.

Where a= Number of species which is found in habitat A

b= Number of species found in habitat B and

c= Number of common species found in habitat A and B

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 *et al.* (2005) and Teklehaymanot (2007).

$$ICF = nur - nt / nur - 1$$

Where **nur** is the number of use citation in each category and **nt** is the number of species used.

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.

$$FL\ (\%) = NP/N \times 100$$

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 plant as a medicine to treat any given disease.

Preference ranking: is used to compare the most effective medicinal plants used by the community to treat a particular disease. This was determined following Martin (1995) and Cotton (1996), for the six most important medicinal plants used in treating a stomachache, as traditional healers treat it usually. For this ten informants were selected to identify the best preferred medicinal plant species for treatment of this particular illness. Each informant was provided with six medicinal plants reported to cure this illness with leaves

of medicinal plant used being paper tagged then asked to assign the highest value (6) for the most preferred species against this illness and the lowest value (1) for the least preferred plant and in accordance of their order for the remaining one. The value of each species was summed-up and the rank for each species determined based on the total score. This helps to indicate the rank order of the most effective medicinal plants used by the community to treat the disease.

4. RESULTS AND DISCUSSION

4.1. Ethnomedicinal Plant Species Used by People of the Study Area

A total of 47 species of medicinal plants used to treat 35 different health problems were gathered and documented from the study area (Appendix Table 1). These plants belong to 43 genera and 27 families. Out of these plants, 35 species (74.47%) were noted to treat only human ailments while 8 species (17.02%) were used to treat livestock ailments and 4 species(8.51%) were used to treat both human and livestock ailments. The presence of traditional knowledge and practice on large number of medicinal plants by people of Dano woreda shows that the area still depend on traditional medicinal plant origin. In terms of species composition, family Fabaceae consisted of 6 species followed by Solanaceae and Moraceae 4 species each and Euphorbiaceae consisted of 3 species. The remaining families contained two or one species (Appendix Table 1). The majority of medicinal plant species were obtained from wild area followed by agricultural field, home garden, road side and live fence (Table 1). The fact that high number of medicinal plant species was obtained from wild suggests that maintaining these areas will help to conserve these plant species.

Table 1. Distribution of medicinal plants in different habitats

Habitat type	No. of medicinal Plant species	Percentage
Wild	22	46.81
Agricultural fields	12	25.53
Home garden	6	12.77
Roadside	4	8.51
Live fence	3	6.38
Total	47	100

In this study some plants were reported to have medicinal value more frequently than others to treat various ailments. For example, *Pterolobium stellatum* was cited by 66.66% of informants as a source of remedy for treating tooth ache, evil eye, headache, epilepsy, and intestinal parasite followed by *Allium sativum* cited by 63.33% of informants for stomachache, cough and malaria; *Citrus limon* by 58.33% informants to treat stomachache and nasal bleeding and *Momordica foetida* by 50% informants to treat evileye and wound (Table 2).

Table 2. Some of the medicinal plants cited most by informants.

Scientific Name of Medicinal plants	No. of Informants	Percentage
Pterolobium stellatum	40	66.66
Allium sativum	38	63.33
Citrus limon	35	58.33
Momordica foetida	30	50.00
Asparagus africanus	20	33.33
Vernonia amygdalina	19	31.66
Carica papaya	18	30

4.2. Plant habit (growth forms) and Plant part(s) used for medicine

Of the total of 47 medicinal plants collected from the study area, 16 (34.04 %) were tree species, 16(34.04%) shrub species followed by 11(23.40%) herb species and 4 (8.51%) climbers (Figure 2). This shows that most widely used medicinal plants habit in the study area are trees and shrubs equally. This may be due to high level of abundance of these habits in the study area compared to herb and climber species.

