



HAWASSA UNIVERSITY

COLLEGE OF NATURAL AND COMPUTATIONAL SCIENCES

DEPARTMENT OF BIOLOGY

ETHNOBOTANICAL STUDY OF MEDICINAL PLANTS USED TO TREAT
HUMAN AND LIVESTOCK DISEASES IN MALGA WOREDA OF SIDAMA
REGIONAL STATE, ETHIOPIA

MSc THESIS

By

BY DERGACHEW DEBELA

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HAWASSA, ETHIOPIA

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Advisor Approval Sheet

This is to certify that the thesis entitled “Ethenobotanical Study of Medicinal Plants Used to treat human and livestock diseases in Malga Woreda Sidama Regional state” submitted in partial fulfillment of the requirements for the degree of Master of Science in biology, in the graduate program of the Department of Biology which has been conducted by Dergachew Debela Id. No. GPBotSR/0002/15 was done under my supervision.

Therefore I recommend that the student has fulfilled the requirements and hence here by can submit the thesis to the department.

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We, the undersigned, members of the board of Examiners of the final defense by Dergachew Debela have read and evaluated his thesis entitled “Ethnobotanical Study of Medicinal Plant Used to Treat Hunan and Livestock Diseases in Malga Woreda Sidama Regional State, Ethiopia” and examined the candidate. This is, therefore, to certify that the thesis has been accepted in partial fulfillment of the requirements for the Degree of Master of Science in Biology.

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Declaration

The researcher here by declares that this MSc thesis entitled,”Ethnobotanical Study of Medicinal Plant Used to Treat Hunan and Livestock Diseases in Malga Woreda Sidama Regional State, Ethiopia” is my original work and has not been presented for a degree in any university, and all sources of material used for this thesis have been dully indicated and acknowledged with complete references.

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This MSc thesis has been submitted for examination with my approval as the student advisor.

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ACRONYMS AND ABBREVIATION

- CSA.....Centeral Statistical Authority
- FAO.....Food and Agricultural Organization
- ICF.....Informant Consensus Factors
- TK.....Traditional Knowledge
- IK.....Indigenous Knowledge
- LUCN.....International Union For Conservation of Nature
- MP.....Medicinal Plants
- NMA.....National Metrological Agency
- SPSS.....Software Packaging for Social Science
- TMP.....Traditional Medicinal Plant
- UNESCO.....United Ntion Educational Scientific and Cultural Organization
- UNEP.....United Nations Environment Program
- WHO.....World Health Organization

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ABSTRACT

*Ethiopia is one of the species rich countries in the world and the center of origin with regard to the diversity of many plant species. Ethnobotanical studies are vital to investigate the diverse biological resources for medicinal purposes. The objective of this study was to identify and document traditional medicinal plants used by the people in Malga district for treatment of both human and livestock ailments. The study employed both quantitative and qualitative methods. The information was collected from January 2024 to April 2024 through semistructured interviews, field observations, market survey and focus group discussions. For the interviews a total 120 knowledgeable informants were sampled through purposive sampling method. Of which 20 key informants were identified with the help of elders and local administrators from the informants involved in the interviews. . Figure, table, percentage and frequency were used to present the data. Preference ranking, Paired comparison, direct matrix ranking, Informant consensus factor and Fidelity level were used to quantify the collected ethnobotanical data. A total of 84 medicinal plant species belonging to 80 genera and 50 families were identified, with the Solanaceae family being the most dominant one. The plant habits consisted of herbs, trees, shrubs, and climbers, with natural vegetation and home gardens being the main sources. Leaves were the most commonly used plant parts followed by root and seed; with crushing being the most dominant type of method for remedy preparation, followed by chewing and powdering, and oral routes being the most dominant type of drug administration, followed by dermal. *Allium sativum* was medicinal plant with higher informants' consensus. The disease with higher ICF rate (0.90) was febrillness. Factors threatening traditional medicinal plants in the study area include agricultural expansion, fuel wood, overgrazing and overharvesting medicinal plants. Conservation of medicinal plants in home gardens, replanting, use of alternative source of energy, living fence and terracing were recommended by the local people to conserve and protect the areas that are used as a source of medicinal plant species.*

Key words: Conservation, Indigenous knowledge, Malga, Medicinal plant, Threats.

1. INTRODUCTION

1.1 Background of the study

According to Cotton (1996) Ethno-botany is the study of how people interact with their natural surroundings, including how they recognize, take care of, and utilize the plants that are available to them. Plants and human communities have a complex interaction that includes religious rites, decoration and health treatment in addition to food, clothing and shelter (Khan *et al.*, 2007). Plants are the most essential to human well-being in providing basic human needs. Human beings started using plants for disease control and prevention since time immemorial.

The World Health Organization (WHO, 2019) describes TM as "health procedures, methods, knowledge, and beliefs in the use of exercise, religious therapies, manual methods and medicine based on plants, animals, and minerals to diagnose, treat, and prevent illness or maintain well-being." TM is the main way for treating both human and cattle problems and it is still crucial for satisfying the most basic healthcare needs in undeveloped countries (Endalew Amenu, 2007). The reason for this is that using medicinal herbs has been a long-standing practice that is substantially less expensive than using the existing public health services (Debela Hunde *et al.*, 2004).

Ethiopia has the 5th most diversified plants country in Africa. As one of the world's biodiversity hotspots, it is also well renowned for its abundant forest resources (Yonas Yemshaw, 2004). Over 6000 species of higher plants make up Ethiopia's flora, with 10% of them being unique (Ensermu Kelbessa and Sebsebe Demissew, 2014). Besides biological diversity, the Ethiopia is rich in ethno diversity, culture and traditions. The country also harbours very ancient human populations whose relationship with nature is very intimate and where plants play important roles for their livelihood. Plants have been used as medicinal resources for the treatment and relieve of a many of illnesses and diseases in practically every human culture.

According to Dawit Abebe and Ahadu Ayehu (1993), about 80% of Ethiopian human population and 90% of livestock are depends on traditional medicines for their primary healthcare. More than 95% of traditional medicine preparations are of plant origin (Dawit Abebe, 1986). Despite its significant contribution to rural people, traditional medicines received very little attention in modern research and development and less effort has been made to upgrade the practice. In addition, Ethiopian traditional medicine has sustainability issues as a result of the extinction of species, habitat destruction, and indigenous knowledge. The main risks to Ethiopia's medicinal plants appear to be environmental deterioration, agricultural development, the depletion of trees and forests, overgrazing, wood gathering, and urbanization (Anteneh Belayneh *et al.*, 2012). These problems require immediate attention to conserve and maximize using plants as medicine in the primary healthcare system for people and livestock. The traditional knowledge of medicinal plants is also deteriorating as a result of rural-to-urban migration, the quick destruction of ecosystems and changes in lifestyle (Etana, 2010). Furthermore, little information on the therapeutic herbs previously used by indigenous people has been recorded (Kebu Balemie *et al.*, 2004). As a result, the present investigation was

initiated in order to record Ethnobotanical knowledge along with management and sustainable utilization by local people of Malga districts Sidama regional state.

1.2. Statement of the problem

In developing countries like Ethiopia, the indigenous knowledge about medicinal plants is transferred secretly from generation to generation orally (UNEP, 2008). Thus, there is a gap in the documentation and recording of medicinal plants in the country and when a traditional healer dies without passing on their traditional knowledge of medicinal plants to others, important knowledge might be lost. Several studies have been also conducted in the southern part of Ethiopia including the Sidama Regional State. There are 30 districts and 6 administration town in Sidama Region. However, ethnobotanical study carried out in Sidama regional state has not been studied in many districts, among those only 10 districts of the ethnobotanical studies carried out in the Region (the former Sidama Zone) the remaining 20 districts and 6 administration towns are not studied, and Malga districts is one of those none-studied.

The majority of Ethiopian teraditional knowledge is passed down verbally from one generation to other and when a traditional healer dies without passing on their traditional knowledge of medicinal plants to others, important knowledge might be lost. Rapid economic development and cultural shifts pose a challenge to indigenous peoples' traditional way of life. As a result, there is a larger risk that traditional knowledge and many valuable medicinal plants would be lost. This is because local traditional knowledge of herbal remedies has not been properly documented and because of the rise recent education which has led the next generation to undervalue it. Documentation of traditional knowledge on medicinal herbs is great importance in giving basic information about the use of locally important plant species, the parts of plants used, methods of preparation, diseases treated, Modern drug discovery and plant resource preservation (Mirutse Giday and Tilahun Teklehaymanot, 2007). So far, documentation of traditional herbs and associated indeginous knowledge in Malga woreda is lacking. In addition, there is no ethnobotanical documentation of medicinal plants conducted on the study area. Today many medicinal plant species and their associated knowledge in country are becoming on the verge of extinction due to various reason such as death of knowledgeable people without sharing their knowledge to others, deforestation, environmental degradation and overharvesting. For this reason, urgent ethnobotanical studies and subsequent action is required to sustain these resources from further loss (Mirutse Giday et al., 2009). Thus, this study was explore medicinal plant resources, and their further management generally in the study area.

1.3. Objective of the study

1.3.1. General objectives

The general objective of this study was to investigate and document Medicinal Plants species and related indigenous knowledge of the people in the Malga woreda of Sidama regional state.

1.3.2. Specific objectives

- ❖ Specific objectives of this study was:-
- To identify and document medicinal plant species which are used by the community to treat human and livestock ailments in Malga Woreda.
- To document humans and livestock ailments treated by the medicinal plants in the study area
- To describe the medicinal plant parts used for preparation of remedies, method of preparation, mode, and route of administration of remedies;
- To identify the habit and habitat of medicinal plants in the study area
- To identify major threats and management of medicinal plants in the study area

1.4. Research questions

The following research questions were formulated for this study;

- What are the medicinal plants used to treat human and livestock ailments in the study area?
- What type of diseases of human and livestock treated using medicinal plant species?
- Which plant part is used for preparation of remedy? How is it prepared? What is the mode and route of administration?
- What are the habitat and habit of medicinal plants?
- What are the threats and how local people manage medicinal plants in the study area ?

1.5. Significance of the study

This research emphasize on the medicinal plant used to treat human and livestock ailment in Malga districts of sidama region and appreciating into scientific investigation. The result of the research was also serve as base line information for further investigation and to help conserve medicinal plants in their natural habitats. The study was raise public awareness and give clue for the discovery of new medicine to treat humans, livestock disease and associated indigenous knowledge used by the local people for proper utilization of plants. This in turn has a large input for the livelihood of local people to solve economic, environmental and health problems as well as provide a basis for further Ethno botanical studies that contribute towards protection and conservation of useful plants. It could be used as a source document for further research work in the same area.

1.6. limitation of the study

Throughout the process of conducting the study, the researcher was face many problems no accesses to internet availability and transport difficulty to collect data, inadequate metrological stations closer to the study area, shortage of time and appropriate data based on the plan of the researcher to get reliable climatic data (temperature and rain fall) for the study area. As a result these limitation may lead to gaps in the study findings, potentially impacting the robustness of the conclusions drawn and the applicability of the research to broader context. If the limitation had not occurred, there are several steps that could have been taken to enhance the study and improve the quality of the research; by utilize existing climate data sources, collaborate with local experts and communities, extend the duration of field work and establish partnership with research institution. By implementing these strategies, researchers could address the challenges posed by the limitations mentioned earlier and strengthen the validity, reliability , and relevance of the study on medicinal plants in the study area.

2. Review of literature

2.1. History of traditional medicine

The prefix “ethno” refers to the study of people or “the way that other people look at the world”, While the word “botany” refers to the study of plant (Martin, 1995). Ethnobotany is defined as local people’s interaction with their natural environment: how they classify, manage and use plants available around them (Martin, 1995). According to Cotton (1996), Ethnobotany encompasses all studies that concern the mutual relationships between plants and traditional people. Traditional medicine still serves as the majority of people's primary source of medical care in underdeveloped nations, where it dominates the medical systems that serve millions of people. (WHO 2010; Renckens and Dorlo, 2013). Plant-based remedies constitute an integral part of African traditional medicine both in rural and urban areas. An estimated 80% of the continent’s population depends on traditional medicine for their healthcare needs (Bodeker and Kronenberg, 2002). The people of Ethiopia are no exception to this. In rural areas, traditional medicine is the first level of contact for most Ethiopians due to inadequate healthcare facilities and affordability when these are available. Traditional medicines derived from plants and animals have been used in many parts of the world for centuries, to cure everything from fevers to epilepsy, gout to impotence. With increasing consumer purchasing power, particularly in the Far East, demand for traditional medicine products has increased markedly in recent years. Traditional Asian (Chinese) medicine products are currently used by half the world’s population (Kaspal *et al.*, 2012), as part of a worldwide trade worth billions of dollars, and its popularity is extending well beyond its traditional Asian markets. Traditional medical practitioners are highly dependent on harvesting from biological diversity found in their locality. Primary ingredients used by the traditional healers are wild animals (Alves and Alves2011), plant species and mineral resources for the preparation of their therapeutic remedies for their patients (Alves and Rosa, 2006).

Traditional medicinal plants have been used for centuries by indigenous and traditional communities for various health purposes. These plants have been found to contain a wide range of bioactive compounds with potential medicinal properties. One study by Bussmann and Sharon (2006) conducted in the Bolivian Amazon found that traditional medicinal plants were used to treat a variety of ailments, including gastrointestinal disorder, respiratory infection, and skin conditions. The study identified over 500 plant species used for medicinal purposes, highlighting the rich traditional knowledge of the local indigenous communities. Similarly, another study by Heinrich *et al.* (2018) focused on the traditional medicinal plants used by the Maasai community in Kenya. The study found that the Maasai rely heavily on traditional medicinal plants for their healthcare needs, with over 200 plant species identified as being used for medicinal purposes. The study also highlighted the importance of preserving traditional knowledge and the need for further research into the potential medicinal properties of these plants. In addition, a review by Moerman (1996) examined the use of traditional medicinal plants by Native American communities in North America. The review found that traditional medicinal plants were used to treat a wide range of ailments, including fevers wounds, and digestive issues.

2.2. Indigenous Knowledge and Medicinal Plants

Indigenous knowledge (IK) refers to the accumulated knowledge, rules, standards, skills, and mental sets, which are possessed by local people in a particular area (Quanash, 1998). It is the result of many generations' long years' experiences, careful observations and trial and error experiments (Martin 1995). Over centuries, indigenous people of different localities have developed their own specific knowledge on plant resource use, management and conservation (Cotton, 1996). Systematic application of IK is important for sustainable use of resources and development (Thomas, 1995). The plant kingdom is most essential to human well-being especially in terms of disease control and prevention. It will believe to be the result of many generations' long year experiences, careful observations and trial and error experiments that early humans acquired the knowledge on the utilization of plants for disease prevention and curative purposes (Sofowora, 1982; Martin, 1995). So, the knowledge and application of traditional medicinal plant is one of the widely used indigenous knowledge to cure ailment. Directly and indirectly human being were depend on plants. This implies that humans are dependent on other organisms for their life. This close interaction and reliance of humans on plants is studied under the field of ethnobotany. Such knowledge, known as ethnomedicinal knowledge involves traditional diagnosis, collection of raw materials, preparation of remedies and its prescription to the patients. The documentation of traditional knowledge, especially on the medicinal uses of plants, has provided many important drugs of modern day (Balick and Cox, 1996). Indigenous knowledge on remedies in many countries including Ethiopia passes from one generation to the other verbally with great secrecy. Such secrete makes indigenous knowledge or ethnomedicinal knowledge vulnerable to distortion and in most cases, some of the lore is lost at each point of transfer. Hence, there is a need for systematic documentation of such useful knowledge through ethnobotanical researches.

2.3. Medicinal Plants in Human Healthcare System

Plants play a major role in providing prototype molecules for possible development into conventional drugs by the pharmaceutical industry. Plant diversity remains crucial for human well-being and provides a significant number of remedies required in healthcare. Medicinal plants played a pivotal role in the treatment of various afflictions (distress) in Ethiopia (Fekadu Fullas, 2007). For the role to be played by plant-derived products in human and livestock health care, systematic scientific investigation is vital (WHO, 1998). Pharmaceutical industries and western researchers on plant-based drugs have now rediscovered that plants have much to contribute to the discovery of new, effective, safe and profitable therapeutic agents (Pistorius and Van Wiik, 1993). Plant diversity play a significant role or crucial for human well-being and provides a significant number of remedies for numerous disease in a population. Traditional Ethiopian medicine is commonly used to treat a variety of diseases employing substances as recommended by professional traditional medical practitioners. The conditions that claim to be treated includes gastrointestinal disturbances, respiratory disorders, sexually transmitted infection, tuberculosis, rabies, intestinal parasite, skin problems, liver diseases, mental disorders, malaria and others (Birgit Nugussie , 1988).

2.4. Plants in Ethno veterinary Medicine

The importance of medicinal plants to the economy of low-income countries remains critical and strategic because medicines are key to maintaining a health population that drives and sustain the economy.

In Ethiopia as well as in most developing countries, animal disease remains one of the principal causes of poor livestock performance, leading to an ever increasing gap between the supply of, and the demand for, livestock products (Teshale Sori *et al.*, 2004). People have used traditional veterinary methods to treat livestock diseases for generations. Ticks damage cows teats which become sealed, reducing milk yield. Plants comprise the largest component of the diverse therapeutic elements of traditional livestock health care practices. Herbal medicine is the branch of traditional medical practices that is most amenable to scientific investigation. Plants are also invaluable subjects of international development. Knowledge of medicinal plants can empower livestock owners to solve animal health problems cost-effectively. Pharmacotherapy is one of the most important means of controlling livestock diseases, but it is possible only if livestock owners can afford to cover the cost of treatments. Cost of treatment is therefore an important determinant of the usefulness of veterinary drugs. Livestock owners cannot rely on veterinary services for control of various important livestock diseases. A practical solution to this problem is to develop socially acceptable and effective remedies from reasonably inexpensive sources that can complement modern medicine (Ibrahim, 1986)

2.5. The Importance of Medicinal Plants for Development of Modern Drugs

Medicinal plants are very essential element of indigenous medicinal systems worldwide. Ethnopharmacology is the cross-cultural study of how people derive medicines from plants, animals, fungi, or other naturally occurring resources (Casagrande, 2005). In addition, Taxonomy and the newer discipline of ethnobotany have now become an integral part of drug discovery from plants (Jachak and Sakalani, 2007).

Searching new drug from traditionally used medicinal plant can be the shortest path to success (Berhanemeskel Weldegerima, 2009) and indigenous people remain the ultimate resource for retrieving this information for the purpose of application, particularly in modern medicine (MacDonald, 2009). The number of higher plant species (angiosperms and gymnosperms) on this planet is estimated between 250,000-500,000 (Mahesh and Satish, 2008). Of these, only about 6% have been screened for biologic activity and reported 15% have been evaluated phytochemically (Fabricant and Farnsworth, 2001). Estimates show that about 25,000 to 75,000 species of higher plants have been used in traditional medicine (Farnsworth, 1994). Evidently, traditional knowledge of medicinal plants is important in development of new drugs.