Figure 2. Growth forms of medicinal plants used for human and livestock ailments in the study area

People of the study area use different plant parts for the preparation of traditional medicines. Results of this study showed that leaf is the most cited

plant part in medicine preparation followed by root and seed/bark. Plant parts such as fruit, bulb, flower, root and leaf, sap, latex, entire part, leaf and stem, entire above ground were also reported (Table 3). This result agrees with some previous studies conducted in different parts of the country (e.g., Bayafers, 2000; Mirutse, 1999; Endalew, 2007). Though excessive harvest of leaves may damage plants, particularly the young plants bearing few leaves, the fear of destruction of medicinal plants due to the nature of plant parts collected for the purpose of medicine seems to be minimal in the area where this study was conducted. Because, collection of plant parts that often serve as organ of regeneration were not reported much.

Table 3. Plant parts used for traditional medicine preparations in Dano woreda

Plant parts	**Total responses**	**% of total**
Leaf	21	35
Root	12	20
Seed	5	8.33
Bark	4	6.67
Sap	4	6.67
Fruit	4	6.67
Bulb	3	5
Latex	2	3.33
Root and leaf	1	1.67
Flower	1	1.67
Entire part	1	1.67
Leaf and stem	1	1.67
Entire above ground	1	1.67
Total	60	100

4.3. Preparation methods of remedies, dosage and route of administrations

Concerning the preparation of traditional medicine, the local people employ various methods of preparation of traditional medicines for different types of ailments. The preparations vary based on the type of disease treated and the actual site of the ailment. The principal methods of traditional medicine preparation reported were pounding, crushing and powdering (Table 4). This may be due to the possibility of effective extraction of plant ingredients when pounded or crushed and powdered so that its curative potential would increase. Preparations may involve using a single plant part or mixtures of different organs of the same plant. In this study, the local people also use some other products as additives in their preparations. For example, water, oil, sugar, salt, milk, honeys are some of the additives that the local people reported to be used to improve the flavor and reduce adverse effects such as vomiting and diarrhea. Such additives were also reported by some previous researchers (Mirutse, 1999; Bayafers, 2000).

Table 4. Preparation methods of herbal medicine reported by people of Dano Woreda

Forms of preparation	**Total responses**	**% of total**
Pounding	15	25
Crushing	12	20
Powdering	10	16.67
Squeezing	7	11.67
Chewing	7	11.67
Burning/Heating	4	6.67
Powdering/Painting	2	3.33
Smoking	1	1.67
Rubbing	1	1.67
Immersing	1	1.67
Total	60	100

The dosage of medicine to be administered is given by rough estimation of the age and physical condition of the patient. Hence there is no precision on the dosage of the remedy. Dawit and Ahadu (1993) reported that lack of precision in the dosage is one of the major drawbacks of practicing traditional remedy. Route of administration include through oral, dermal, nasal, and others. Overall, oral administration was reported as a dominant route of administration (47.69%) followed by dermal route (35.38%). This finding agrees with some of the previous reports (Bayafers, 2000; Kebu *et al*., 2004).

Figure 3. Percentage distribution of route of administration of plant remedies used for human and livestock.

4.4. Ways of application of plant remedies and Conditions of preparation of remedies in use

The prepared traditional medicines are applied in a number of methods, among which drinking (33.85%), eating/chewing (16.92%), and putting on (15.38%) were the dominant methods. Creaming and rubbing against skin were also some of the reported approaches of medication.

The results (Figure 4) showed that majority 39 (60%) of the herbal remedies are prepared using fresh materials while 21 (32.31%) were used in dried form and 5 (7.69%) are used either as fresh or in dried form . Similarly, a study conducted by Teshale *et al*. (2004) in Borana, Oromia Reginal State, South Western Ethiopia, showed that using this conditions of preparation remedies.

Figure 4. Conditions of preparation of herbal Remedies

4.5. Jaccard's Similarity Coefficient (J)

The results of the comparison by using Jaccard similarity coefficient of study area and four other areas indicated that the highest degree of similarity was observed with the study conducted in Chelya woreda (0.23%) followed by Jima Rare Woreda (0.22%), Gololcha woreda (0.21%) and finally with Goma woreda (0.12%) Endalew Amenu, (2007), Behailu Etana, (2010), Mulgeta Kuma, (2014), Mekonnen Abebe, (2013). The highest degree of similarity is observed with Cheliya Woreda. This may probably due to socio-cultural factors that could contribute to the medicinal plant knowledge base of people. There is

also nearness to each other of the study area that might contribute to higher degree of cultural influx. The lowest degree of similarity is observed in Goma Woreda this might be due to vegetation difference of the two study areas.

Table 5. The Jaccard similarity coefficient of Dano Woreda with four other areas with respect to medicinal plant composition.

Sample area	Species	a	b	c	JI%
Dano Woreda	47	-	-	-	-
Chelya Woreda	89	21	68	26	0.23
Jima Rare Woreda	82	23	59	24	0.22
Goma Woreda	160	25	135	22	0.12
Gololcha Woreda	70	28	42	19	0.21

4.6. Informant consensus factor (ICF)

All cited human diseases were categorized into 10 major disease categories (Table 6) based on sources/assumed causative agents of the disease and body parts involved. Informant consensus factor values ranged from 0.97 to 0.81 with the Goiter and tonsillitis having the highest ICF value (0.97) and Gastritis, Intestinal parasites, stomach ache, liver disease, stomach worm, soften of the abdomen had the lowest (0.81) ICF value. The diseases that exist frequently in a given area will have higher ICF value. Therefore, the fact that Goiter and tonsillitis disease got high ICF value (0.97) indicates that these diseases are the most common in the study area than others so that people agree on the type of plants they have to use for treatment.

Table 6. Informant Consensus Factor (ICF)

Disease categories	nt	Nur	ICF
Goiter, tonsillitis	2	60	0.97
Common cold, asthma, cough	2	47	0.96
Placenta retention, urine retention	3	35	0.94
Anemia, Malaria	2	15	0.93
Toothache, headache, nasal bleeding	6	54	0.91
Skin rash, ring worm, skin infection, lymphatic swelling, warts	7	60	0.90
	3	22	0.90
Evil eye, Epilepsy	2	8	0.8
Rabies, spider poison	9	52	0.84
Wound, Hemorrhoid, bleeding	12	58	0.81
Gastritis, Intestinal parasites, stomach ache, liver disease, stomach worm, soften of the abdomen			

4.7. Fidelity level index (FL)

Fidelity level (FL) values were calculated for some commonly used medicinal plants against some commonly reported ailments. Results showed that *Pterolobium stellatum* (against head ache) had the highest fidelity level followed by *Olea europaea* (against hemorrhoid), *Allium sativum* (against stomachache), *Eucalyptus globulus* (against common cold), *Acacia abyssinica* (against goiter), *Clematis simensis* (against tonsillitis) and *Capsicum annum* (against blotting) (Table 7). The medicinal plants that are widely used by the local people to treat one or very few ailments will have higher FL values than those that are less popular (Tilahun and Mirutse, 2007). High FL could also be an indication of efficiency of the reported plant to cure a specific ailment.

Table 7. Fidelity index of some medicinal plants

Scientific Name of Medicinal plants	Examples of ailment treated	Np	N	FL	FL%
Pterolobium stellatum	Head ache	26	28	0.92	92

Olea europaea	Hemorrhoid	22	26	0.84	84
Allium sativum	Stomachache	20	24	0.83	83
Eucalyptus globulus	Common cold	18	22	0.81	81
	Goiter	16	20	0.80	80
Acacia abyssinica	Tonsillitis	14	19	0.73	73
Clematis simensis	Blotting	12	17	0.70	70
Capsicum annum					

4.8. Preference ranking

When there are different species prescribed for the same health problem, people show preference to one over the other. Preference ranking of six medicinal plants that were reported for treating stomach ache was conducted after selecting ten key informants. The informants were asked to compare the given medicinal plants based on their efficacy and to give the highest number (6) for the medicinal plant which they thought most effective in treating stomachache and the lowest number (1) for the least effective plant in treating stomach ache. *Solanum marginatum* scored 45 and ranked first indicating that it is the most effective in treating stomach ache followed by *Allium sativum* and the least effective was *Citrus limon* (Table 8).