Many research institutions in this field have turned to traditional medicine, mainly the use of plants as source of new drugs. Traditional medicines play a key role in the development and advancement of modern studies by serving as a starting point for the development of novelty in drug (Pramono, 2002).

In addition, an increasing reliance on the use of medicinal plants in the industrialized societies has been traced to the extraction and development of several drugs and chemotherapeutics from these plants as well as from traditionally used rural herbal remedies (UNESCO, 1998). Furthermore, chemical structures derived from plants can be used as models for synthetic compounds (WHO, 2000). Most of plant derived drugs were originally discovered through the study of traditional cures and folk knowledge of indigenous people (Balick and Cox, 1996).

Currently there are more drugs (e.g, aspirin from *Ulmaria* (Rosaceae), Quinine from *Cinchona pubescens* (Rubiaceae), Morphine from *Papaver samniferum* (Papaveraceae) and ephedrine from *Ephedra sinica*) prescribed in North America and Europe (Balick and Cox,1996).

Maytansine, an active principle against cancer will be isolated from *Maytenus* species (Sebsebe Demissew and Ermias Dagne, 2001). Compothecin, irenotecan and topotecan were extracted from *Mappiafoetida* Miers, which has been used against Lung, Ovarian and Cervical cancer (Samy and Gopalakrishnakone, 2007). Artemisinin, which is a recently extracted antimalarial drug, is also derived from a plant. It is derived from the leaves and flowers of *Artemisia annua*. Resprspine, extracted from the root of the Serpant-root; Ephedrine, a decongestant, is derived from Chinese shrub *Ephedra sinica* (BGCI,1998) and L-Dopa, from a tropical legume *Mucunadeeringiana*, used for treating Parkinson's Disease; Picrotoxin, derived from *Anamirtacocculus*, a tropical climbing plant from South-east Asia, is used as a nervous system stimulant and in cases of barbiturate poisoning (BGCI, 1998). Perhaps the best-known species is *Phytolaca dodecandra*. Extracts of the plant, commonly known as endod, are used as an effective molluscicide to control shistosomiasis (Aklilu Lemma *et al.*, 1984).

2.6. Ethnobotanical Studies of Medicinal Plants in Ethiopia

Although plants have been used as source of medicine to treat both human and livestock ailments in Ethiopia, research and documentation on medicinal plants have been ongoing for centuries, with early records dating back to ancient civilizations such as the Egyptians, Greeks, and Chinese. However, their formal scientific study of medicinal plants as ethnobotany began to gain prominence in the mid-20th century. One of the key milestones in the modern study of medicinal plants was the establishment of the international society of Ethnobiology in 1988, which brought together researchers from around the world to collaborate on the study of traditional knowledge related to plants and their uses. Since then, there has been a growing interest in ethnobotanical research, with numerous studies conducted to document the traditional knowledge of medicinal plants and their potential pharmacological properties several decades, there is still much to learn and discover about the vast wealth of traditional knowledge and practices related to plant based medicine (Mesfin Tadesse and Sebsibe Demissew, 1992). Different parts of plants are being used for medicine in order to cure human or livestock diseases in Ethiopia. However, roots and leaves are the most widely utilized plant parts. People use medicinal Plant parts to treat human or livestock ailments while they are fresh, dried or both. The study of Gidey Yirga (2010) on Central Tigray revealed that some of medicinal preparations were used fresh or in a dried state. As these plants are used in both forms, there is high chance of using these medicinal plants under different seasons of the year. This also helps traditional

healers to preserve those plants that they cannot find in dry season for later use. Various studies conducted on ethnobotany stated that most medicinal plants are being obtained from the wild. The study of Ethiopian medicinal plants has not been realized as fully as that of India or other traditional communities elsewhere is likely due to several factors; research and finding, historical and cultural factor, access to technology and expertise, government policies and support (Iwu, 1993). These factors, among others, could contribute to the study of Ethiopian medicinal plants has not been as fully realized as in other traditional communities.

2.7. Threats of traditional medicinal plants

Due to the availability of plants in general and medicinal plants in particular being impacted by both natural and anthropogenic reasons, herbal practitioners are now need to trek longer distances to gather herb collections that grew around their residences (Cunningham, 1996). According to Tesfaye Awas and Sebsebe Demissew (2009), medicinal plants are collected from their natural habitat and used by both traditional and professional healers. Accordingly, the loss of indigenous knowledge, the loss of medicinal plant habitats, and the loss of plant taxa are the main causes of this issue (Endalew Amenu, 2007). Medicinal plants face danger from two different sources. These have both natural and man-made causes. According to Ensermu Kelbessa *et al.* (1992), man-made factors include the fast population growth, the need for fuel, urbanization, the production of lumber, overharvesting and destructive harvesting, the commercialization of alien species, and the degradation of honey collections, the expansion of agriculture, and the destruction of habitats.

On the other hand, frequent droughts, bush fires, illnesses, and pest outbreaks are the main natural causes (Ensermu Kelbessa *et al.*, 1992). As a result, this exacerbates the pace of extinction of taxa that are associated with indigenous knowledge, as well as the loss of commonly occurring medicinal plant species and the customs that are linked to them (Behailu Etana, 2010).

Thus, identifying medicinal plants, recording their applications, and evaluating the risks establish a foundation for local decision-making, implementing suitable management, and carrying out indepth pharmacological analysis (Mekuanent *et al.*, 2015). Additionally, a study plan and program must be created for the conservation, use, and documenting of medicinal plants, taking into account the plants' location, current population, and recognized traditional usage (Tibebu Tefera and Mesele Yihune, 2018).

2.8 Conservation of traditional medicinal plants

Sustainability is concept that directs economic and social growth, particularly with regard to biological resources. Conservation is the sustainable use of biological resources. (Abdurhaman Nuria, 2010). Because of the reliance on traditional medicine for health, it is crucial to manage traditional medicinal plant resources sustainably. This is in addition to their potential importance as a source of new medications (Cunningham, 1993). Therefore, it is crucial to preserve medicinal plants by making sure and promoting their growth in designated areas, such as places of worship (churches, mosques, cemeteries, etc.), terraced grooves, farm margins, riverbanks,

roadsides, and living fences of fields and gardens. In gene banks and botanical gardens, medicinal plants can also be preserved with the use of suitable conservation techniques (Zemed Asfaw, 2001).

In-situ and ex-situ conservation techniques are two of the conservation measures set to prevent additional global devastation of vulnerable medicinal plants (Cunningham, 1996). As opposed to ex-situ conservation, which protects endangered species by removing a portion of them from a threatened habitat and relocating them to a new location that may be a wild area or under human care, such as seed gene banks, field gene banks, arboreta, and botanic gardens, in-situ conservation involves keeping species in their natural habitats, such as reservoirs and national parks. Certain traditional medicinal plants must be conserved in-situ due to the difficulty of domestication and management outside of their natural habitat. (Zemed Asfaw, 2001).

According to Abebe Demissie, (2001) in-situ and ex-situ should be complementarily implanted in Ethiopia to conserve valuable plant species, which are threatened due to natural or manmade factors. In Ethiopia today, the issue of medicinal plant conservation calls for aggressive studies and documentation before the habitats of these plants and traditionally held knowledge bases distorted by accelerated ecological and cultural transformation (Endashaw Bekele, 2007). Therefore, Ethiopia has policies and strategies that support the development and utilization of plant resources in a sustainable manner (Nuria Abdurhaman, 2010).

3. MATERIAL AND METHODS

3.1. Description of the study area

This study was conducted in Malga woreda of Sidama regional state. Malga woreda is bordered by Wondogenet in the North, Goriche and Shebedino in the south, Tula administration to the west and Kokosa woreda in Oromia Regional state to the east. Geographically the woreda lies between 6.92’ 57° or 6° 55’ 33” North latitude and 38.64’ 27° or 38° 38’34” East longitude (Fig 1)

The woreda is divided into 23 kebele administration (KAs) and has three rural towns. Manicho is the administration center of the woreda, which is located 26 kilometer (km) from the regional capital, Hawassa city. Based on the data from the woreda, the total land area of Malga is 32,651 hectares (ha), of which an estimated 18,177 ha are under cultivation, of which, 6,988 ha are used for cereal and enset production. Among the food crops, barley is the most important, followed by potatoes. The average annual temperature varies from 12.6 °C to 20°C and the average annual rain fall vary from 1200 to 1600 mm. The elevation of the area ranges from 1500 to 3000 meter above sea level (m.s.a.l). The woreda fall under two agro-ecological zones, namely Dega (78%), while the remaining area (22%) fall under Woinadega.

According to the data from the woreda office, the total population of the woreda is estimated to be 175,718, of which 84,894 (48%) are male and 90,204 (52%) are female, and the population growth rate is about 2.9% for the zone (MWFEDO,2022).The majority (77.78%) of the inhabitants are protestants, 11.39% are Muslim; 4.39% are Catholic; 3.12% follows traditional religions; and 2.9% practiced Ethiopian Orthodox Christianity.(Malga woreda administrative office,2022).

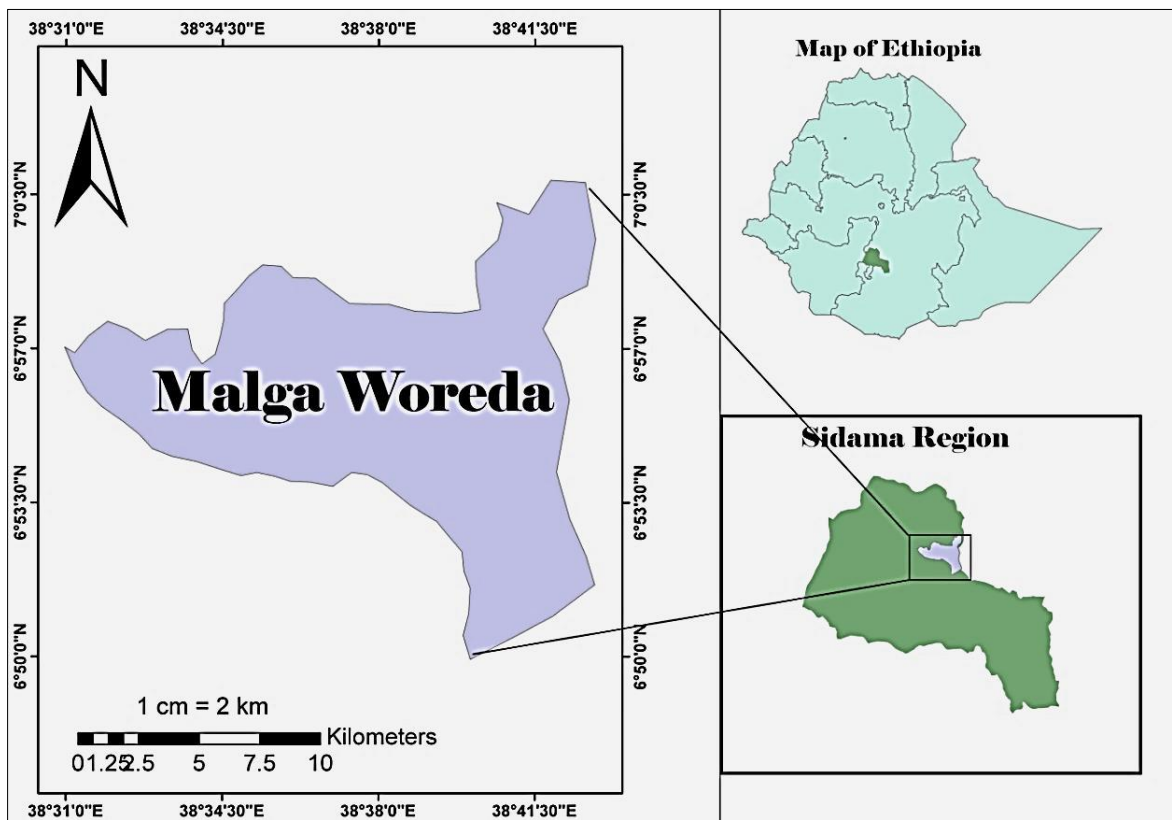


Figure 1 Map of the study area

3.2. METHODS

3.2.1. Reconnaissance survey

The reconnaissance survey of the study area was conducted December 24 to December 30, 2023 G.C to obtain general information and to identify potential kebeles for the study.

3.2.2. Selection of study sites

A total of 26 kebeles are present in the woreda, out of which 6 kebeles were selected based on information gathered during reconnaissance survey. Three kebeles from Dega and the rest three kebeles from Woinadega agroecology were included in the study.

3.2.3. Selection of informants

A total of 120 knowledgeable informants (80 male and 40 females) between ages 20 to 86 were selected using purposive sampling method from six selected study kebeles (the smallest administrative units in Ethiopia). For different ranking exercises, 20 key informants (14 male and 6 female) were identified with the help of elders and local administrators from the informants that were already involved in interviews. For ethical purpose data was collected with permission of the informants and the knowledge of local administration.

3.2.4. Data sources

Both primary and secondary sources of information was utilised in this study. The primary data was obtained from informants through interviews; focus group discussion guided field walks, and market survey. Secondary data was obtained from the journals, websites or the internet and Woreda reports.

3.2.5. Methods of data gathering

Information on ethenobotanical data was gathered between January, 2024 to April 2024. Data was collected by using different data collection tools such as observation, semi-structured interviews, guided field walks, group discussions and market surveys. Interviews and discussions was carried out based on a checklist of questions prepared in English and translated into local language (Sidama affo). In addition, market survey was made to record the herbal drugs that are sold in the market.

3.2.6. Plants specimen collection and identification

Those medical plant species that are most common and well-known was identified at spot. Those plants that are difficult to identify at spot were sampled, pressed and brought to Hawassa University for identification using experts assistance. In addition, books like Flora of Ethiopia and Eritrea (Gilbert, 1995; Tewolde Brehan Gebre Egziabher and Edwards, 1997; Hedberg, 2000; Leewenberg, 2003; Friis, 2006), Useful trees and shrubs of Ethiopia (Azene Bekele, 1997) were also be used for plant identification purposes.

3.3. Methods of Data analysis

Descriptive statistics: Microsoft Excel Windows 2007 was used to code and store the recorded data. Following that, descriptive statistics like percentages was used to assess the most important

data on the medicinal usage, plant habit, habitat, preparation techniques, and route of administration of medicinal plants.

Preference ranking: If different species prescribed for the same health problem, people show preference of one over the other. Preference ranking of six medicinal plants used to treat stomachache was conducted to identify the most preferred one based on Martin (1995). In the study six key informants selected the best-preferred medicinal plant species that expected to treat that specific disease. Each informant assigned most preferred and the least preferred plant against the illness their order. These values were summed up and ranks were given to each plant species.

Paired comparison: Paired comparison method was used to determine the relative importance of plant species, which are used in the treatment of typhoid and tases. In paired comparison, items are presented in pairs and decisions were made by individual respondents on the relative importance of one of the items from a pair (Martin, 1995). The total number of possible pairs was obtained by applying the formula $n(n-1)/2$, where n is the number of medicinal plants being compared.

Direct Matrix Ranking

Direct matrix ranking was performed following Martin (1995) in order to compare multipurpose use of medicinal plants. Five multipurpose plant species commonly reported by informants was selected out of the total collected medicinal plants and use diversity of these plants was listed for key informants to order them by considering several attributes at a time. Then, each chosen key informants was asked to assign to attribute of each species (5=most valuable, 4=very good, 3=good, 2=less used, 1=least valuable, and 0=not used). The values of each species was summed up and ranked for each informant, and then for the total informants.

Informants consensus factor (ICF): To determine the informants' agreement about reported treatments for the group of illnesses, the informants consensus factor (ICF) was computed for each category. Following is the formula, ICF is equal to $nur-nt/nur-1$, where nt is the number of species utilized, ICf is the informants consensus factor, and nur is the number of usage citations in each category

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

Where, nur is the number of usage citations in each category

nt is the number of species utilized, ICF is the informants consensus factor,

Fidelity level (FL)

The relative healing potential of each reported medicinal plant was used against human and livestock ailment was estimated using an index called Fidelity Level (FL). Its formula was given as,

$$FL = \frac{Np}{N} * 100$$

Where, Np = the number of informants that claim the use of a plant species to a particular disease and

N = the number of informants that use the plants as a medicine to treat any disease as described by Alexiades (1996). Accordingly, FL index was calculated for 5 medicinal plant species used for treating blackleg/tapeworm/ urine retention, gonorrhea and toothache etc.

3.4. Interviewing protocol and ethical consideration

Formal written permission to undertake the study in the district was taken from Department of Biology, Hawassa University and the relevant district administration. In order to develop a positive mind-set between informants and the researcher as well as to create a positive interaction, the objective of the study was clearly explained in simple way.

4. RESULT AND DISSCUSSION

4.1. Taxonomic diversity of medicinal plants in the study area

The people in the study area use diverse plant species for traditional medicinal purpose to treat both human and livestock ailments. The results of the ethnobotanical study revealed that 84 medicinal plant species distributed in 80 genera belonging to 50 different families were frequently used for treatment of various ailments in the study area (Appendix 1). Of these, 64 medicinal plant species were reported to be used for human ailments only while 7 medicinal plant species were used to treat only livestock ailments and the remaining 13 medicinal plant species were used to treat both human and livestock ailments. In the study site, large numbers of medicinal plants were used to treat human ailments than livestock ailments (Appendix 3 and Appendix 4). The family Solanaceae stood the first rank sharing 7 species, followed by Fabaceae five species, Lamiaceae five species, Asteraceae ,euphorbiaceae, Rosaceae, Rutaceae, Poaceae, Cucurbitaceae represented three species each and other 35 families consists of one representative species 35 (Fig 2). This finding indicated that the existence of diverse sources of medicinal plants in the study area.