Table 8. Preference ranking of medicinal plants used for treating stomachache.

List of medicinal Plants	**R_1**	**R_2**	**R_3**	**R_4**	**R_5**	**R_6**	**R_7**	**R_8**	**R_9**	**R_{10}**	**Total**	**rank**
Solanum	6	5	5	6	4	3	3	6	2	5	45	1st
marginatum	5	6	5	5	6	4	4	3	1	1	40	2nd
Allium sativum	5	4	5	3	3	2	6	3	2	1	34	3rd
Ruta chalepensis.	4	2	2	3	6	4	3	3	2	1	30	

Eucalyptus	3	3	3	1	2	4	1	1	3	3	24	4th
camaldulensis	2	2	1	2	1	4	1	3	1	3	20	5th
Acacia abyssinica												6th
Citrus limon												

Key: - R=Respondent

4.9. Threats to Medicinal Plants and Indigenous Knowledge

Rural people need plants in their livelihood for different aspects. Agricultural encroachment, fire wood collection, charcoal production, plant use for house and fence construction, overgrazing and urbanization were reported. As a result, the accessibility of medicinal plants becomes less when compared with the past decade, so key informants require long distance of travelling to fetch medicinal plants. The ethnobotanical knowledge on uses of medicinal plants is secrete and transferred from one generation to the next orally. From discussion with key informants, it was observed that the forefathers tell information only to the male elder's family members to use in secrecy. They disclose their knowledge on medicinal plants at old age by the time when they most probably die before teaching the details of medicinal plants or when they are too old to walk to the field to show the plants in their habitat. Modernization and facility to modern medication have also contribution to the loss of indigenous knowledge as new generations give less attention to traditional medicinal plants. As a result the indigenous knowledge seems to be vanishing from the study area.

5. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary

A study on Ethnobotanical Study of Medicinal Plants Used by People of Dano Woreda, West Shoa, Oromia Region, Ethiopia were conducted. The study aimed at identifying and documenting the plants used to treat human and livestock diseases. The study would involve informants between the ages of ≥25 were randomly and purposely selected from traditional healers,

knowledgeable elders and local communities. Various techniques were used to collect and analyze the data: semi- structured interviews, group discussion, guided field walk, preference ranking, informant consensus factor and fidelity level combined with descriptive statistical analysis were done. The overall study activity was taken between August 2016 to October 2017. The outcome of this study was raised the responsibility of the community in the study area on problem associated with medicinal plants and give awareness for the sustainable use of medicinal plants and the conservation of the threatened ones.

5.2 Conclusions

Dano Woreda has diverse plant species. In this study, 47 medicinal plant species were recorded. Of these, 74.47% and 17.02% of the species were reported as medicine to treat human ailments and livestock only, respectively, while 8.51% of them were reported to treat both livestock and human ailments. The majority of these medicinal plant species were obtained from wild. Analysis of growth forms of these medicinal plants revealed that trees and shrubs constitute the largest category 16 (34.04%) each, followed by herbs 11 (23.40%) and 4(8.51%) climbers species. Leaves were the most frequently used plant parts followed by roots for preparation of human and livestock remedies. Route of administration was mainly internal in which oral administration is the common route followed by dermal (external application).

The main factors that threaten indigenous knowledge were secrecy of information on medicinal plants, oral based knowledge transfer, modernization of young generation and turning to modern medication. 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 could also be conducted on the reported medicinal plant species of the study area so as to utilize them in drug development.

5.3 Recommendations

Finally, based on the finding of the study, the following recommendations were forwarded.

- Indigenous people of the study area should be involved in conservation and management plans of plant resources.
- Local community must be aware of preserving indigenous knowledge on medicinal plants.
- Local people must be taught of growing medicinal plants in home gardens mixing with crops in the agricultural fields.
- Encourage the local herbal medicine practitioners to enhance the use of traditional medicine through licensing and other incentives.
- Young generation needs raising awareness to avoid negative impacts on the medicinal plants and associated knowledge in the area.
- Attention should be given to standardization of measurement and hygiene of the medicines made from plants by training both the healers and other members of the local community.

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7. APPENDIX

Appendix table 1. List of medicinal plants used for human or livestock diseases.

Scientific Name and plant habit	**Family**	**Local Name**	**Health problem Treated**	**Part(s) used, Mode of Preparations and application**	**Route of application**
Allium sativum L. **Herb**	Alliaceae	Qullubbii adii	Stomachache*	**Bulb**: Bulb will be eaten when there is pain	Oral
			Cough*	**Bulb**: Bulb will be crushed and eaten	Oral
			Malaria*	**Bulb**: Bulb of *Allium sativum* pounded and eaten with honey.	Oral
Acacia abyssinica Hochst.ex.Benth.: **Tree**	Fabaceae	Laaftoo	Goiter*	**Leaf**: Fresh leaf of *Acacia abyssinica* is smashed and the sap is injected into the skin around the swollen neck area (goiter)	Dermal
			Stomachache*	**Bark**: One tea spoon of powdered bark is taken with tea every day for 3days.	Oral
Solanum marginatum L.f **Herb**	Solanaceae	Hiddii	Stomachache*	**Root**: Root tip will be chewed and Swallowed	Oral
Eucalyptus	Myrtaceae	Baargamo diimaa	Stomachache*	**Leaf**: Leaf will be chewed and Swallowed	Oral

camaldulensis Dehnh. **Tree**					
Eucalyptus globulus Labill: **Tree**	Myrtaceae	Baargamoo adii	Commoncold*	**Leaf**: Leaf will be boiled and the steam will be inhaled	Nasal
Albizia gummifera (J.F.Gmel.)C.A.Sm. :**Tree**	Fabaceae	Imala	Evileye*	**Root**: Dried root of *Albizia gummifera* and *Pterolobium stellatum* will be crushed together and the smoke of 3-4 spoon of the mixture will be inhaled	Nasal
Juniperus procera Hochst .ex **Tree**	Cupressaceae	Gaatiraa	Toothache*	**Bark**: Powder form mixed with fine powder of *Rumex nepalensis* in the presence of food oil is kept on the teeth	Oral
Carissa spinarum L.:**Shrub**	Apocynaceae	Hagamsa	Head ache*	**Leaf**: Dry leaf of *Carissa spinarum* will be smoked and inhaled through nostrils.	Nasal
Datura stramonium L.: **Herb**	Solanaceae	Asangira	Wound*	**Leaf**: The leaf is pounded and applied (put) on affected area once a day for 2-5 days.	Dermal
Ruta chalepensis L. **Herb**	Rutaceae	Teenaadaama	Stomachache*	**Leaf**: Leaf will be crushed mixed with coffee and drunk**.**	Oral
Ficus vasta Forssk.:	Moraceae	Qilxuu	Haemorrhoid*	**Sap**: Sap from *Ficus vasta* and powdered root	Anal/Oral

Tree				of *Pterolobium stellatum* are mixed together and creamed to the external hemorrhoid.	
Adhatoda schimperiana(Hochst. ex Nees) T.Anderson : **Shrub**	Acanthaceae	Dhumuga	Rabies*	**Root** and **Leaf**: Root and leaf of *Justica schimperiana* will be pounded together, mixed with water and drunk.	Oral
Solanum lycopersicum Mill**. Herb**	Solanaceae	Timaatimii	Skin rash*	**Leaf**: Leaf will be crushed and rubbed against the skin	Dermal
Vernonia amygdalina Del. : **Shrub**	Asteraceae	Eebicha	Blotting**	**Leaf**: Leaf will be pounded mixed with water and drunk	Oral
Croton macrostachyus Hochst. ex Del. **Tree**	Euphorbiaceae	Bakkanisa	Ring worm*	**Sap**: Sap will be rubbed against the affected body part	Dermal
			Wound**	**Sap**: Sap will be rubbed against the affected body part	Dermal
Coffea arabica L. **Shrub**	Rubiaceae	Buna	Asthma*	**Seed**: Powder of roasted coffee seed will be boiled mixed with juice of lemon and ginger	Oral.