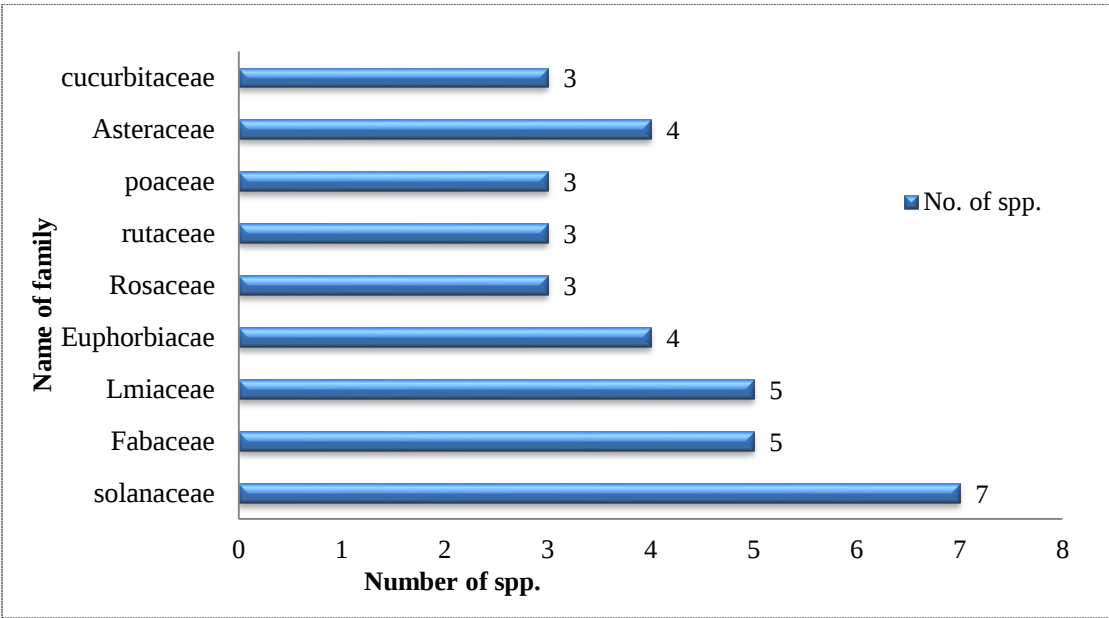


Figure 2 the domiant families of medicinal plants in the study area.

4.2. Habitat of Medicinal Plants in the Study Area.

In the present study, of the 84 medicinal plants species recorded 45 species were collected from the wild, 37 species from home garden and 2 species were collected from both wild and home garden (Fig 3). This indicates that greater proportion of medicinal plants obtained from wild habitats and relatively less proportion of medicinal plants have been under cultivation in home gardens.

This evidence indicates that the residents mostly depend on medicinal plants inhabited in the wild to prepare remedies in the study area. Moreover, the local people’s habit-to cultivate around their home garden is mostly very low. Similar findings were reported by Mesfin et al (2013), Etana (2010), Tamru (2016), Tirfessa, et al (2017) and Tefera, et al (2019).

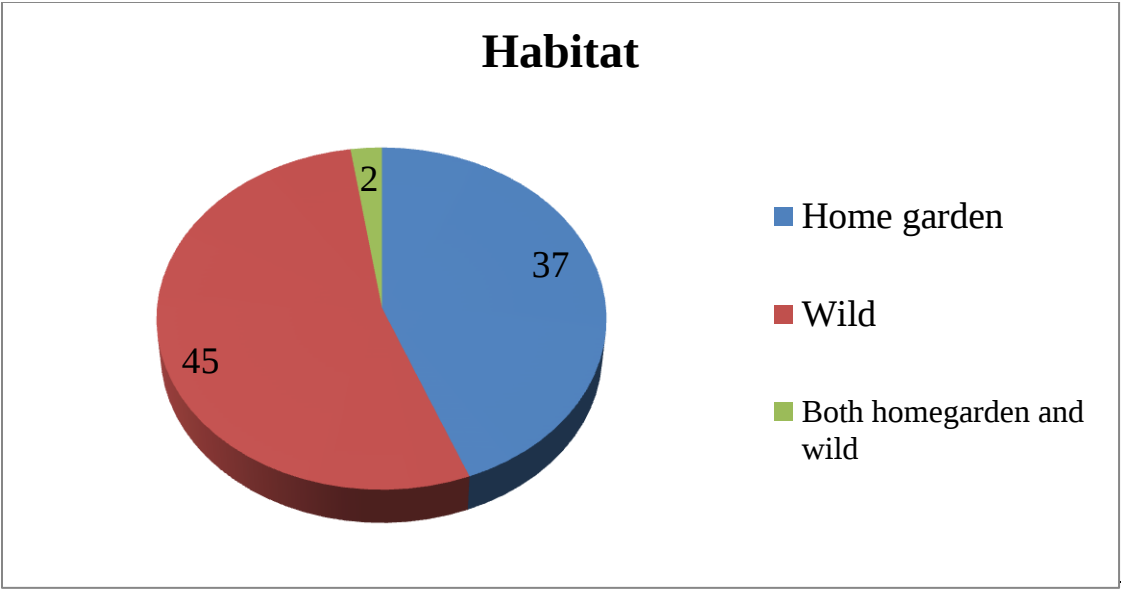


Figure 3 Habitatt of medicinal plants

4.3. Habit of Medicinal Plants in the Study Area.

Medicinal plants that were collected in the study district have different habit or growth forms. From the recorded plant species in the study area herbs, 40 were the leading growth habit in the study area followed by tree 27 and shrubs. Very few numbers of medicinal plants have growth form of climbing 2 (Figure 4). This result showed that the most widely used medicinal plants habit in the study area were herbs followed by tree. This is because the local communities simply get the herb species plant and the plant species were found high in number in the study area. A similar result was found by Getaneh and Girma (2014) and Eskedar (2011). On the contrary, other researchers such as Jima and Megersa (2018).

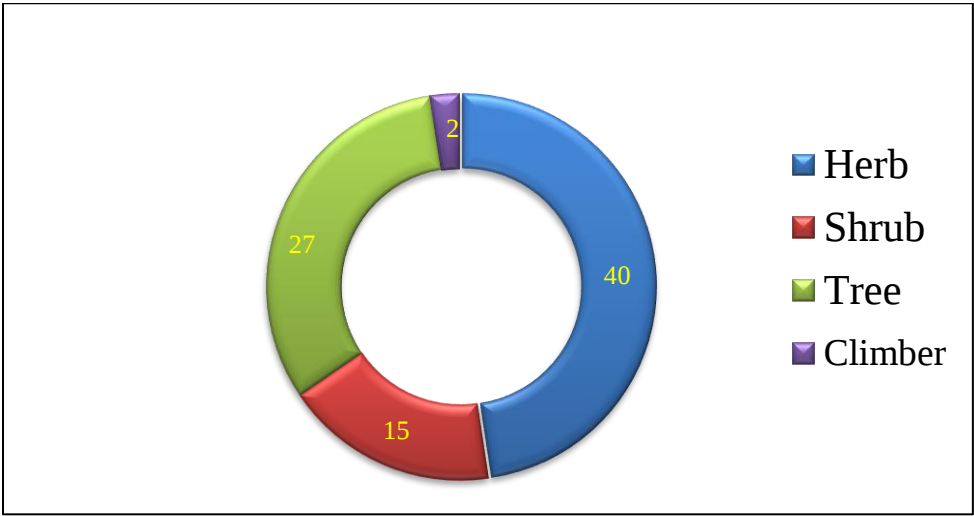


Figure 4 Habit of medicinal plants

4.4. Plant Parts Used

The society uses different parts of the plant for medicinal purposes. The local communities mostly used leaves which 70 followed by roots 25, seed 24, whole part 9, fruit 9, latex 8, bark 6, Bulb 5, stem 4, fruit + leaf 3, leaf + stem 2, root + leaf 2s, (Fig 5). The result showed that leaf is the most commonly used plant part in preparation of remedies. The reason is, it is easy for

preparation and collection. However, harvesting the root causes loss of the whole plant. This finding agrees with the results of other ethnomedicinal studies by (Mesfin et.al, 2014, Asmera, 2014, Eskedar, 2011, Wondimu et al., 2007), and (Tibebu and Mesele, 2019) who reported that leaves were the most cited plant part used in remedy preparations. On the other hand, the work of (Mekuanent et al., 2015, Giday et al., 2007), and (Yayesh et al., 2015) showed that the root was a widely used plant part.

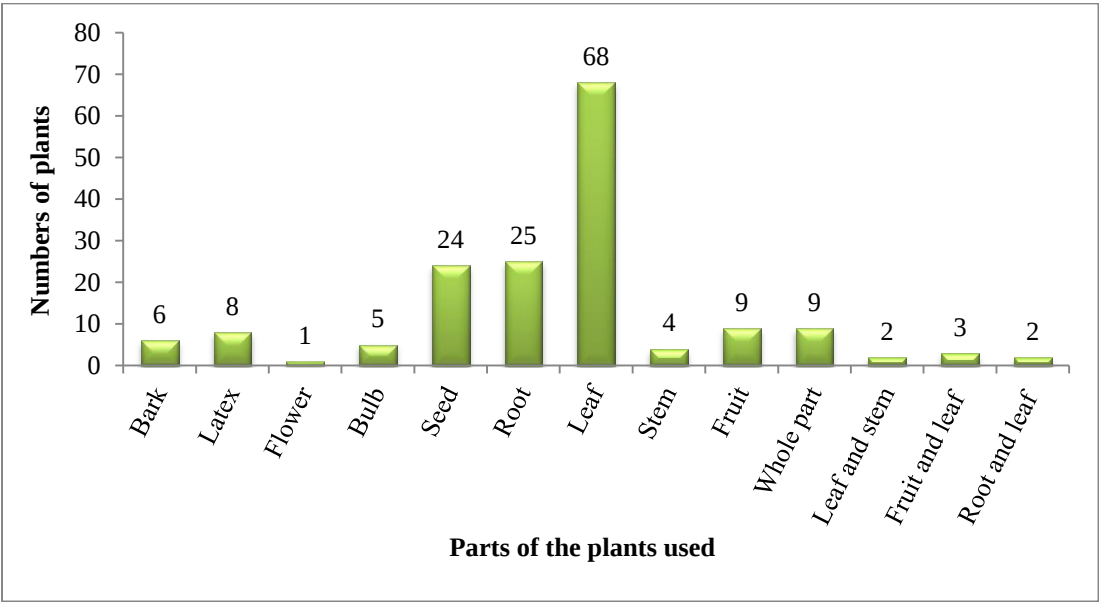


Figure 5 Parts of medicinal plants used for remedy preparation

4.5. Solvents and Additives •

The local people use some other products as additives in their preparations. These are water 53 (69.74%), butter and tea 5 (6.58%) and others (Table 1). This showed that water contains the highest percentage of solvent or additives in the preparation of remedies. The local people reported that some of the additives used to improve the flavor and reduce adverse effects such as vomiting and diarrhea, so that the efficacy of the traditional medicine would be increased. A previous research study performed by Giday, et al. (2007) also reported similar additives in the preparation of plant based medicines.

Table 1 Solvent and additives used in preparation of remedies

Additives	Frequency	percentage
Water	32	51.61%
Butter	4	6.45%
Tea	4	6.45%
Injera or bread	2	3.22%
Honey	4	6.45%
Salt	14	22.58%
Coffee	2	3.22%
Total	62	100

4.6. Conditions of Preparation from Plant Materials

The local communities of the study area employ several methods of preparation of traditional medicines from plants. According to informant herbal preparations are mostly made from fresh material of the plant parts which accounted for 82 (65.6%) followed by dried 40 (32%) and both fresh/dry 3 (2.4%) (Table 2). In similar studies Teshale Sori et al. (2004) indicated that the importance of using fresh materials for preparation of remedies for various health problems is the more account than dry materials or dry or fresh materials. The reason for the preference of application of fresh plant parts relative to dried plant material might be related to efficacy of remedy prepared from fresh material in curing diseases compared with the dried parts. The local people claim that most important chemical in plant may be changed during drying process and hence, weakness its strength. Therefore, they prefer to use fresh material than dried ones.

Table 2 Conditions of preparation from plant materials.

Condtion	Frequency	Percentage
Fresh	82	65.6%
Dried	40	32%
Both fresh and dried	3	2.4%
Total	125	100

4.7. Route of Administration

Majority of the prepared traditional medicinal plant remedies were administered by oral was followed by dermal , nasal , ear and other fumigate (Figure 6). This might be due to the reason that oral and dermal routes are more effective because the prepared medicines will react quickly with the physiology of pathogens and increase its curative power. The other reason is related with the presence of the wide spread of the internal diseases in the study area. This fnding is agreed with some previous reports such as Tamru, (2016), Giday, et.al. (2007) Tibebe and Mesele, (2019) which indicated that oral was the most common route of administration.

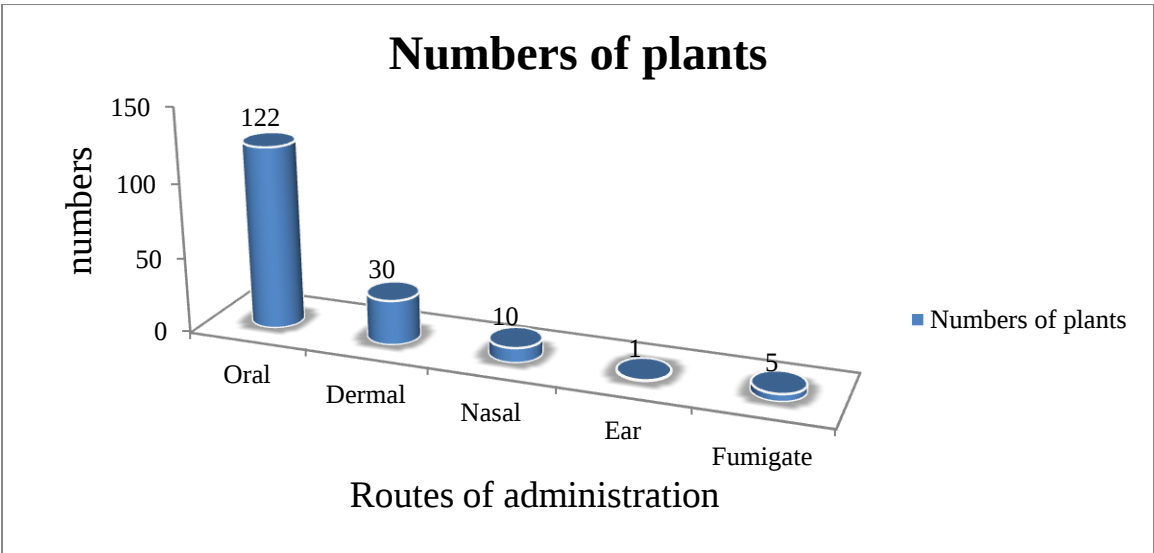


Figure 6 Route of administration

4.8. Application of Prepared Remedies •

The largest parts of prepared remedies are applicable by drinking 48 (40.33%) followed by eating 21(17.64%) and chewing constituted 20 (16.80%) each and others (Table 3). This result agrees with the work of (Etana, 2010, Asmera, 2017) in which drinking accounted the largest percentage of application of prepared remedies. Internal ailments were commonly treated by making the patient drink medication preparations; tooth infection was treated by crushing and applying the remedial plant part on the tooth surface; skin infections caused due to ringworms were treated by painting herbal preparations on the infected skin, and are applied on swollen body parts to cure swelling. Some plants do have different applications for different disease types. • This preparation is used for different diseases by diverse application techniques.

Table 3 Forms of application of remedies in the study area

Method	No. of preparation	%
Drinking	48	40.67%
Eating	21	17.79%
Chewing	20	16.94%
Fumigating	10	8.47%
Applying	9	7.62%
Creaming	8	6.77%
Painting	2	1.69%
Total	118	100

4.9. Dosage and other related application

The findings of this study showed that all administrations are not standardized. But healers in the study area used almost the same materials to measure the dosage. This may be due to experience sharing among them. According to Abebe D and Ayehu A (1993) the real drawback in traditional medicine system mostly arises from lack of precision in dosage. Healers determine the dosages based on age, physical appearance, occupation, and duration of the illness, strength of the disease and diagnosis and experience of individual healer. Children are given smaller doses of medicine than considered in case of adult patients. As a result the local healers simply recommend or prescribe small amount such as drops, hand palms, coffee cups and for larger dosages the water glasses or other local materials that are used for drinking. They consider the type of disease and its severity to determine the frequency of treatment. Local healers have special care for pregnant women and physically weak persons. Most of the remedies were reported to have no serious adverse effects except vomiting, diarrhea, and temporary inflammations. According to the healers, these effects are generally due to an over dose of the remedy.

4.10. Preference ranking

Analaysis by preference ranking was carried out on six selected medicinal plants, which were employed by residents for the treatment of stomach ache, common ailment of the study districts. Six key informants were asked to give rank or order for those selected medicinal plants based on their degree of treating stomach ache. As given below in Table 4, the result of the this study showed *Allium sativum* , *Zingiber officinale* were ranked first and second respectively whiles *Lepidium sativum* and *Ruta chalepensis* were ranked third based on its degree of treating stomach ache. *Vernonia amygdalina* and *Solanum incanum* medicinal plants were used for stomach ache treatment purposes though least preferred. *Allium sativum* widely available in the agricultural field of the study area, so residents in general and farmers in particular have been using this plant for treating stomach ache. A study by Nigusie Amsalu (2010) in farta woreda, south gonder, indicate the preference ranking for medicinal l plants to treat stomachache revealed that *Lepidium sativum* was the most preferred one followed by *Ruta chalepensis*.

Table 4 Preferance ranking of medicinal plants used to treat stomache ache

Medicinal plant	Score by the Informants						Total	Rank
	I ₁	I ₂	I ₃	I ₄	I ₅	I ₆		
<i>Allium sativum</i>	5	5	6	6	6	6	34	1
<i>Zinger officinale</i>	3	4	3	4	3	4	21	2
<i>Ruta chalepensis</i>	1	2	4	5	4	3	19	3
<i>Lepidium sativum</i>	2	6	2	3	1	5	19	3
<i>Vernonia amygdalina</i>	4	3	5	2	2	2	18	6
<i>Solanum sativum</i>	6	1	1	1	5	1	15	3

4.11. Parid comparision of five medicinal plants used to treat typoid and tafes

A parid comparison made to determine the most preffed medicinal plants among the five species that were used to treat typoid and tafes in the area. The responses of five key informants showed that *Ruta chalepensis* ranked first followed by *lomon citrus* and *Lepidium sativum* ranked second while *Coffee arebica* is the least favored over the other plant species (Table 5). This rank is because of the effectiveness of the plant in the point of view of the indigenous people of the areas.

Table 5 paired comparison of medicinal plants used to treat typoid and tafes.

Name of medicinal plants	Number of reson dents						Total	Rank
	R1	R2	R3	R4	R5			
<i>Ruta chalepensis</i>	3	4	4	1	4		16	1
<i>Lomon citrus</i>	3	2	3	4	1		13	2
<i>Lepidium sativum</i>	3	3	1	3	3		13	2
<i>Arthimusia abyssinica</i>	1	1	1	2	1		6	4
<i>Coffee arabica</i>	0	0	1	0	1		2	5

4.12. Direct matrix ranking

Direct matrix ranking was carried out following the method of Martin (1995) and cotton (1996). In order to compare the multipurpose use of a given species and to relate this to the extent of its utilization versus its dominance. Based on the information gathered from the informants and collected ethno botanical data, five most widely utilized multi-purpose plant species were selected out of the total medicinal plants that are seven use diversities of these plants were selected. The seven use-values include medicinal, food (edible), fencing, firewood, construction, furniture, charcoals. In direct matrix ranking exercise, each key informant was asked to assign use values 5=excellent, 4=very good, 3=good, 2=less, 1=less used, 0=not used, for each species and average value of use diversity for a species was taken and the values for use reports across the selected species were summed up and ranked. Similarly, six randomly selected key informants were selected for the preference ranking exercise. In view of that, *Cordia africana* was found to be the most multi-purposed plant scoring 28, followed by *Podocarpus falcatus* scoring 25 and the least one was *Hagina abyssinica* having 20 scores, The highest direct matrix ranking on the top of *C. africana* was reported (Table 6). This confirms that as the value getting high, the plants have multiple uses in the context of local community.

Table 6 Direct matrix ranking for multipurpose of five medicinal plants

Medicinal plant	Uses catagories							Total	Ran k
	Med icine	Food	Fencin g	Fire wood	Construct ion	Fur nitu re	Char coal		
<i>Cordia africana</i>	3	3	5	5	5	5	2	28	1
<i>Podocarpus falcatus</i>	3	0	4	5	4	5	4	25	2
<i>Eucalyptus globules</i>	5	0	5	4	4	2	3	23	3
<i>Croton macrostachyus</i>	5	0	3	4	3	2	4	21	4
<i>Haygina abyssinica</i>	5	0	3	4	3	3	2	20	5
Total	21	3	20	22	19	17	15	117	
Rank	2	7	3	1	4	5	6		

4.13. Informant consensus factor (ICF)

To determine the informants agreement about reported treatments for the group of illnesses, the informants consensus factor (ICF) was computed for each category. Following is the formula, ICF is equal to $nur-nt/nur-1$, where nt is the number of species utilized, ICf is the informants consensus factor, and nur is the number of usage citations in each category. Based on the informants, medicinal palnts that were presumed effectily in treating diseases in group of aliments obtained higher values of ICF.

Accordingly MPs used to treat ailments of the febrile individuals had the highest ICF value (0.90) was followed by medicinal plants used to treat evil eye (0.86), urinary problem and blood pressure had the lowest value (0.48) (Table 7)

Table 7 Informant consensus factors by categories of disease in the study area

No	Disease categories	nt	nur	ICF	%ICF
1	Febrillness	16	157	0.90	90%
2	Stomachache, constipation	20	60	0.67	67%
3	Eye disease, eye cataract	6	28	0.81	81%
4	Snake bite, rabies	9	38	0.78	78%
5	Skin infection, rash skin	4	15	0.785	78.5%
6	Urinary problem, blood pressure	17	32	0.48	48%
7	Blotting, blackleg, leech, internal parasite	26	121	0.79	79%
8	Common cold, cough, headache, fever	9	28	0.70	70%
9	Toothache, tonsillitis	6	13	0.58	58%
10	Diarrhea, Amoeba	16	46	0.66	66%
11	Wound, haemorrhoid	2	5	0.75	75%
12	Evil eye, evil spirit	5	30	0.86	86%

4.14. Fidelity level (FL)

Fidelity level (FL) values were calculated for some medicinal plants commonly used against the certain some reported ailments; *Croton macrostachyus* (against black leg), *Hagenia abyssinica* (against tapeworm), *Vernonia amygdalina* (against urine retention), *Rumex abyssinica* (against gonorrhea), *Solanum incanum* (against toothache) (Table 8). The medicinal plant species that are widely used by the local people to treat one or few ailments could be highest value of FL than the less popular. The highest values of FL indicated that a good curing potential.

Table 8 The relative healing potential of individual medicinal plants used against human and livestock diseases

Medicinal plant	Disease treated	Ni	N	FL	FL%	R
<i>Croton macrostachyus</i>	Black leg	8	8	1	100%	1
<i>Hagenia abyssinica</i>	Tapeworm	12	12	1	100%	1
<i>Vernonia amygdalina</i>	Urine retention	20	28	0.71	71%	3
<i>Rumex abyssinica</i>	Gonorrhea	8	12	0.66	66%	4
<i>Solanum incanum</i>	Toothache	6	12	0.5	50	5

4.15 Market survey

Market survey are rich sources of ethnobotanical information, since they are site at which medicinal, ornamental, edible and other useful plants are sold. Market survey was conducted at Manicho and wotara markets on Wednesday and Saturday respectively. Furthermore, medicinal

plants were also sold in the market associated with other uses such as spice, food, fumigation and others such as beverage (9). However there were no medicinal plants that were sold in market legally as respondents explained most healers prepared traditional medicinal plants in home rather than market. The herbalist post notice on the visible place what they can treat using herbal medicines to attract patients for treatment near or informants of their home.

Table 9. Some medicinal plants which are found in market.

Medicinal plant	Local name	Used for
<i>Allium sativam</i>	Wajjo tuma	Midicinal and Spice
<i>Ruta chalepensis</i>	Tenadame/shunkurta	Spice
<i>Argemone mexicana</i>	Kokole	Smoothing(mitad)
<i>Cordia africana</i>	Wadicho	Furniture
<i>Phytolaca dodecandra</i>	Haranje	detergent
<i>Brassica nigra</i>	Srnafiche	Flavor food/spice
<i>Coffea arabica</i>	bunna	Stimulant
<i>Rumex abyssinicus</i>	shishone	medicine
<i>Zingiber officinale</i>	zinjibilla	Spice
<i>Echinops kebericho</i>	bursa	Medicinal
<i>Lepidium sativum</i>	Fexxo	Medicinal and spice
<i>Artemisia abyssinica</i>	enare	Spice or Aromatic

4.16. Threats and Conservation Status of Medicinal Plants

People need plants for their daily life activity. This result showed that only a few number of medicinal plant species are available as remedies for the treatment of livestock diseases as compared to the number of plant species used to cure human diseases. The cause of threats to medicinal plants can be generally grouped into natural and human induced factors. However, in the study area as reported by the informants, most of the causes for the threats to medicinal plant are the anthropogenic factors such as agricultural expansion, fire wood collection, timber production ,overgrazing, charcoal, deforstation. Some natural factors that are well known factors in the study area are drought and wildfire. To rank these threats of medicinal plants based on the degree of damage, five key informants were selected for the preference ranking exercise for seven most threatening factors. Ranking of threats on medicinal plants (values 1–5: 1 is the least destructive threat and 5 is the most destructive one) was also conducted and values were summed up and ranks were given to each threat. According to informants’ response in the study area, agricultural expansion scoring 23 was the most threatened factor followed by overgrazing scoring 20 and firewood scoring 17 (Table 9). A similar result was obtained by Getahun (2010), in the Seru district; Arsi zone showed that agricultural expansion is the most threatened factor for medicinal plants. Moreover, the local people are highly dependent on the fresh leaves and roots of medicinal plants; these greatly threaten the medicinal plants, since there is no habit of preservation or storage of plant parts for later use Getaneh and Girma (2014)

Table 10 Ranking factors threatening medicinal plant species in study area

Threat	Respondents (s)					Total	Rank
	R1	R2	R3	R4	R5		
Agricultural expansion	4	5	5	5	4	23	1
Overgrazing	3	4	4	5	4	20	2
Fire wood	4	3	3	4	3	17	3
Charcoal	4	4	2	2	3	15	4
Deforestation	5	2	2	2	3	14	5
Timber production	4	3	1	2	2	12	6
Drought	3	2	1	2	2	10	7

4.17. Conservation of medicinal plants in the study area.

Conservation of medicinal plants is crucial for preserving biodiversity, ensuring sustainable use of natural resources, and maintaining the availability of important medicinal remedies for future generations

Conservation of natural resources in general and medicinal plants in particular maximizes the benefit of creatures. This conservation practice whatever in-situ (in their natural habitat) or/and ex-situ (out of their natural habitat) has been practiced. The source of most medicinal plants in the study district is wild (53.19%), so low conservation of wild medicinal plants cause scarcity. Though conservation approaches were not sufficient, people of the study district have been practiced in variety of wise use aspects such as nursery sites: such site propagates and distributes various plant species to increase wealth of plant resource. Protected areas: mainly in mountains and religious practice centers in forests are protected and reserved. The reason why Churches and Mosques preferably harbor plant diversity is because, their thought prohibited to cut plant resources from these sacred groves

5. CONCLUSIONS AND RECOMMENDATION

5.1. CONCLUSION

The result of ethnobotanical study indicated that the people in the study area reported using diverse plant species (84) in their herbal medical system that were used to treat different ailments. Of the total collected medicinal plant species in the study areas, 64 were used against human disease, 7 against livestock disease and 13, were used against both human and livestock diseases. Thus, result from this investigation reveal that local people depend on medicinal plants to meet their basic healthcare needs. The family Solanaceae had the highest number of species followed by Fabaceae and Lamiaceae. Most of the medicinal plants used in traditional medicine are herbs mainly harvested from the wild and some from home gardens. Leaves followed by roots and seeds were the dominant plant parts used for preparation of most remedies. The result in the condition of plant part used indicated that the majority were prepared in fresh form. Remedies were prepared mostly from freshly harvested plant parts. The popular method of preparation of traditional medicine is crushing and chewing followed by powdering. The largest proportions of remedies are administered for internal ailment through oral route followed by dermal application. Dosage were not standardized for most medicinal plant preparation and prescription to patients. The main threat for MPs in the area arises from overgrazing, firewood, charcoal production, deforestation, agricultural expansion, timber production and drought. Finger counted traditional healers in the study area have brought the different medicinal plants from natural habitats and started to conserve in home gardens. Threats which erode IK were caused by secrecy, oral based knowledge transfer, unwillingness of the young to knowledge, influence of modern education and awareness factors. Thus, the present study helps in recommending and focusing the attention towards the management and conservation of plant diversity in the study area. Additional study on indigenous knowledge has to be documented and conserved for the next generations. For the validity of reported medicinal plants, phytochemical analysis should also be carried out to detect pharmacological properties.

5.2. RECOMMENDATION

In general, based on the result of the study the following recommendations are forwarded:

- ✓ Local people could be encourage to cultivate and planting medicinal plant species around home garden and protected forest area and also management and conservation of medicinal plant species resource for sustainable use their locality.
- ✓ Attention should be given to the usage of traditional medicine and indigenous knowledge of traditional practetioners.
- ✓ Promoting conservation of medicinal plants in home garden.
- ✓ Training should be given to local people to have positive attitude toward traditional healers and to give prior emphasis to medicinal plants and multipurpose use tree species
- ✓ To encourage education and awareness about the importance of conserving medicinal plants among local communities, traditional healers, and the general public. Educate people about the value of these plants and the need to protect them for future generations.
- ✓ By implementing these recommendations and working together to conserve medicinal plants, we can help ensure the continued availability of important remedies for treating human and livestock ailments while safeguarding biodiversity and natural ecosystem.

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APPENDICES

Appendix 1: List of medicinal plants used to treat human and livestock ailments in the study area: Scientific name, local name, family, habit, habitat, disease treated, parts used, condition, method of preparation, dosage form and route of administration.

Key: Habit (Ha):Herb (H); Shrub (S); Tree (T); Climber (Cl) ,Epipatic (Ep) Habitat (Hab); (Hg=home garden, Wd=Wild; Bo=both .Parts used (Pu); (B=Bark, La=Latex, Bu=Bulb, Bd=Bud, R=Root, L=Leaf, Fr=Fruit, Se=Seed, St=Stem; Wp=whole part L+St=Leaf and stem together, Fr+L=Fruit and leaf together; R+L=Root and leaf together). Route of administration (RA);(O- oral, D- dermal, N- nasal, Oc-ocular, E-ear, A-anal, F-fumigate)

No	Medicinal plant species		Fam	Ha	Ha b	Disease treated	Use	Pu	Condition, method of preparation and dosage form	Route of administration
	Scientific name	Local name								
1	<i>Allium sativum</i> L.	Wajotuma	Alliaceae	H	Hg	Common cold	Hu	Bu	Pounding fresh bulb of <i>Allium sativum</i> and adding honey(concoction) then take 1 spoon	O
						Malaria	Hu	Bu	Pounding bulb fresh of <i>Allium sativum</i> and mixed with <i>Cicer aritinum</i> in water (concoction). Then take with 1-2 cup of tea.	O
						Stomache ache	Hu	Bu	Pounding fresh bulb then simply chewing	O
						Headache	Hu	Bu	Pounding fresh then eat or ingestion	O
						Febrile illness	Hu	Bu	Bulb pounded fresh bulb with the leaf of <i>Ruta chalepensis</i> (concoction) and eaten	O

2	<i>Allium cepa</i>	Dum o tuma	Alliaceae	H	Hg	Hypertension	Hu	Se	The fresh seed Aillum cepa is crushed and immersed in little water for 1 day and then filterd by clean cloth and drink before food	O
						Stomach ache	Hu	St	Pounded fresh stem mixed with A. sativum , R chalepensis and honey is added (concoction) and eat 1-2 spoon every morning before break fast.	O
3	<i>Aloe vera</i>	Erret	Asphodelac eae	H	Wd	Hemorrhoid	Hu	La	Cut to isolate fresh latex of the plant to cream juice on the affected part.	D
						Wound	Hu	La	Cut to isolate fresh latex/secretion to cream on infected skin.	D
						Dandruff	Hu	La	Cut to isolate fresh latex/secretion and apply to wound.	D
4	<i>Arthemisia abyssinica</i>	Enare	Astraceae	H	Wd	Febrile illness	Hu	R	The fresh root of Artemisia abyssinicus with root of Verbascum sinaiticum (concoction) is pounded and drunk.	O
						Common cold	Hu	L	Inhaling the unprocessed fresh leaves through nostril	N
5	<i>Albizia gummifera</i>	Matic ho	Fabaceae	T	Wd	Swelling of stomache &evil eye	Hu	W p	Grinding, boiling.	O
6	<i>Asparagus africanus</i>	Bula butic ho	Asparagace ae	H	Wd	Tetanus	Hu	Fr +L	The fresh leaf and fruit of Asparagus africanus together with the leaf of Cucumis ficifolium ground, powdered, mixed with fresh butter (concoction) and creamed on affected part.	D
						Eczemia	Hu	L	Fresh leaf pounded being mixed with J. abyssinicum. S. nigrum. K. petitiana (concoction) and bandage on the wound.	D
7	<i>Balanites</i>	Godic ho	Balanitaceae	T	Wd	Stomachache, diarrhea,	Hu	Fr	Chewing, liquid form , grinding	O

	<i>aegyptiaca (L.) Del</i>					headache				
8	<i>Bersama abyssinica</i>	Teberako	Meliathaceae	S	Wd	Hemorrhoid	Hu	B	Heating the fresh bud and place on the wound	D
						Ascariasis	Hu	L	The fresh leaf is boiled in milk (decoction) and drinking one cup every morning. But over dosage has reported to have powerful effects.	O
9	<i>Brucea antidysenterica J.F.Mill</i>	Haxxawich o	Simaroubaceae	H	Wd	Diarrhea	Hu	R	Dried root powdered is drunk with water(milk).	O
						Dandruff	Hu	L	Dried leaf is powdered and mixed with butter and applied on the head.	D
10	<i>Citrus limon(L.) Burm.f</i>	Lome	Rutaceae	S	Hg	Skin rash	Hu	Fr	Split and squeeze juice of 1 fresh citrus limon fruit to be creamed on the skin.	D
						Stomach ache	Hu	Fr	Fresh fruit juice mixed with N. sativa, R chalepensis & A.sativum then adds honey (concoction) and drink.	O
11	<i>Coffea arabica</i>	buna	Rubiaceae	S	Hg	Wound	Hu	Se	Dry seed of Coffea arabica roasted and powdered to be applied on the wound	D

	<i>L,</i>									
12	<i>Carica papaya</i>	Papaya	Caricaceae	T	Hg	Malaria	Hu	L	Decoction-boiling fresh leaf being mixed with seeds of Calpurnia aurea in water and take 2-3 tea glass	O
						Swelling	Hu	Se	Pounding to isolate fresh seed and its whole content to bandage the seed on swelling	D
13	<i>Cordia africana</i>	Wadi cho	Boraginaceae	T	Wd	Hepatitis	Hu	L	The dry leaf of Cardia africana boiled with sorgahum (decoction) and drink.	O
						Spider poison	Hu	L	The dry leaf of Cordia africana burned in fire and the ash mixed with butter and creamed on affected skin.	D
14	<i>Coriandrum sativum</i>	Dimilale	Apiaceae	H	Hg	Cough	Hu	Se	Dry seed is powdered, mixed with honey, and two spoons of the mixture is eaten every morning until recovery.	O
15	<i>Croton macrostachys Del.</i>	Masi ncho	Euphorbiaceae	T	Wd	Ring worm	Hu	L	Cut the tip part of fresh leaf and isolate the jelly secretion and apply (cream) on infected skin	D
						Wound	HL	L	Leaf of dried Croton macrostachyus powderd and homogenenized in a very small amount of water and uses 1 spoon.	D
16	<i>Cucurbita pepo L.</i>	Baqula	Cucurbitaceae	H	Hg	Tape worm	Hu	Se	The dried of Cucurbita seed roasted and order eaten.	O
17	<i>Capsicum</i>	Miximixa(	Solanaceae	H	Hg	Anthrax(Abasenga)	Hu	Fr	Pounded the mixture of Capiscum annuum L. Allium sativum L Ruta chalepensis L and . Eucalyptus globulus (Labill.) then drenching.	O

	<i>annuum</i>	karia)								
18	<i>Cymbopogon citratus</i>	Yetejsar	Poaceae	H	Wd	Tonsilliti	Hu	R	Fresh root chewed with salt to get relief from stomach ache.	O
						Evil eye	Hu	R	Dried root smoking covered with clothes or closed room applied fumigated.	F
						Febrilliness	Hu	L	Dried leaf smoking covered with clothes or closed room fumigated.	F
						Stomach ache	Hu	L	Fresh leaf chewed with salt to get relief from stomach ache.	O
19	<i>Cupressus lusitunica</i>	honic ho	Cupressaceae	T	Hg	Heamorrhoids	Hu	L	Dried or fresh leaf of cupress lustinica contain an essential oil to cure heamorrhoid	D
20	<i>Datura stramonium</i>	Atsefares	Solanaceae	H	Wd	Dandruff	Hu	L	Squeeze fresh leaf of Datura stramonium and cream secretion on head skin after hair removed.	D
						Tooth ache	Hu	Se	Dried or fresh seeds will be roasted and held onto the teeth.	O
						Snake bite	Hu	L	Fresh leaf of Datura stramonium crushed with salt (concoction) and extracted solution and ingest.	O
21	<i>Discopodium penninerivium</i>	Rejic ho	Solanaceae	S	Wd	Repellent, Detoxification	Hu	L	Fresh leaf is crushed and rubbed on the skin.	D
22	<i>Dioscorea alata</i>	Boye e	Dioscoreaceae	H	C	Immune system	Hu	R	The root of dioscorea alata are rich in various nutrients, and mineral, which can help boost the immune system.	O

						support				
23	<i>Drynaria volkensii</i>	kokosa	Polyponiaceae	S	Ep	Wound	Hu	L	The frond (leaves) of <i>drynaria volkensii</i> are often used for wound healing and promote skin health.	D
24	<i>Eucalyptus globules Labill.</i>	Wajjobarizafe	Myrtaceae	T	Hg	Febrile illness	Hu	L	The fresh leaf of <i>Eucalyptus globulus</i> is chopped and boils with water (decoction) and inhale repeatedly the vapor, while boiling steam bath is taken by human in closed door.	O
						Amoeboic dysentery	Hu	L	The fresh leaf of <i>Eucalyptus globulus</i> is crushed with one or two bulb of <i>Allium sativum</i> and <i>Zinger officinale</i> (concoction) making as solution to drink.	O
						Common cold	Hu	L	Fresh leaf boiled being mixed with <i>O. sauve</i> & <i>Z. scabra</i> (decoction).	N
25	<i>Echinops kebericho</i> *Mesfin.	Kebericho	Asteraceae	H	Wd	Febrillness	Hu	R	The dried root of <i>Echinops kebericho</i> is smoking to nostril.	N
26	<i>Embelia schimperi</i> Vatke.	Qonqo	Myrsinaceae	S	Wd	Diarrhea	Hu	R & L	Fresh root and leaf will be crushed with <i>Zinger officinale</i> and salt that extracted liquid to drink human.	O
27	<i>Euphorbia</i>	carich	Euphorbiaceae	T	Bo	Rabies	Hu	La	Cut the tip part to isolate latex. Then drop of fresh latex is collected ,	O