				and drunk.	
Foeniculum vulgare Miller. **Herb**	Apiaceae	Ensilala	Urine retention**	**Entire part**: The whole part will be pounded mixed with water and drunk	Oral
Calpurnia aurea (Aiti) Benth. **Shrub**	Fabaceae	Ceekataa	Ecto-parasite**	**Seed**: Seed will be powdered mixed with water and rubbed against the body of the animal	Dermal
Pterolobium stellatum (Forsk.)Brenan: **Shrub**	Fabaceae	Arangama	Evil eye*	**Root**: Root of *Pterolobium stellatum* and root of *Ruta chalepensis* will be powdered together and sniffed	Nasal
			Head ache*	**Root**: Root of *Pterolobium stellatum* and root of *Ruta chalepensis* will be powdered together and sniffed.	Nasal
			Epilepsy*	**Root**: Root is dried powdered and one spoon of the powder is mixed with half cup of local alcohol and given to human.	Oral
			Tooth ache*	**Leaf**: Leaf of *Pterolobium stellatum*, *Croton macrostachyu* and *Vernonia amygdalina* are smashed together and cover with leaf of *Croton macrostachyus* and heated in fire and	Tooth Surface

				put on infected teeth.	
			Intestinal.parasite* eg,Tapeworm	**Root**: Root of *Pterolobium stellatum* is dried and powdered, mixed with water. Three spoon is given per aday for three days	Oral
Schinus molle L.**Shrub**	Anacardiaceae	Qundoberbere	Tonsillitis*	**Flower**: Flower will be chewed and Swallowed	Oral
Ruellia prostrata Poir. **Herb**	Amaranthaceae	Darguu	Bleeding*	**Leaf**: Leaf will be squeezed and the juice will be put on the injury	Dermal
Ricinus communis L. **Shrub**	Euphorbiaceae	Qobboo	Soften the part of abdomen in humans*	**Seed**: Oil from the seed will be drunk	Oral
Maytenus senegalensis (Lam.) Exell **Shrub**	Celastraceae	Kombolcha	Hemmoroids*	**Leaf:** Leaf and dried root of *Rumex abyssinicus,* young stem of *Olea europea* are pounded, mixed with butter and the paste is applied on it.	Dermal
Brucea antidysenterica J.F. Miller. **Shrub**	Simaroubaceae	Qomonyo	External parasites (cinii)**	**Leaf:** Leaf is pounded and mixed with water in dish to wash skin of cattle, donkey, mule and horse for 3-5 days.	Dermal

Cordia africana Lam. **Tree**	Boraginaceae	Waddeesa	Spider Poison*	**Leaf:** Leaf is burned and mixed with butter and creamed on affected part..	Dermal
Erythrina brucei Schweinf. **Tree**	Fabaceae	Waleensuu	Swelling(dhiitoo)**	**Bark:**Bark of *Erythrina brucei* pounded with leaf of *Teclea nobilis* mixed with water and half a glass is given to mule and donkey.	Oral
			Eye disease**	**Root:** Root of *Erythrina brucei* and leaf of *Premna resinos*a are pounded together and 4-6 drop of the liquid extract is added to cattle eye.	Optical
Phoenix reclinata Jacquin.**Tree**	Arecaceae	Meexxi	Eye Disease**	**Leaf and stem**: Leaf and stem are chewed together and spitted on cattle eye.	Optical
Rumex nervosus Vahl. **Herb**	Polygonaceae	Dhangaggo	Skin rash (Shiffe)*	**Root** :Root of *Rumex nervosus* is dried and powdered. 3-4 spoon of the powder is mixed with butter and creamed on affected skin	Dermal
Echinochloa polystachya (Fresen.) Pil.: **Herb**	Poaceae	Muujjaa	Skin infection (Fungal)	**Entire above ground part:** Lateral part will be crushed and rubbed against the affected skin.	Dermal
Mikaniopsis	Menispermace	Hidda Kalaala	Wound*	**Leaf: Leaf** of *Stephania abyssinica* is	Dermal

clematoides (Sch.Bip.ex. A.Rich.) **Climber**	ae			pounded and a small amount is added to wound.	
Asparagus africanus Lam. **Shrub**	Asparagaceae	Sariitii	Placenta-Retention*	**Root:** Root is pounded, warm in water then mixed with honey and is drunk.	Oral
			Placenta-Retention**	**Leaf :**Leaves and root is pounded mix with water without boiling and given to the animal with a large local drinking cup	Oral
			Wound*	**Root:** Fresh root is pounded and mixed with butter and applied on the wound.	Dermal
Euphorbia tirucalli L.**Shrub**	Euphorbiacea e	Cadaa	Warts*	**Latex:** the latex are painted on the area	Dermal
Melia azedarach L. **Tree**	Meliaceae	Miinii	Malaria*	**Leaf :** Squeezed and 1/4 coffee cup is taken	Oral
Olea europaea L: **Tree**	Oleaceae	Ejersa	Haemorrhoid(kintarota)*	**Bark**: The bark will be heated on fire and held on the pain area.	Dermal
Capsicum annum L. **Herb**	Solanaceae	Qaaraa	Blotting **	**Fruit**: Fruit will be crushed together with roots of *Brucea antidysenteria* and leaves of *Justica schimperiana* mixed with cold water	Oral

				and given to cattle.	
Clematis simensis Frosen. : **Climber**	Ranunculaceae	Hidda Fiitii	Tonsillitis	**Leaf**: Leaf of *Clematis hirsuta* will be crushed and pressed, rapped with clean cloth and tied on the neck.	Neck\Dermal
			Diffuse cutaneous leshmaniasis	**Leaf**: The leaf is crushed with leaf of *Justice schimperiana* are creamed at affected area and also sniffed without touched of nose for 3-days to half minute.	Dermal\Nasal
			Lymphatic swelling	**Leaf**: Leaf of *Clematis hirsuta* will be crushed together and tied on swelling.	Dermal
Ficus sur Forssk.:**Tree**	Moraceae	Harbuu	Skin infection*	**Sap**: Sap from *Ficus sur* will be creamed on affected skin.	Dermal
Momordica foetida Schumach. **Cimber**	Moraceae	Hidda lo'aa	Evil eye**	**Root:** Crushed and Washed	Dermal
			Evil eye*	**Leaf:** Squeezed and 1/2 coffee cup is given	Oral
			Wound*	**Leaf:** Crushed and covered with the leaves overnight and again washed with hot water in the morning.	Dermal
Rytigynia neglecta	Rubiaceae	Mixoo	Haemorrhoid*	**Leaf**: The leaf of *Rytigynia neglecta* and	Oral

(Hiern) Robyns :**Shrub**				*Dodonaea angustifolia* will be pounded and drunk with local alcohol or tea.	
Pavetta gardeniifolia Hochst. ex. Rich. **Shrub**	Rubiaceae	Qadiidaa	Tooth ache	**Root:** Chewing the root for tooth ache.	Oral
			wounded *	**Root:** Pounding the root & put on the infected part.	Dermal
Cirsium englerianum Hoffm. **Climber**	Ranunculacea e	Umbahoo	Liver disease*	**Root:** Squeezed and 1 tea cup is given	Oral
Albizia schimperiana Oliver. **Tree**	Fabaceae	Ca'ii	Wound**	**Bark:** Crushed and added on the area	Dermal
Ficus sycomorus L. **Tree**	Moraceae	Odaa	Worm*	**Latex**: Latex will be drunk with coffee	Oral
*Citrus limon (*L.) Osbeck **Shrub**	Rutaceae	Loomii	Stomach ache	**Fruit:** Fruit of *Citrus limon* and bulb of *Allium sativum* are pounded together and mixed with honey and eaten with wheat bread.	Oral
			Nasal bleeding	**Fruit:** Liquid sap of *Citrus limon* is added to nose or the sap is taken orally.	Nasal/Oral