	<i>ia abyssinica</i> <i>J.F.Gmel.</i>	o	ae						mixed with “teff” powdered and backed and then eaten 1/3 of it.	
						Wound	Hu	La	Cut the tip part to isolate latex and the drop of fresh latex is collected and creamed on the affected area.	D
						Malaria	Hu	R	The root is chopped, dried, crushed and eaten with egg then a lot of aguat is drunk as antidote.	O
28	<i>Eleusine intermedia</i> <i>(Chiov.) S. M. Phillips.</i>	akurim	Poaceae	H	Wd	Snake bite	Hu	L of Wp	Fresh leaf will be crushed with mixed water extracted liquid to drink human	O
						Skin rash	Hu	L	Fresh whole part leaf will be crushed with salt and painting on the surface of skin.	D
29	<i>Erythrina brucei</i>	Welakkko	Fabaceae	T	Hg	Ascaris, stomach ache	Hu	B	Crushed or powdered fresh mixed with wate rand taken.	O
	<i>Giravilla robusta</i>	girawela	proteaceae	T	Hg	Tooth ache	Hu	B	Bark of giravella robusta used to treat tooth ache.	O
30	<i>Hagenia abyssinica</i> <i>(Bruce ex</i>	Soicho	Rosaceae	T	Wd	Tenia saginata	Hu	Flo	Dried fruit crushed and mixed with in water making solution drink morning before break fast.	O

	<i>Steud.)J. F.Gmel.</i>									
31	<i>Kalanch eo petitiana</i>	Hans hulul e	Crassulacea e	H	Wd	Body swelling	Hu	L	The fresh leaf of Kalancheo petitiana is first heated and then put on the infected part of the body until recovery.	D
						Ascariasis	Hu	R	The fresh root Kalancheo petitiana with seed of Cicer arietinum (concoction) is boiled, filtered and drunk.	O
						Wound	Hu	L	Fresh leaf placed on fire/heating/ and put on the area.	D
32	<i>Lippia adoensis Hochst.</i>	Koss oroti	Verbenacea e	H	Wd	Diarrhea	Hu	L	Fresh leaf of Lippia adoensis is crushed added with water and salt solution drink.	O
						Stomach ache	Hu	L	Leaf of Lippia adoensis is directly chewed during feeling ache.	O
33	<i>Leucas stachdif ormis</i>	Gurd umic ho	Lamiaceae	H	Wd	Mich	Hu	R	Dried the root and fumigated	N
34	<i>Laggera crassifol ia</i>	Seesi qoo	Asteraceae	H	Wd	Blood clotting	Hu	L	Chopping the leaves and putting on the cut.	D
35	<i>Ocimum lamifoli um Hochest ex Benth</i>	Dama kase	Lamiaceae	H	Hg	Febrillness	Hu	L	Fresh leaf of Ocimum lamiifolium crushed and the solution applied through inhaled nose.	N
						Evil eye	Hu	Se	Dried seed of Ocimum lamifolium fumigating/smoking to patient closed room.	N
						Stomach ache	Hu	L	Fresh leaf of Ocimum lamifolium chewed during ache feeling as.	O

						Head ache	Hu	L	Fresh leaf are crushed mixed with water and drunk.	O
						Cough	Hu	L	Fresh leaf are crushed mixed with water and drunk.	O
						Swelling	Hu	L	Fresh leaf rubbed on swelling body of affected area.	D
36	<i>Ocimum basilicum</i>	basobila	Lamiaceae	H	Hg	Stomach ache	Hu	L	Crushed, pounded and given oral	O
37	<i>Rhamnus prinoidea L Her.</i>	Xado	Rhamnaceae	S	Hg	Tonsillitis	Hu	Se	Fresh seed pounded being mixed with Artemisia rehan then squeezed (concoction) and drink. Chewed fresh leaf with Zinger officinale and salt.	O
						Tineacorporis	Hu	S&L	Fresh leaf is crushed with salt and painting on affected area of skin.	D
38	<i>Rumex abyssinicus Jacq.</i>	Shishone	Polygonaceae	H	Wd	Evil eye	Hu	R	Dried root is fumigated in closed room.	F
						Stomach ache	Hu	L	Dried root and Ruta Allium sativum are crushed and drunk.	O
39	<i>Ruta chalepensis</i>	xeenadame	Rutaceae	H	Hg	Head ache	Hu	Wp	Fresh leaf together with Zinger officinale is chewed and drunk.	O
						Stomach ache	Hu	L	Fresh leaf together with garlic and Zinger officinale chewed.	O
						Suddenly disease	Hu	Wp	Fresh leaf with salt & Zinger officinale is chewed	O
						Febrilleness	Hu	L	Fresh leaf together with garlic and Zinger officinale chewed.	O

						Diarrhea	Hu	W p	Fresh leaf together with salt and Zinger officinaleis chewed.	O
40	<i>Olea europaea subsp. C uspidata</i>	Ejerisa	Oleaceae	T	Wd	Eye disease	HL	St	Its fresh stem with leaves of Jasminum abyssinicum, ground, mixed with water (concoction) and 2-3 drop is applied on the eye.	O
						Tonsilities	Hu	L	Washing the fresh juvenile leaf of Olea europea well to chewing and ingesting the juice.	O
						Tooth ache	Hu	St	The fresh stem heated iscached between teeth.	O
41	<i>Psidium guajava</i>	Zattonne	Myrtaceae	T	Hg	Tooth ache	Hu	L	Washing the fresh leaf of psidium guajava well to chewing and remain to some duration.	O
						Infected gum/throat	Hu	L	Washing the fresh leaf of psidium guajava well to chewing and remain to some duration.	O
						Amoebic dysentery	Hu	Fr	Fresh fruit (unprocessed) is directly eaten which employed as remedy against amoebic dysentery.	O
42	<i>Passiflora edulis</i>	Hophe	Passifloraceae	Cl	Hg	Calming effects	Hu	Fr	Passiflora edulis which can help reduce anaxiety and improve sleep quality.	O
43	<i>Rosa abyssinica</i>	kega	Rosaceae	S	Wd	Devil	Hu	R	Dry root of Rosa abyssinica burnt in fire for fumigation.	F
						Tape worm	Hu	Fr	Handful of fresh ripened fruits (unprocessed) is directly eaten.	O
44	<i>Rosemarinus officinal</i>	mexibesha	Lamiaceae	S	Hg	Cancer&cognitive impairment	Hu	Leaves	Rosemary can be taken orally in the form of a capsule, tablet, or tea.	O

	<i>is</i>									
45	<i>Sida schimperi</i>		Malvaceae	H	Wd	Evil eye	Hu	R	Fumigated/smoking dried root to patient in closed room.	N
46	<i>Sida rhombifolia</i> L.	cikke	Malvaceae	S	Bo	Impotence	Hu	R	Fresh root crushed , pounded and infution of form of Tragia brevipes, sida rhomlifolia and Vernonia amygdalina (concoction) are drunk with “tella”.	O
47	<i>Schinus molle</i>	Qundo	Anacardiaceae	T	Hg	Febrillness	Hu	L	Fresh leaf boiling with salt and wash face and small amount drink.	O
48	<i>Solanum incanum</i> L.	boribodhicho	Solanaceae	H	Hg	Tooth ache	Hu	R	Root tip crushed and put on surface of teeth ache.	O
						Headache	Hu	R	Root tip will be crushing and chewing.	O
						Stomach ache	Hu	R	The root will be chewed during ache feeling.	O
49	<i>Solanum nigrum</i>	Xunayye	Solanaceae	H	Wd	Stomach ache	Hu	R	Fresh root crushed with salt and drink.	O
						Diarrhea	Hu	R	Fresh root crushed with Zinger officinale and salt making as solution form and drunk or chewed.	O
						Amoeba	Hu	R	Fresh root crushed with Zinger officinale and Ruta chalepensis with salt making as solution form and drunk .	O
50	<i>Zinger officinale</i> Roscoe*	gingiila	Zingiberaceae	H	Hg	Febrillness	Hu	Rhizo me	Fresh rhizome crushed and chewed.	
						Stomach ache	Hu		Fresh or dry rhizome crushed and drunk as qisher and chewing with salt.	O
						Cough	Hu		Fresh or dry rhizome crushed and drunk as qisher and chewing with salt.	O

						Headache	Hu		Fresh or dry rhizome crushed and drunk as qisher and chewing with salt.	O
						Common cold	Hu	R	Fresh root is chewed.	O
51	<i>Moringa stenopetala</i> L	Shifara	Moringaceae	T	Hg	Malaria	Hu	L	Heated the leaf and then eaten until threatened.	O
						Blood pressure	Hu	L	Heated the leaf and then eaten until the pressure become normal.	O
52	<i>Musa paradisiaca</i>	Muzze	Musaceae	S	Hg	Blood clotting	Hu	Wp	Crushed applied on the injured part.	D
53	<i>Urtica simensis</i>	sonicho	Urticaceae	H	Wd	Hemorrhoid	Hu	R	Crushing the fresh root and polish the wound.	O
						Gonorrhoea	Hu	R+L	The fresh root and leaves of <i>Urtica simensis</i> with the bark of <i>Croton macrostachyus</i> are grounded, powdered, mixed with little water (concoction), filtered, and then a cup of filtrate is drunk for 3-5 days in every morning.	O
54	<i>Ficus vasta</i> Forssk.	odakko	Moraceae	T	Wd	Hemorrhoid	Hu	St	Stem wounded sap from it collected pounded with its leaf and <i>Croton mactostachyus</i> Hochst.ex.Del applied topically on Hemorrhoid.	D
55	<i>Millettia ferruginea</i>	Hengedicho	Fabaceae	T	Wd	Impotency	Hu	R	Dried root powdered and drunk it .	O
56	<i>Prunus</i>	Garib	Rosaceae	T	Wd	Evil eye	Hu	L	Dried the leaves and powdered then smoke or fumigated	N

	africana	icho								
57	Casimiroa edulis	kazimir	Rutaceae	T	Hg	Gastritis, Stomachache	Hu	Fr	Eating fresh fruit	O
58	Peponium vogeli	Surupa	Cucurbitaceae	H	Hg	Malaria, wound, stomachache	Hu	L & Fr	Grinding, eating, liquid form, boiling	O
59	Podocarpus falcatus	Daguch	Podocarpaceae	T	Wd	Sudden sickness	Hu	L	The leaf of Podocarpus falcatus is squeezed and drink it	O
60	Pychnostachys abyssinica (Schweinf.) Agnew	Tonto	Lamiaceae	H	Wd	Evil eye, sun problem, wound, weight loss	H	L	Grinding, rubbing, squeezing.	O
61	Rubus apetalus	Gora	Rosaceae	H	Wd	Child cleaning	H	St	Liquid form	O
62	Thymus schimperi	tosign	Lamiaceae	H	Wd	Cough	Hu	L+ St	Dried leaf and stem boiled in water to drink in the form of tea (decoction) and take 1-2 cup of tea.	O
						Hypertension	hu	L	Boiling the dry leaves with tea (decoction) and drink the mixture immediately the hot.	O

63	<i>Vicia faba</i>	Baqel la	Fabaceae	H	Hg	Anema	Hu	Se	Dry seed is roasted and infusion in drunk.	O
						Leshmaniasis	Hu	Se	Fresh seed chewed & spitted on the wound after scratching.	D
64	<i>Calpurnia aurea</i> (Aiton) Benth.	cheka ta	Fabaceae	T	Wd	External parasite	Ls	L	Squeezing fresh leaves and applies on the skin.	D
						Snake bite	Ls	R	Fresh root of Calpurnia aurea crushed with Allium sativum (concoction) drunken cattle.	O
						Diarrhea	Ls	L	The fresh leaf is crushed, soaked in water for 2-3 hrs, decanted and one glass is administrated orally.	O
65	<i>Nicotiana tabacum</i> L.	Tamb o/Ara ddo	Solanaceae	H	Hg	Expel leech	Ls	L	Dried leaves powderd and homogenized and drink the animal with water.	O
						Cough	Ls	L	The dry leaf of Nicotiana tabacum with Capparis cartilaginea (concoction) crushed pounded and smoked as cigarette by the nose.	N
						Blackleg	Ls	L	Fresh leaf Nicotiana tabacum of crushed together with Allium sativum (concoction) given to livestock.	O
						Stomach ache	L s	L	Dried powder of leaf mixed with salt added with water given to cattle.	O
						Bloating	Ls	L	The fresh leaf is squeezed with water and one glass of juice is given orally.	O
66	<i>Ricinus communis</i> L.	konboicho	Euphorbiaceae	T	Hg	Anthrax	Ls	Fr	Dried fruit of Ricinus communis is powderd and mixed with water given to cattle orally.	O
						Sudden sickness	Ls	R	Root of Ricinus communis and root of Justicia schimperiana are pounded mixed with cold water . 1-2 cup of tea is given to cattle.	O

67	<i>Maesa lanceolata</i> Frossk.	gowa cho	Myrsinaceae	T	Wd	Trypanosomiasis	Ls	B	Crushed bark mixed with salt and water given oral	O
68	<i>Juniperus procera</i> Hochst	Abasuhonichoho	Cuppressaceae	T	Wd	Wound	Ls	L	Decocted leaf applied dermal.	D
						Expel leech	Ls	L	Crushed fresh leaf mixed with salt and taken oral.	O
69	<i>Argemone Mexicana</i> L.	kokole	Papaveraceae	H	Wd	Rabies	Ls	R	Fresh root is crushed and given with water to all animals.	O
70	<i>Tragia cordata</i>	Lalesa	Euphorbiaceae	H	Wd	Treating Urinary track & external parasite & evil eye	Ls	R	Dried or fresh root is consumed orally	O
71	<i>Lepidium sativum</i>	Fexxo	Brassicaceae	H	Hg	Blotting	Ls	Se	Dried seed of <i>Lepidium sativum</i> and bulb of <i>Capsicum frutescens</i> are crushed together and given to cattle.	O
						Internal parasite	Ls	Se	Dried seed of <i>Lepidium sativum</i> and bulb of <i>Capsicum frutescens</i> are crushed together and given to cattle.	O

						Diarrhea	Ls	Se	Seed of <i>Lepidium sativum</i> is powdered and mixed bulb <i>Allium sativum</i> drink cattle.	O
						Blackleg	Ls	Se	Seed of <i>Lepidium sativum</i> is powdered and mixed bulb <i>Allium sativum</i> drink cattle.	O
						Febrillness	Hu	Se	Chewing the seeds with salt.	O
						Diarrhea	Hu	Se	Dried seed of <i>Lepidium sativum</i> are crushed together with <i>Allium sativum</i> given to human.	O
						Stomach ache	Hu	Se	Dried seed of <i>Lepidium sativum</i> are crushed together with <i>Allium sativum</i> given to human.	O
72	<i>Linum usitatissimum</i> L.	Telba	Linaceae	H	Hg	Stomach ache	Hu	Se	The dry seed of <i>Linum usitatissimum</i> is crushed, powdered, mixed water and sugar (concoction) and then drunk during feeling pain.	O
						Diarrhea	HL	Se	The dry seed of <i>Linum usitatissimum</i> is immersed (roasted) in water for one day and drunk.	O
						Retained placenta	Ls	Se	The dry seed of <i>linum usitatissimum</i> is powdered and homogenized and mixed with water and bioled (decoction) and then drunk the solution after cooled.	O
						Urinary problem	Ls	Se	Seed of <i>Linum usitatissimum</i> is powdered and half of jog of powder is dissolved in water and given to livestock.	O
73	<i>Lycopersicon esculent</i>	Tumatum	Solanaceae	H	Hg	Eye disease	Hu	Se	The fresh seed of <i>Lycopersicon esculentum</i> (unprocessed) is added to the eye	E
						Leech	Ls	L	The fresh leaf of <i>Lycopersicon esculentum</i> is pounded, squeezed and	N

	um								added nose.	
						Urinary problem	Ls	L	Fresh leaf of Lycopodium esculentum crushed and drunk cattle	O
74	<i>Nigella sativa L.</i>	Kolis ho azum ude	Ranunculaceae	H	Hg	Stomach ache	Hu	Se	Dried powder of Nigella sativum mixed with Rhizome of Zinger taken.	O
						Diarrhea	Hu	Se	Dried powder of Nigella sativum mixed with Rhizome of Zinger taken.	O
						Blotting	Ls	Se	Dried powder of Nigella sativum crushed with fresh leaf of Ruta challepensis and Brassica nigra drunk cattle.	O
						Blackleg	Ls	Se	Dried powder of Nigella sativum crushed with powder Brassica nigra drunk cattle	O
75	<i>Vernonia amygdalina Del**</i>	Hecho	Asteraceae	S	Hg	Stomach ache	Hu	L	Chewed fresh leaf with salt relief from stomach ache.	O
						Blotting	Ls	L	Fresh leaf of Vernonia amygdalina crushed with salt making solution drunk cattle.	O
						Diarrhea	Ls	L	Fresh leaf of Vernonia amygdalina crushed with leaf of Eucalyptus globulus making solution drunk cattle.	O
						Internal parasite	Ls	L	Fresh leaf of Vernonia amygdalina crushed with leaf of Eucalyptus globulus making solution drunk cattle.	O
						Urinary problem	Ls	L	Fresh leaf of Vernonia amygdalina crushed with leaf of Eucalyptus globulus making solution drunk cattle.	O
						Malaria	Hu	L	Fresh leaf crushed mixed with water cup of tea is taken.	O
76	<i>Persea americana</i>	Awukatto	Lauraceae	T	Hg	Abdominal pain	Bo	B	The fresh bark crushed/decocted taken orally.	O

	<i>na Mill.</i>									
77	<i>Phytolacca dodecandra L.Her.</i>	Haranje	Phytolaccaceae	S	Wd	Rabies, intestinal parasite & urination problem	Bo	L	Fresh leaves of <i>Aningeria adolfi-friederici</i> , <i>Phytolacca dodecandra</i> , <i>Croton macrostachyus</i> Hochst.ex.Del, <i>Vernonia amygdalina</i> and <i>Psydrax schimperiana</i> . Was pounded by water and a cup of tea was given for human and half litter was given for animal for 4 to 7 days.	O
						Abortion	Hu	L	Fresh leaf pounded (decoction) added with linseed or alone can be taken	O
78	<i>Olinia rochetiana A.Juss</i>	Nolle	Oliniaceae	T	Wd	Tooth ache	Hu	L	The fresh leaves of it will be smashed and held on diseased tooth for few minute	O
79	<i>Commelina Africa</i>	Lalunxe	Commelinaceae	H	Wd	Skin disease, chirt, quaqucha	Bo	L & S t	The fresh leaf and stem of <i>Commelina africa</i> rubbing, cutting, grinding, liquid form.	D
80	<i>Momordica boivinii Baill.</i>	Kira	Cucurbitaceae	Cl	Wd	Stomachache, evil eye, weight gain	Bo	L & F r	Grinding eating, boiling, squeezing	N
						Cancer	Hu	L	The leaf of <i>Momordica boivinii</i> pounded and drink ½ cup of tea	O
81	<i>Ehretia cymosa Thonn.</i>	Gidicho	Boraginaceae	S	Wd	Cancer, toothache, wound	Bo	L & Ba	Chewing, grinding, boiling, squeezing, spitting.	O

82	<i>Enset ventricosum</i> (Welw.) <i>cheesman</i>	Wesse	Musaceae	S	Hg	Remove retained placenta	Ls	Wp	Cooked stem and fresh vegetative part eaten remove retained placenta in animal.	O
						Bone maintenance	Hu	St	Products of Enset ventricosum mixed with butter eaten.	O
83	<i>Cynodon dactylon</i>	Woraso (hayiso)	Poaceae	H	Wd	Wound&anthrax	Bo	Wp	Crushed and tied on affected part	F
84	<i>Melia azedarach</i>	Mimi	Meliaceae	T	Hg	Malaria	Hu	L	Fresh leaf pounded and added with water ready to drink then use with 1 cup of water.	O
						Diarrhea	Hu	L	Fresh leaf pounded & squeezed & drinks.	O
						Hen disease	Ls	L	Fresh leaf pounded and added with water ready to drink by infected hen.	O

Appendix 2: Scientific name, local name, family, other use, availability (Av) (Common, M-medium, R-rare) of medicinal plants in the district.

No	Scientific name	Local name	Family	Main use other than medicinal	Av
1	<i>Allium sativum</i>	Wajjo tuma	Alliaceae	Food as spice	C
2	<i>Allium cepa</i>	Dumo tuma	Alliaceae	Food spice	C
3	<i>Albizia gummifera</i>	Maticho	Fabaceae	Firewood fences	M
4	<i>Artemisia abyssinica</i>	Enare	Asteraceae	--	M
5	<i>Argemone Mexicana</i>	Kokole	Papaveraceae	-	M
6	<i>Asparagus africanus</i>	Bula buticho	Asparagaceae	Firewood	M
7	<i>Aloe vera</i>	Erret	Asphodelaceae		M
8	<i>Bersama abyinica</i>	Xewerakko	Melianthaceae	Firewood, fences	C
9	<i>Balanites aegyptiaca</i>	Godicho	Balanitaceae	Firewood, fences	M
10	<i>Brucea antidysenterica</i>	Haxawicho	Simaroubiaceae	-	M
11	<i>Calpurnia aurea</i>	Chekatta	Fabaceae	Firewood, fences	M
12	<i>Casimiroa edulis</i>	Qazimire	Rutaceae	Food	M
13	<i>Commelina Africa</i>	Lalunxe	commelinaceae	-	C
14	<i>Croton macrostachyus</i>	Masincho	Euphorbiaceae	Firewood, charcoal, house construction,fences	C
15	<i>Carica papaya L.</i>	Papaya	Caricaceae	Food	M
16	<i>Citrus limon (L.) Burn.f.</i>	Lome	Rutaceae	Food	R

17	<i>Coffea arabica</i> L.	Bunna	Rubiaceae	Coffe	M
18	<i>Coriandrum sativum</i> L.	Dimbilale	Apiaceae	Spice	M
19	<i>Cordia africana</i> Lam.	Wadicho	Boraginaceae	Edible fruits, firewood, house construction, furniture making, forage, charcoal, fence	M
20	<i>Cucurbita pepo</i> L.	Baquulla	Cucurbitaceae	Fruits for food, forage	C
21	<i>Cyrandom dactylon</i>	Wora	Poaceae	-	C
22	<i>Cympopogan citratus</i>	Teji sar	Poaceae	-	C
23	<i>Cupress lusitanica</i>	Faranjete honicho	Cupressaceae	Firewood, charcoal, house construction, fences	M
24	<i>Capsicum annuum</i>	Miximixa	Solnaceae	-	C
25	<i>Datura stramonium</i>	Atsefares	Solanaceae	-	C
26	<i>Dioscorea alata</i>	Boyee	dioscoreaceae	Food	M
27	<i>Discopodium peninervum</i>	Rejicho	Solanaceae	Firewood, fences	C
28	<i>Drynaria volkensii</i>	kokosa	polypodiaceae	-	C
29	<i>Eucalyptus globulus</i>	Wajjo barizafe	Myrtaceae	Firewood, charcoal, fences, construction	C
30	<i>Euphorbia abyssinica</i>	caricho	Euphorbiaceae	Fences	C
31	<i>Embelia schimpersi</i>	konko	Primulaceae	-	M
32	<i>Eleusine intermedia</i>	Akurim (Ahm)	Poaceae	-	R
33	<i>Enset ventricosum</i>	Wesse	Musaceae	Food	C
34	<i>Erythrina brucei</i>	Welakko	Fabaceae	Firewood, fences	C
35	<i>Echisnops kebericho</i>	Burisa	Asteraceae	Firewood,charcoal	R
36	<i>Ehretia cymosa</i>	Gidincho	Boraginaceae	Firewood, fences	M

37	<i>Ficus vasta</i>	Odakko	Moraceae	Firewood, fernture, fence	C
38	<i>Giravilla robusta</i>	Giravella	proteaceae	Firewood, fence, charcoal, furnarure	C
39	<i>Hagina abyssinica</i>	kosso	Rosaceae	Firewood, forage, fence	R
40	<i>Juniperus procera</i>	Abashu honcho	Cupericae	Firewood, fences,	M
41	<i>Kolancheo pititiana</i>	Hanchulule	Crassulaceae	-	R
41	<i>Lactuca spp</i>	Amessa	Asteraceae	-	M
42	<i>Leucas stachdiformis</i>	Guridumicho	Lamiaceae	-	C
43	<i>Lipidium sativum</i>	Fexxo	Brassicaceae	Firewood, fence, forage	M
44	<i>Linum usitatissimum</i>	Shiqqo	Linaceae	Food	R
45	<i>Lycopersicon esculentum</i>	tumatume	Solanaceae	Food	M
46	<i>Lippia adoensis</i>	Hanasho	verbanaceae	Spices	M
47	<i>Melia azedarach</i>	Mimi	Meliaceae	Firewood, fences	M
48	<i>Mesa lancolata</i>	Gowacho	Primulaceae	Firewood, fences.	C
49	<i>Militia perugina</i>	Hengedicho	Fabaceae	Firewood, fences.	C
50	<i>Moringa stenopetela</i>	Shifara	Moringaceae	Firewood, food, fences	R
51	<i>Musa acuminate</i>	Muzze	Musaceae	Food	M
52	<i>Monordica boivinii</i>	Kirea	curcubitaceae	-	C
53	<i>Nigella sativa</i>	Kolisho azumude	Ranunculaceae	Food	R
54	<i>Nicotiana tabacum</i>	Arado	Solanaceae	-	R
55	<i>Ocimum lamifolium</i>	Damakese	Lamiaceae	Firewood, fences	M
56	<i>Olea europaea subsp. Cuspide</i>	Ejerisa	Oleaceae	Firewood, fences, house construction	M
57	<i>Olinia rochetiana</i>	Nolle	Oliniaceae	Firewood, fences, house construction	R

58	<i>Ocimum basilicum</i>	Basobila	Lamiaceae	Spices	R
59	<i>Psidium guajaya</i>	Ziyittone	Myrtaceae	Food	M
60	<i>Phytolacca dodecandra</i>	Haranje	Phytolaccaceae	Firewood, fences, washing of clothes	C
61	<i>Persea Americana</i>	Awukatto	Lauraceae	Firewood, fences, food	M
62	<i>Peponium vogelii</i>	Surupha	Cucurbitaceae	Food	M
63	<i>Podocarpus falcatus</i>	Daguch	Podocarpaceae	Firewood, fences, house construction	M
64	<i>Passiflora edulis</i>	Hophe	Passifloraceae	Food, fences	M
65	<i>Pychnostachus abyssinica</i>	Tontona	Lamiaceae	Firewood, fences	C
66	<i>Prunus africana</i>	Garibicho	Rosaceae	Firewood, fences, food	M
67	<i>Rhamnus prinoids</i>	xado	Rhamnaceae	Alcohol making, firewood, forage, fences	M
68	<i>Rumex abyssinicus</i>	Shishone	Polygonaceae	-	M
69	<i>Rosa abyssinica</i>	Kega (Ahm)	Rosaceae	Edible fruits, firewood, fences	R
70	<i>Ruta chalepensis</i>	Shunkurta (tenadam)	Rutaceae	Food, spice	M
71	<i>Ricinus communis</i>	qonboicho	Euphorbiaceae	Fruits used for making leather soft, forage	C
72	<i>Rosemarinus officinalis</i>	mexibesha	Labiatae	Spice	M
73	<i>Rubus apetalus</i>	Gora	Rosaceae	Food	M
74	<i>Sida rhombifolia</i>	cikke	Malvaceae	-	M
75	<i>Sida schimperiana</i>	Chifreg (Amh)	Malvaceae	Firewood, fences	M
76	<i>Schinus molle</i>	qundo	Anacardiaceae	Firewood, fences	R
77	<i>Solanum nigrum</i>	Xunaye	Solanaceae	Food	M
78	<i>Solanum incanum</i>	Boribodhicho	Solanaceae	Firewood, fences	C

79	<i>Thymus schimperi</i>	Tosign	Lamiaceae	Spice	R
80	<i>Tragia cordata</i>	Lalessa	Euphorbiaceae	-	C
81	<i>Urtica simensis Steudel</i>	Sonicho	Urticaceae	Food	R
82	<i>Vernonia amygdolina</i>	Hecho	Asteraceae	Firewood, fences	C
83	<i>Vicia faba L,</i>	Baqella	Fabaceae	Food	M
84	<i>Zingiber officinale</i>	Jinjibilla	Zingiberaceae	Spice	M

Appendix 3: Medicinal plants used to treat human disease

No	Medicinal plant species		Fam	Ha	Hab	Disease treated	Use	Pu	Condition, method of preparation and dosage form	Route of Administation
	Scientific name	Local name								
1	Allium sativum	Wajotuma	Alliaceae	H	Hg	Common cold	Hu	Bu	Pounding fresh bulb of Allium sativum and adding honey(concoction) then take 1 spoon	O
						Malaria	Hu	Bu	Pounding bulb fresh of Allium sativum and mixed with Cicer aritinum in water (concoction). Then take with 1-2 cup of tea.	O
						Stomachache	Hu	Bu	Pounding fresh bulb then simply chewing	O
						Headache	Hu	Bu	Pounding fresh then eat or ingestion	O
						Febrile illness	Hu	Bu	Bulb pounded fresh bulb with the leaf of Ruta chalepensis (concoction) and eaten	O
2	Aillum cepa	Dumotuma	Alliaceae	H	Hg	Hypertension	Hu	Se	The fresh seed Aillum cepa is crushed and immersed in little water for 1 day and then filterd by clean cloth and drink before food	O
						Stomachache	Hu	St	Pounded fresh stem mixed with A. sativum , R chalepensis and honey is added (concoction) and eat 1-2 spoon every morning before break fast.	O

3	Aloe vera	Erret	Asphodelaceae	H	Wd	Hemorrhoid	Hu	La	Cut to isolate fresh latex of the plant to cream juice on the affected part.	D
						Wound	Hu	La	Cut to isolate fresh latex/secretion to cream on infected skin.	D
						Dandruff	Hu	La	Cut to isolate fresh latex/secretion and apply to wound.	D
4	Arthemisia abyssinia	Enare	Astraceae	H	Wd	Febrile illness	Hu	R	The fresh root of Arthemisia abyssinicus with root of Verbascum sinaiticum (concoction) is pounded and drunk.	O
						Common cold	Hu	L	Inhaling the unprocessed fresh leaves through nostril	N
5	Albizia gummifera (J.F.Gmel.) C.A.Sm.	Maticho	Fabaceae	T	Wd	Swelling of stomache & evil eye	Hu	Wp	Grinding, boiling.	O
6	Asparagus africanus L.*	Bulbuticho	Asparagaceae	H	Wd	Tetanus	Hu	Fr +L	The fresh leaf and fruit of Asparagus africanus together with the leaf of Cucumis ficifolium ground, powdered, mixed with fresh butter (concoction) and creamed on affected part.	D
						Eczemia	Hu	L	Fresh leaf pounded being mixed with J. abyssinicum. S. nigrum. K. petitiiana (concoction) and bandage on the wound.	D
7	Balanites aegyptiaca (L.) Delile	Godicho	Balanitaceae	T	Wd	Stomachache, diarrhea, headache	Hu	Fr	Chewing, liquid form, grinding	O

8	Bersama abysinica	Tebera ko	Meliatha ceae	S	Wd	Hemorrhoid	Hu	B	Heating the fresh bud and place on the wound				D
						Ascariasis	Hu	L	The fresh leaf is boiled in milk (decoction) and drinking one cup every morning. But over dosage has reported to have powerful effects.				O
9	Brucea antidysente rica	Haxxa wicho	Simaroub aceae	H	Wd	diarrhea	Hu	R	Dried root powdered is drunk with water(milk).				O
						Dandruff	Hu	L	Dried leaf is powdered and mixed with butter and applied on the head.				D
10	Citrus limon		Lome		Rutaceae	S	Hg	Skin rash		Hu	Fr	Split and squeeze juice of 1 fresh citrus limon fruit to be creamed on the skin.	D
								Stomach ache		Hu	Fr	Fresh fruit juice mixed with N. sativa, R chalepensis &A.sativum then adds honey (concoction) and drink.	O
11	Coffea arabica		Buna		Rubiaceae	S	Hg	Wound		Hu	Se	Dry seed of Coffea arabica roasted and powdered to be applied on the wound	D
12	Carica papaya		Papaya		Caricaceae	T	Hg	Malaria		Hu	L	Decoction-boiling fresh leaf being mixed with seeds of Calpurnia aurea in water and take 2-3 tea glass	O
								Swelling		Hu	Se	Pounding to isolate fresh seed and its	D

									whole content to bandage the seed on swelling	
13	Cordia Africa	Wadicho	Boraginaceae	T	Wd	Hepatitis	Hu	L	The dry leaf of Cardia africana boiled with sorgahum (decoction) and drink.	O
						Spider poison	Hu	L	The dry leaf of Cordia africana burned in fire and the ash mixed with butter and creamed on affected skin.	D
14	Coriandrum sativum L	Dimilale	Apiaceae	H	Hg	Ascariasis	Hu	Fr	Oral	O
15	Croton macrostacus	Masincho	Euphorbiaceae	T	Wd	Ring worm	Hu	L	Cut the tip part of fresh leaf and isolate the jelly secretion and apply (cream) on infected skin	D
						Wound	HL	L	Leaf of dried Croton macrostachyus powderd and homogenized in a very small amount of water and uses 1 spoon.	D
16	Cucurbitie pepo	Baqulla	Cucurbitaceae	H	Hg	Tape worm	Hu	Se	The dried of Cucurbita seed roasted and order eaten.	O
	Capsicum annuum L.**	Miximixa(karia)	solanaceae	H	Hg	Anthrax(Abasenga)	Hu	Fr	Pounded the mixture of Capiscum annuum L. Allium sativum L Ruta chalepensis L and . Eucalyptus globulus (Labill.) then drenching.	O
17	Cymbopogon citratus	Yetej sar	Poaceae	H	Wd	Tonsilliti	Hu	R	Fresh root chewed with salt to get relief from stomach ache.	O

						Evil eye	Hu	R	Dried root smoking covered with clothes or closed room applied fumigated.	F
						Febrilliness	Hu	L	Dried leaf smoking covered with clothes or closed room fumigated.	F
						Stomach ache	Hu	L	Fresh leaf chewed with salt to get relief from stomach ache.	O
18	Cupress lusitunica	Honicho	Cupressaceae	T	Hg	Heamorrhoids	Hu	L	Dried or fresh leaf of cupress lustinica contain an essential oil to cure heamorrhoid	D
19	Datura stramonium	Atsefares	Solanaceae	H	Wd	Dandruff	Hu	L	Squeeze fresh leaf of Datura stramonium and cream secretion on head skin after hair removed.	D
						Tooth ache	Hu	Se	Dried or fresh seeds will be roasted and held onto the teeth.	O
						Snake bite	Hu	L	Fresh leaf of Datura stramonium crushed with salt (concoction) and extracted solution and ingest.	O
20	Discopodium penninervium	Rejicho	Solanaceae	S	Wd	Repellent, Detoxification	Hu	L	Fresh leaf is crushed and rubbed on the skin.	D
21	Dioscorea	Boyee	dioscoreaceae	H	C	Immune system support	Hu	R	The root of dioscorea alata are rich in various nutrients, and mineral, which can help boost the immune system.	O

22	<i>Drynaria volkenssii</i>	Kokosa	Polyponiaceae	S	Ep	Wound	Hu	L	The frond (leaves) of <i>drynaria volkenssii</i> are often used for wound healing and promote skin health.	D
23	<i>Eucalyptus globulum</i>	Wajjo barizafe	Myrtaceae	T	Hg	Febrile illness	Hu	L	The fresh leaf of <i>Eucalyptus globulus</i> is chopped and boils with water (decoction) and inhale repeatedly the vapor, while boiling steam bath is taken by human in closed door.	O
						Amoeboic dysentry	Hu	L	The fresh leaf of <i>Eucalyptus globulus</i> is crushed with one or two bulb of <i>Allium sativum</i> and <i>Zinger officinale</i> (concoction) making as solution to drink.	O
						Common cold	Hu	L	Fresh leaf boiled being mixed with <i>O. sauve</i> & <i>Z. scabra</i> (decoction).	N
24	<i>Echinops kebericho</i> Mesfin*	Kebericho	Asteraceae	H	Wd	Febrillness	Hu	R	The dried root of <i>Echinops kebericho</i> is smoking to nostril.	N
25	<i>Embelia schimperi</i>	Qonqo	Myrsinaceae	S	Wd	Diarrhea	Hu	R&L	Fresh root and leaf will be crushed with <i>Zinger officinale</i> and salt that extracted liquid to drink human.	O
26	<i>Euphorbia abyssinica</i>	Caricho	Euphorbiaceae	T	Bo	Rabies	Hu	La	Cut the tip part to isolate latex. Then drop of fresh latex is collected , mixed with “teff” powdered and backed and then eaten	O