Carica papaya L. **Tree**	Caricaceae	Paappaayyaa	Gastritis*	**Leaf**: Leaf will be crushed mixed with water and drunk before eating brake fast	Oral
			Anaemia*	**Fruit:** Fruit of *Carica papaya* squeezed and used as a drink early in the morning.	Oral
Brassica carinata A.Br.**Herb**	Brassicaceae	Raafuu	Stomach Problem*	**Seed**: Crushed and eaten with *Allium sativum* by adding salt	Oral
			Wound**	**Seed**: The seed pounded and applied to the affected area.	Dermal
Indigofera vohemarensis Baill. **Shrub**	Leguminosae	Heenaa	Toothache*	**Leaf:** Covered by leaves and placed on fire and put on	Tooth Surface

Key:-Animal disease**
Human disease*
Both for animal and human

Appendix table 2. Semi-structured interviews (questioners) prepared for data collections in the study area

Date _____ village (Kebele) _____

Name of respondent (informant) _____
Sex: Male ___; Female _____; Age _____

1. What are the most common human health problems in your kebele?
2. What are the most common livestock health problems in your kebele?
3. Do you use plants to treat disease X in your locality?
3.1, Name of plant_____
3.2, Habitat of plant_____
3.3, part of the plant used_____
3.4, Preparation methods_____
3.5, Amount used (dose)_____
3.6, Application methods_____
3.7, Treats to the above plant_____
3.8, Methods of conservation of the plant_____ and other uses of the plant_____
4. How do you prevent or control those diseases?
5. How do you treat human health problems?
6. How do you treat live stock problems?
7. Which plants do you use for treating those particular diseases?
8. How widespread is the medicinal plants from your residence?

9. Used alone, mixed with water or other materials, etc_____
10. Preparation forms (crushed, pounded, powder, milky latex/extract with cold water/boiled/juice etc_____
11. Does the dosage differ among sex and age groups?
12. Any noticeable side effects?
13. How do you preserve traditional medicines?
14. Are there restrictions in collecting medicinal plants?
15. Are there threats to those medicinal plants?
16. Are there threats to those medicinal plants?
17. How is the knowledge of traditional medicine passed to a family member/younger generation?
18. Is there any relationship between modernization and traditional medicinal plant use in the study area?
19. Preference ranking_____
20. Fidelity level index_____

Identification

Study area - Dano woreda
Interviewer: Chala Tadesse
Date/month/year---------/---------/----------
Time: From----------

---------- **Thank you**----------

Appendix table 3. Health problems treated by traditional medicinal plants in the study area

No	**English Name**	**Local Name (Or.)**
	Swelling of any body part	Dhiita
	Soften the part of abdomen in humans	Gara laaffisaa
	Common cold	Utalloo
	Cough	Qufaa
	Diffuse cutaneous leishmaniasis	Dhibee sinbiraa
	Epilepsy	Gaggabdo
	Evileye	Budaa
	Eye disease	Dhukuba ijaa

	Fungi of leg	O'ichoo
	Goiter	Inniqii
	Hemorrhoid	Kormamu Harree
	Headache	Mata bowoo
	Hook worm	Sabata waqayoo
	Intestinal parasite	Ramoo gara
	Liver ache	Dhibee hadhoftuu
	Malaria	Busaa
	Nasal bleeding	Funuuna
	Rabies	Dhibee Saree
	Skin infection	Shifee
	Stomachache	Garacha
	Tonsillitis	Harsasee
	Toothache	Dhibee hilkanii
	Wound	Madaa
	Blotting	Bokoksaa
	Retained placenta	Diluu