									1/3 of it.	
						Wound	Hu	La	Cut the tip part to isolate latex and the drop of fresh latex is collected and creamed on the affected area.	D
						Malaria	Hu	R	The root is chopped, dried, crushed and eaten with egg then a lot of aguat is drunk as antidote.	O
27	Eleusine intermedia	Akurim	Poaceae	H	Wd	Snake bite	Hu	L of Wp	Fresh leaf will be crushed with mixed water extracted liquid to drink human	O
						Skin rash	Hu	L	Fresh whole part leaf will be crushed with salt and painting on the surface of skin.	D
28	Erythrina brucei Schweinf**	Welakko	Fabaceae	T	Hg	Ascaris, stomach ache	Hu	B	Crushed or powdered fresh mixed with water and taken.	O
	Giravilla rubesta	Girawela	proteaceae	T	Hg	Tooth ache	Hu	B	Bark of giravella robusta used to treat tooth ache.	O
29	Hagenia abyssinica	Soicho	Rosaceae	T	Wd	Tenia saginata	Hu	Flo	Dried fruit crushed and mixed with in water making solution drink morning before break fast.	O
30	Kalanchoe petitiana A. Rich*	Hanshulule	Crassulaceae	H	Wd	Body swelling	Hu	L	The fresh leaf of Kalanchoe petitiana is first heated and then put on the infected part of the body until recovery.	D
						Ascariasis	Hu	R	The fresh root Kalanchoe petitiana with	O

									seed of Cicer arietinum (concoction) is boiled, filtered and drunk.	
						Wound	Hu	L	Fresh leaf placed on fire/heating/ and put on the area.	D
31	Lippia adoensis Hochst.exWalp*	Kossoroti	Verbenaceae	H	Wd	Diarrhea	Hu	L	Fresh leaf of Lippia adoensis is crushed added with water and salt solution drink.	O
						Stomach ache	Hu	L	Leaf of Lippia adoensis is directly chewed during feeling ache.	O
32	Leucas stachdiformis	Gurdumicho	Lamiaceae	H	Wd	Mich	Hu	R	Dried the root and fumigated	N
33	Laggera crassifolia	Seesiqoo	Asteraceae	H	Wd	Blood clotting	Hu	L	Chopping the leaves and putting on the cut.	D
34	Ocimum lamifolium Hchst ex Benth***	Damakase	Lamiaceae	H	Hg	Febrillness	Hu	L	Fresh leaf of Ocimum lamiifolium crushed and the solution applied through inhaled nose.	N
						Evil eye	Hu	Se	Dried seed of Ocimum lamifolium fumigating/smoking to patient closed room.	N
						Stomach ache	Hu	L	Fresh leaf of Ocimum lamifolium chewed during ache feeling as.	O
						Head ache	Hu	L	Fresh leaf are crushed mixed with water and drunk.	O
						Cough	Hu	L	Fresh leaf are crushed mixed with water	O

									and drunk.	
						Swelling	Hu	L	Fresh leaf rubbed on swelling body of affected area.	D
35	Ocimum basilicum	Basobila	Lamiaceae	H	Hg	Stomach ache	Hu	L	Crushed, pounded and given oral	O
36	Rhamnus prinoidea Herit*	Xado	Rhamnaceae	S	Hg	Tonsillitis	Hu	Se	Fresh seed pounded being mixed with Artemisia rehan then squeezed (concoction) and drink. Chewed fresh leaf with Zinger officinale and salt.	O
						Tinea corporis	Hu	S&L	Fresh leaf is crushed with salt and painting on affected area of skin.	D
37	Rumex abyssinicus	Shishone	Polygonaceae	H	Wd	Evil eye	Hu	R	Dried root is fumigated in closed room.	F
						Stomach ache	Hu	L	Dried root and Ruta Allium sativum are crushed and drunk.	O
38	Ruta chalepensis	Xeenadame	Rutaceae	H	Hg	Head ache	Hu	Wp	Fresh leaf together with Zinger officinale is chewed and drunk.	O
						Stomach ache	Hu	L	Fresh leaf together with garlic and Zinger officinale chewed.	O
						Sudden disease	Hu	Wp	Fresh leaf with salt & Zinger officinale is chewed	O
						Febrilleness	Hu	L	Fresh leaf together with garlic and Zinger officinale chewed.	O
						Diarrhea	Hu	Wp	Fresh leaf together with salt and Zinger	O

									officinaleis chewed.	
39	Olea europaea subsp.Cuspidata Wall.ex.G.Don)Cif****	Ejerisa	Oleaceae	T	Wd	Eye disease	HL	St	Its fresh stem with leaves of Jasminum abyssinicum, ground,mixed with water (concoction) and 2-3 drop is applied on the eye.	O
						Tonsillities	Hu	L	Washing the fresh juvenile leaf of Olea europea well to chewing and ingesting the juice.	O
						Tooth ache	Hu	St	The fresh stem heated iscached between teeth.	O
40	Psidium guajava L.*	Zattone	Myrtaceae	T	Hg	Tooth ache	Hu	L	Washing the fresh leaf of psidium guajava well to chewing and remain to some duration.	O
						Infected gum/throat	Hu	L	Washing the fresh leaf of psidium guajava well to chewing and remain to some duration.	O
						Amoebic dysentery	Hu	Fr	Fresh fruit (unprocessed) is directly eaten which employed as remedy against amoebic dysentery.	O
41	Passiflora edulis	Hophe	Passifloraceae	Cl	Hg	Calming effects	Hu	Fr	Passiflora edulis which can help reduce anaxiety and improve sleep quality.	O
42	Rosa abyssinica	Kega	Rosaceae	S	Wd	Devil	Hu	R	Dry root of Rosa abyssinica burnt in fire	F

	Lindley*								for fumigation.	
						Tape worm	Hu	Fr	Handful of fresh ripened fruits (unprocessed) is directly eaten.	O
43	Rosemarinus officinalis	Mexibesha	Labiatae	S	Hg	Cancer&cognitive impairment	Hu	Leaves	Rosemary can be taken orally in the form of a capsule, tablet, or tea.	O
44	Sida schimperiana Hochst. Ex A. Rich*		Malvaceae	H	Wd	Evil eye	Hu	R	Fumigated/smoking dried root to patient in closed room.	N
45	Sida rhombifolia	Cikke	Malvaceae	S	Bo	impotence	Hu	R	Fresh root crushed , pounded and infution of form of Tragia brevipes, sida rhomlifolia and Vernonia amygdalina (concoction) are drunk with “tella”.	O
46	Schinus molle	Qundo	Anacardaceae	T	Hg	Febrillness	Hu	L	Fresh leaf boiling with salt and wash face and small amount drink.	O
47	Solanum incanum L***	Boribodhicho	Solanaceae	H	Hg	Tooth ache	Hu	R	Root tip crushed and put on surface of teeth ache.	O
						Headache	Hu	R	Root tip will be crushing and chewing.	O
						Stomach ache	Hu	R	The root will be chewed during ache feeling.	O
48	Solanum nigrum L*	Xunayye	Solanaceae	H	Wd	Stomach ache	Hu	R	Fresh root crushed with salt and drink.	O
						diarrhea	Hu	R	Fresh root crushed with Zinger officinale and salt making as solution form and drunk or chewed.	O

						Amoeba	Hu	R	Fresh root crushed with Zinger officinale and Ruta chalepensis with salt making as solution form and drunk .	O
49	Zinger officinale	Gingiila	Zingiberaceae	H	Hg	Febrillness	Hu	Rhizome	Fresh rhizome crushed and chewed.	
						Stomach ache	Hu		Fresh o rdry rhizome crushed and drunk as qisher and chewing with salt.	O
						Cough	Hu		Fresh or dry rhizome crushed and drunk as qisher and chewing with salt.	O
						Headache	Hu		Fresh or dry rhizome crushed and drunk as qisher and chewing with salt.	O
						Common cold	Hu	R	Fresh root is chewed.	O
50	Moringa stenopetala	Shifara	Moringaceae	T	Hg	Malaria	Hu	L	Heated the leaf and then eaten until threatened.	O
						Blood pressure	Hu	L	Heated the leaf and then eaten until the pressure become normal.	O
51	Musa paradisica	Muzze	Musaceae	S	Hg	Blood clotting	Hu	Wp	Crushed applied on the injured part.	D
52	Urtica simensis Steudel*	Sonicho	Urticaceae	H	Wd	Hemorrhoid	Hu	R	Crushing the fresh root and polish the wound.	O
						Gonorrhoea	Hu	R +L	The fresh root and leaves of Urtica simensis with the bark of Croton macrostachyus are grounded, powdered, mixed with little water (concoction),	O

									filtered, and then a cup of filtrate is drunk for 3-5 days in every morning.	
53	<i>Ficus vasta</i> Forssk	Odakko	Moraceae	T	Wd	Hemorrhoid	Hu	St	Stem wounded sap from it collected pounded with its leaf and <i>Croton mactostachycus</i> Hochst.ex.Del applied topically on Hemorrhoid.	D
54	<i>Millettia ferruginea</i>	Hengedicho	Fabaceae	T	Wd	Impotency	Hu	R	Dried root powdered and drunk it .	O
55	<i>Prunus africana</i>	Garibicho	Rosaceae	T	Wd	Evil eye	Hu	L	Dried the leaves and powdered then smoke or fumigated	N
56	<i>Casimiroa edulis</i>	Kazimir	Rutaceae	T	Hg	Gastritis, Stomachache	Hu	Fr	Eating fresh fruit	O
57	<i>Peponium vogeli</i> (Hook.f) Engl.	Surupa	Cucurbitaceae	H	Hg	Malaria, wound, stomachache	Hu	L&Fr	Grinding, eating, liquid form, boiling	O
58	<i>Podocarpus falcatus</i>	Dagucho	Podocarpaceae	T	Wd	Sudden sickness	Hu	L	The leaf of <i>Podocarpus falcatus</i> is squeezed and drink it	O
59	<i>Pychnostachus abyssinica</i>	Tontona	Lamiaceae	H	Wd	Evil eye, sun problem, wound, weight loss	H	L	Grinding, rubbing, squeezing.	O
60	<i>Rubus apetalus</i>	Gora	Rosaceae	H	Wd	Child cleaning	H	St	Liquid form	O
61	<i>Thymus schimperi</i>	Tosign	Lamiaceae	H	Wd	Cough	Hu	L+St	Dried leaf and stem boiled in water to drink in the form of tea (decoction) and take 1-2 cup of tea.	O

						Hypertension	hu	L	Boiling the dry leaves with tea (decoction) and drink the mixture immediately the hot.	O
62	Vicia faba L*	Baqella	Fabaceae	H	Hg	Anema	Hu	Se	Dry seed is roasted and infusion in drunk.	O
						Leshmaniasis	Hu	Se	Fresh seed chewed & spitted on the wound after scratching.	D

Appendix 4: Medicinal plants used to treat livestock ailment in the study districts

No.	Medicinal plant species		Fam	Ha	Hab	Disease treated	Use	Pu	Condition, method of preparation and dosage form	Route of Administation
	Scientific name	Local name								
1	Calpurnia aurea	chekata	Fabaceae	T	Wd	External parasite	Ls	L	Squeezing fresh leaves and applies on the skin.	D
						Snake bite	Ls	R	Fresh root of Calpurnia aurea crushed with Allium sativum (concoction) drunken cattle.	O
						Diarrhea	Ls	L	The fresh leaf is crushed, soaked in water for 2-3 hrs, decanted and one glass is administrated orally.	O
2	Nicotiana tabacum	Tambo/Ara ddo	Solanaceae	H	Hg	Expel leech	Ls	L	Dreid leaves powderdn and homogenized and drink the animal with water.	O
						Cough	Ls	L	The dry leaf of Nicotina tabacum with Capparis cartilaginea (concoction) crushed pounded and smoked as cigarette by the nose.	N
						Blackleg	Ls	L	Fresh leaf Nicotina tabacum of crushed together with Allium sativum (concoction) given to livestock.	O
						Stomach ache	L s	L	Dried powder of leaf mixed with salt added with water given to cattle.	O
						Bloating	Ls	L	The fresh leaf is squeezed with water and one glass of juice is	O

									given orally.	
3	Ricinus communis	konboicho	Euphorbiaceae	T	Hg	Anthrax	Ls	Fr	Dried fruit of Ricinus communis is powderd and mixed with water given to cattle orally.	O
						Sudden sickness	Ls	R	Root of Ricinus communis and root of Justica schimperiana are pounded mixed with cold water . 1-2 cup of tea is given to cattle.	O
4	Maesa lanceolata	gowacho	Myrsinaceae	T	Wd	Trypanosomiasis	Ls	B	Crushed bark mixed with salt and water given oral	O
5	Juniperus procera	Abashuhonicho	Cuppressaceae	T	Wd	Wound	Ls	L	Decocted leaf applied dermal.	D
						Expel leech	Ls	L	Crushed fresh leaf mixed with salt and taken oral.	O
6	Argemone Mexicana	kokole	Papaveraaceae	H	Wd	Rabies	Ls	R	Fresh root is crushed and given with water to all animals.	O
7	Tragia cordata	Lalessa	Euphorbiaceae	H	Wd	Treating Urinary track & external prasite &evil eye	Ls	R	Dried or fresh root is consumed orally	O

Appendix 5: medicinal plants used to treat both human and livestock ailments

No.	Medicinal plant species		Fam	Ha	Hab	Disease treated	Use	Pu	Condition, method of preparation and dosage form	Route of Administation
	Scientific name	Local name								
1	Lepidium sativum	Fexxo	Brassicaceae	H	Hg	Blotting	Ls	Se	Dried seed of Lepidium sativum and bulb of Capsicum frutescens are crushed together and given to cattle.	O
						Internal parasite	Ls	Se	Dried seed of Lepidium sativum and bulb of Capsicum frutescens are crushed together and given to cattle.	O
						Diarrhea	Ls	Se	Seed of Lepidium sativum is powdered and mixed bulb Allium sativum drink cattle.	O
						Blackleg	Ls	Se	Seed of Lepidium sativum is powdered and mixed bulb Allium sativum drink cattle.	O
						Febrillness	Hu	Se	Chewing the seeds with salt.	O
						Diarrhea	Hu	Se	Dried seed of Lepidium sativum are crushed together with Allium sativum given to human.	O
						Stomach ache	Hu	Se	Dried seed of Lepidium sativum are crushed together with Allium sativum given to human.	O
2	Linum usitatissimum	Telba	Linaceae	H	Hg	Stomach ache	Hu	Se	The dry seed of Linum usitatissimum is crushed, powdered, mixed water and sugar (concoction) and then drunk during feeling pain.	O
						Diarrhea	HL	Se	The dry seed of Linum usitatissimum is immersed (roasted) in	O

									water for one day and drunk.	
						Retained placenta	Ls	Se	The dry seed of linum usitatissimum is powdered and homogenized and mixed with water and boiled (decoction) and then drunk the solution after cooled.	O
						Urinary problem	Ls	Se	Seed of Linum usitatissimum is powdered and half of jug of powder is dissolved in water and given to livestock.	O
3	Lycopersicon esculentum Mill ***	Tumatume	Solanaceae	H	Hg	Eye disease	Hu	Se	The fresh seed of Lycopersicon esculentum (unprocessed) is added to the eye	E
						Leech	Ls	L	The fresh leaf of Lycopersicon esculentum is pounded, squeezed and added nose.	N
						Urinary problem	Ls	L	Fresh leaf of Lycopersicon esculentum crushed and drunk cattle	O
4	Nigella sativa	Kolisho azumude	Ranunculaceae	H	Hg	Stomach ache	Hu	Se	Dried powder of Nigella sativum mixed with Rhizome of Zinger taken.	O
						Diarrhea	Hu	Se	Dried powder of Nigella sativum mixed with Rhizome of Zinger taken.	O
						Blotting	Ls	Se	Dried powder of Nigella sativum crushed with fresh leaf of Ruta chalepensis and Brassica nigra drunk cattle.	O
						Blackleg			Dried powder of Nigella sativum crushed with powder Brassica nigra drunk cattle	O
5	Vernonia amygdalin	Hecho	Asteraceae	S	Hg	Stomach ache	Hu	L	Chewed fresh leaf with salt relief from stomach ache.	O
						Blotting	Ls	L	Fresh leaf of Vernonia amygdalina crushed with salt making	O

	a								solution drunk cattle.	
						Diarrhea	Ls	L	Fresh leaf of Vernonia amygdalina crushed with leaf of Eucalyptus globulus making solution drunk cattle.	O
						Internal parasite	Ls	L	Fresh leaf of Vernonia amygdalina crushed with leaf of Eucalyptus globulus making solution drunk cattle.	O
						Urinary problem	Ls	L	Fresh leaf of Vernonia amygdalina crushed with leaf of Eucalyptus globulus making solution drunk cattle.	O
						Malaria	Hu	L	Fresh leaf crushed mixed with water cup of tea is taken.	O
6	Persea americana	Awukatto	Lauraceae	T	Hg	Abdominal pain	Bo	B	The fresh bark crushed/decocted taken orally.	O
7	Phytolacca dodecandra L.Herit.	Haranje	Phytolaccaceae	S	Wd	Rabies, intestinal parasite & urination problem	Bo	L	Fresh leaves of Aningeria adolfi-friederici, Phytolacca dodecandra, Croton macrostachyus Hochst.ex.Del, Vernonia amygdalina and Psydrax schimperiana. Was pounded by water and a cup of tea was given for human and half litter was given for animal for 4 to 7 days.	O
						Abortion	Hu	L	Fresh leaf pounded (decoction) added with linseed or alone can be taken	O
8	Olinia rochetiana. A.Juss	Nolle	Oliniaceae	T	Wd	Tooth ache	Hu	L	The fresh leaves of it will be smashed and held on diseased tooth for few minute	O
9	Commelina Africa	Lalunxe	Commelinaceae	H	Wd	Skin disease, chirt, q	Bo	L&St	The fresh leaf and stem of Commelina Africa rubbing, cutting, grinding, liquid form.	D

						uaqucha				
10	Momordica boivinii Baill.	Kirae	Cucurbitaceae	Cl	Wd	Stomachache, evil eye, weight gain	Bo	L&Fr	Grinding eating, boiling, squeezing	N
						Cancer	Hu	L	The leaf of Momordica boivinii pounded and drink ½ cup of tea	O
11	Ehretia cymosa Thonn.	Gidincho	Boraginaceae	S	Wd	Cancer, toothache, wound	Bo	L&Ba	Chewing, grinding, boiling, squeezing, spitting.	O
12	Enset ventricosum	Wesse	Musaceae	S	Hg	Remove retained placenta	Ls	Wp	Cooked stem and fresh vegetative part eaten remove retained placenta in animal.	O
						Bone maintenance	Hu	St	Products of Enset ventricosum mixed with butter eaten.	O
13	Cynodon dactylon (L) Pers.**	Wora(hayiso)	Poaceae	H	Wd	Wound&anthrax	Bo	Wp	Crushed and tied on affected part	F
14	Melia azedarach	Mimi	Meliaceae	T	Hg	Malaria	Hu	L	Fresh leaf pounded and added with water ready to drink then use with 1 cup of water.	O
						Diarrhea	Hu	L	Fresh leaf pounded & squeezed & drinks.	O
						Hen disease	Ls	L	Fresh leaf pounded and added with water ready to drink by infected hen.	O

Appendix 6: Major human diseases of the district and the number of corresponding plant species used (ps (#))

No	English name	Local name	Ps (#)	%
1	Stomach ache	Godowu game	12	7%
2	Wound	Madaa	7	4%
3	Malaria	Binichu xibba	6	3.55%
4	Hemorrhoid	Qunturote xisso	4	2.36%
5	Cough	Busano	6	3.55%
6	Evil eye	Budda	4	2.36%
7	Febrilillness	Ibille	5	2.95%
8	Leishmaniasis		4	2.36%
9	Eye disease	Illete xibba	7	4%
10	Dandruff(head skin rash)	Forifore	6	3.55%
11	Common cold	Ganshu xiba	8	4.7%
12	Snake bite	Hamashu qasiro	2	1.18%
13	Tooth ache	Hinkote xibba	6	3.55%
14	Head ache	Umu damume	4	2.36%
15	Tape worm	Kosso	5	2.95%
16	Diarrhoea	Deu xibba	5	2.95%
17	Tonsillitis	Tonsile	4	2.36%
18	Rabies	Woshichu xibba	2	1.18%
19	Ascariasis	Hamashu xibba	4	2.36%
20	Swelling	Fugote xibba	1	0.59%
21	Hypertension	Demigifite	6	3.55%
22	Ear disease	Machate xibba	2	1.18%
23	Amoebic dysentery	amoeba	3	1.77%
24	Amemia	Mundete anje	2	1.18%
25	Miscarry/abortion	Wurija	2	1.18%
26	Acne	Bugurete	1	0.59%
27	Abdominal distinition	Godowu gido damula	2	1.18%
28	Wound of genital mutilation	Mineni hinganiwoti mada	2	1.18%
29	Kidney disease	Kolalitete xiba	4	2.36%
30	Infected gum	Erigegu xibba	6	3.55%
31	Bleeding after delivery	Illihu gedensani dunanitano munde	8	4.7%
32	Gonhorrea	Shuma girano xubba	6	3.55%
33	Fire injury	Girate dano	2	1.18%
34	Skin rash, scabies	Hangarisisano xibba	4	2.36%
35	Urinary problem	Shuma shumara hollano xibba	3	1.77%
36	Typoid and tases	Tayfodena tafese	14	8.28%
	Total		169	

Appendix 7: Major livestock disease/health problem of the district and the number of corresponding plant species used (ps (#))

No	English name	Local name	Ps (#)	%
1	Abdominal distention	Godowu fugo	6	16.6%
2	Rabies	Woshichu xibba	4	11%
3	Diarrhea	Godowu fushsho	4	11%
4	Blackleg	Aba gorba	3	8.3%
5	Urinary problem	Shuma shumara holano xiba	4	11%
6	Eye disease	Illete xisso	4	11%
7	Wound, kemkim	Madda, faru madda	2	5.5%
8	Cough	Busano	3	8.3%
9	Hen disease	Lukkuwu xibba	2	5.5%
10	External parasite	Derehe	2	5.5%
11	Constipation	Godowu mollee	1	2.7%
12	Epidemic	Yanate xisso	1	2.7%
	Total		36	

Appendix 8 : Demographic and socioeconomic characteristics of respondent

Characteristics		Number of informant	%
Gender	Male	84	70%
	Female	36	30%
Age	15-25	34	28.33%
	26-35	29	24.16%
	36-50	34	28.33%
	51-65	11	9.16 %
	66-80	11	9.16%
	>81	1	0.83%
Marital status	Married	106	88.3 %
	Single	13	10.83 %
	Divorce	1	0.83 %
Educational level	Illitirate	60	5 %
	Writing and reading	14	11.69 %
	Church education	15	12.5 %
	8-12	16	13.33 %
	>12	15	12.5 %

N=120, Number of respondent

Appendex 9: Questionarie



HAWASSA UNIVERSITY
SCHOOL OF GRADUATE STUDIES
COLLEGE OF NATURAL AND COMPUTATIONALSCIENCE
DEPARTNMENT OF BIOLOGY

Interview guideline interviewed by development worker/DA and Kebele
Administers

DEAR RESPONDENTS,

Appendix 1: Questionnaires

Dear respondents: My name is Dergachew **Debela**, I am a student of Hawassa University College of natural and computational sciences Department of biology Masters of Science degree specialization in “**...Botanical sciences.**” Currently, I am undertaking a research study with the title: “**Ethnobotanical study of medicinal plants used to treat human and livestock ailment in melga woreda sidam region ethiopia**” The purpose of this questionnaire is the systematically and objectively secure information to understand the sources of the households.

General directions

- ❖ Please read each item carefully and patiently, and give the answers of each questions sequentially based on your understanding
- ❖ Read all the instructions before attempting to answer the questions
- ❖ No need of writing your names on the questionnaire
- ❖ Please do not leave the questions without giving an answers
- ❖ Attempt your responses tick in the provided space
- ❖ Write your answers for close-ended questions carefully
- ❖ Write your comments for open-ended questions clearly

Appendix 1: Semi-structured interviews that conducted to collect Ethnobotanical information on traditional medicinal plants.

Part I: Informant Background

1. Date _____ Residence area (village) _____ Kebele _____
2. Name of respondent _____ Sex: Male ____ Female ____ Age _____
 - 2.1 Marital status: Married ____ Single _____ Divorced _____ Widowed _____
 - 2.2 Occupation (main Job): Farmer ____ Merchant ____ Student ____ Government Work ____ Others ____
 - 2.3 Religion: Orthodox ____ protestant ____ Muslim ____ Catholic ____ Others ____
 - 2.4 Educational background: Illiterate ____ Elementary school ____ High school ____ Others ____

Part II: Ethnobotanical data for medicinal plants

1. Do you use medicinal plants?

2. List medicinal plants used to treat human disease _____
3. List medical plants used to treat Animal disease _____
4. List type of disease treated by medical plants _____
5. Medicinal plants used to treat human disease

1

Local names	disease treated	Part used	Application	Administration route	Dosage	Collection number

6. Medicinal plants used to treat Livestock disease

Local names	disease treated	Part used	Application	Administration route	Dosage	Collection number

7. Medicinal plants used to treat both Human and Livestock disease

Local names	disease treated	Part used	Application	Administration route	Dosage	Collection number

8. What is Condition of preparation of Medicinal plants? Fresh/ Dry/Both
9. What is the habit of the plants? Herbs/Shrubs/ Tree/climber
10. Does the amount utilized (dose) different among age groups, sex? If yes, state for each age groups and sex. _____
11. In which types of habitat are these plants grow? Forest /homegarden / Agricultural field /Grazing land /Road side/others_____
12. In which season are these plants available? A. Winter B. Spring C. summer D. Autumn
- 13 Are there members of community who frequently use medicinal plants? A. yes B. No
14. Mention medicinal plants species with other uses in addition to medicinal purposes._____
15. From whom the people learned the knowledge on the use of medicinal plants? A. family B. Elders C. through practice D. from other person
- 16 How they pass this knowledge to the other? A. orally B. by writing C. both
17. Is the medicinal plants easily accessible? A. yes B. No

18. Which members of the community use the medicinal Plants frequently?
- A. young B. Elders C. Women D. Men
19. What are threatening factors of medicinal plant species in your area?
20. What are the major problems associated with medicinal plants in the area?
21. What is the status of medicinal plants?
22. Is there traditional conservation methods used to conserve medicinal plants in the area? If yes list out them and explain how are the medicinal plants conserved in the area?
23. List the traditional way of classifying vegetation, landscapes and the soils in your area:
- _____
24. What is the indigenous knowledge of the local community on health?

2. Checklist of semi-structured interview question for Key informants

1. Which of the following medicinal plants are most preferred in your area?

Medicinal plant species	Key informants (I1-I10)										Total	Rank
	I1	I2	I3	I4	I5	I6	I7	I8	I9	I10		

2. Which of the following medicinal plants have multiple uses?

№	Medicinal plant species	Uses					Total	Rank
		U1	U2	U3	U4	...		

3: Checklist of semi-structured interview for collecting data from local market place

- I. General information of counterpart or respondent.
1. Date _____ Residence area (village) _____ Kebele _____
2. Name of respondent _____ Sex: Male ____ Female ____ Age _____
- 2.1 Marital status: Married _____ Single _____ Divorced _____ Widowed _____

2.2 Occupation: Farmer___ Merchant___ Student___ Government Work___ Others___

2.3 Religion: Orthodox _____protestant_____ Muslim_____Catholic _____ Others_____

2.4 Educational background: Illiterate___ Elementary school___ High school___ Others_____

II. Ethnobotanical Data

1. Is the medicinal plant marketable?

2. Which medicinal plant species is commonly used to treat both human and animal diseases in the study area? _____

3. Local name of medicinal plants _____

4. Where do plants grow? Wild/ home gardens/ other_____

5. Plant parts used _____

6. Conditions for the use of medicinal plants: singular, mixed, or other.

7. The state of the healing plants: fresh, dried, or powdered

8. Do you keep the drug in storage? If yes, how long and how? _____

9. Approximated quantity: per single vendor, each market._____

10. Which month are medicinal plant species available?

11. What is your measurement to sell? _____

12. How much its price? _____

13. How much did the user pay for service they give? A. high B. less C. based on the disease
D. based on personal status

14. Among the medicinal plants which one have high price?

15. How much sold medicinal plants now and compare to past: More/the same/Less

Date of interview _____

Name of interview site _____

Many Thanks for your cooperation!!!



HAWAASI YUNIVERSITE

HAWAASI JAWIIDI ROSI UURINSHA

KOLLEEJJE KALAQAMU SAYINSE

ROOSU GOLA

LAYINIKI DIGIRE.....

Ayiraddu xinxallote miilla ikkitinoonniri tenne xinxallote qara mixo Arbegoonu woradi shoole doorantinoonniri

Xaphoomu hajajo

Ayiraddu xiinxallote miilla dawaro dawara'nera albaanni hajajo nabbabbe qoleno xa'mo dawartinanni yannara woroonni noo hajajo harunse

Insano:-

- ❖ Su'ma borreessadihasissanno
- ❖ Xa'modawarakira alba hajajonabbawi
- ❖ Eeggate mitte mittenta xa'mo garunni nabbawi
- ❖ Hajajotegarinniuyinoonnifanobaserataalo dawaro uyi
- ❖ Uyinoonnixa'modawarittokkiagurtooti
- ❖ Uyinnonnisaaxi'ne giddo qoqoowumalaateworatenni dawaro dawari
- ❖ Fanoxa'moraumikkihedoleellannogarinniborreessi.

Xa'mishsha 1: Gutu-waaxo xa'muwa baadilicho xagga loonsanni muro daafira ikkado xiinxallonna mashalaqqe gamba assinanni gara lainohunni,

Kifile I: Halanyu Mashalaqqubba

1. Barra _____ Teesso _____ Ollaa _____

2. Dawaraancho su'ma _____ Koo/Tee: Labbaaha ____ Meyaata ____
Diro _____

2.1 Adhamme: Adhino _____ Diadhino _____ Tirino _____ Shiirino _____

2.2 Loosu dana: Baatto loosiranno _____ Daddalaancho _____ Rosaancho _____ Mootimma
loosaasincho _____ Woleno xawisi _____

2.3 Amma'no: Ortodokise _____ Pirotestaante _____ Musiliime _____ Kaatoolike _____
Woleno xawis _____

2.4 Rosu dana: Dirosino _____ 1-8 _____ 9-12 _____ Woleno xawisi _____

Kifile II: Murote xiinxallo taje mitte mittente murowaanni

1. Addi addi xagga horonsirattoni?

2. Manna xagisate horonsiratto muro tittirotenni kuli _____
3. Saada xagisate horonsiratto muro tittirotenni kuli _____
4. Babbaxitino muronni xaginsanni dhibba xawisi _____
5. Mannu xissora horonsinanni xagichu muro xawisi _____

Olluu su'ma	Hursitanno xisso	Horonsi'nanni kifile	Horonsi'nanni dana	Gashshootu widoonni	Xagichu bikka	Xagichu kiiro

6. Saadate xissora horonsinanni xagichu muro xawisi _____

Olluu su'ma	Hursitanno xisso	Horonsi'nanni kifile	Horonsi'nanni dana	Gashshootu widoonni	Xagichu bikka	Xagichu kiiro

7. Mannahonna saadate xissora mitteenni horonsinanni xagichu muro xawisi _____

Olluu su'ma	Hursitanno xisso	Horonsi'nanni kifile	Horonsi'nanni dana	Gashshootu widoonni	Xagichu bikka	Xagichu kiiro

8. Baadillichu xagga murotenni qixxeessinanni gari? Shamatenni/ Moolatenni/Lamentenni _____
9. May garinniiti murotenni loonsannihu? Darotenni/Omolchunni/Rumushshunni _____
10. Horonsi'noonni bikka addi addi dirranninna Koo/Tee gaamo garinniiti? Ee ikkiro, dirunninna koo/tee gaamo garinni xawisi. _____
11. Muro kayisirate hiittee gade horonsiratto? Dubbunni/gati kayishshsinni/Irshu baattonni /Saada allaalete xawiwinni /Dooggatenni/Woleno xawisi_____
12. Hittee woggaraati xagichu muro afinannihuIn? A. Hawadi B. Meherete C. Arri D. Belgete
- 13 Ganyite xagicho loossanno halanyooti ledo miiloomitte nooheni? A. Ee B. Dee'ni
14. Xagicho loosate alaamira ikkitanno murote sircho xawisi._____
15. Xagichoho ikkitanno murote sirchi dana badate rosicho afirootto manna xawisi ayeeti?

A. Maatete B. Geerra C. Umi'ya dandoonni D. Addi addi manninni

16 Ati konne rosicho woleho hiittoonni cu'misiissatto? A. Afuunni B. Borrotenni C. Lamunkunni

17. Xagicho ikkitanno murote sircho marri gede afi'nanni? A. Ee B. Dee'ni

18. Wo'ma woyte ganyite xagichu muro horonsidhanno miilla hiitteeti?

A. Wedellaho B. Geerraho C. Meentoho D. Mannootaho

19. Ollaho xagichu muro daafira yaaddo ikkanno yite huluullamattori may no?

20. Ollaho xagichu muro ledo amadaminore qarraho yite hedattori maati?

21. Xagichu muro sirchi gade hiittoote?

22. Ollaaho xagichoho ikkitanno murote sircho baadillichu hayyonni seeda yanna baukkinni heedhanno gede assinanni gari no? Dawarokki (ee) ikkituro hiittoonni seeda yanna baikkinni worranni hayyo xawisi?

23. Ollaaho baadillitte muro, baattote suudenna bushshu dana xawisi.

24. Olluu manni kalaqamunni afiranno egenno dagate fayyimma daafira hiittoote?

2. Buuxote Harunso Gutu Xa'mo Hajo La'anno Olluu Massagaanote Bissa

1. Ollaaho roore yanna mannootu hasiranno xagichu murote sirchi hiikkonneeti?

Xagichu muro sirchi dana	Ollaaho hajo la'anno bissa (I1-I10)										Xaphom	Deerra
	I1	I2	I3	I4	I5	I6	I7	I8	I9	I10		

2. Xagichoho bacu dani horo noosi muro sirchi hiikkonneeti?

A/K	Murote sircho	Horonsa					Xaphooma	Deerra
		U1	U2	U3	U4	...		

3: Buuxote Harunso Gutu Xa'mo Taje Gamba Assannohu Olluu Dikko Daddalaanowaanni

I. Xaphooma Mashalaqqe Olluu Dawaraanowiinni

1. Barra _____ Teesso _____ Ollaa _____
2. Dawaraanchu su'ma _____ Koo/Tee: Lab ____ Mey ____ Diro _____
- 2.1 Adhammete dana: Adhino _____ Diadhino _____ Tirino _____ Shiirino _____
- 2.2 Looso: Baatto loosire ____ Daddalaancho ____ Rosaancho ____ Mootimmate Lo ____ Woleno ____
- 2.3 Amma'no: Ortodokise ____ Pirotestaante ____ Musiliime ____ Kaatoolike ____ Woleno ____
- 2.4 Rosu dana: Dirosino ____ 1-8Kifile ____ 9-12Kifile ____ Woleno xawisi _____

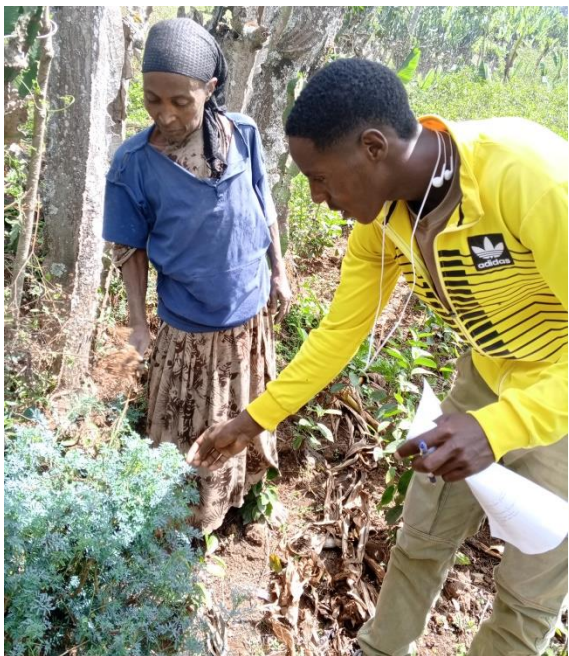
II. Xagichu Xiinxalaano Mashalaqqe

1. Xagicho dikko shiqisha dandiinoonni?
2. Ollaaho mitteenni mannanna saada xagisate horonsi'nanni xagichu dani hiikkonneeti?

3. Ollaaho woshshate horonsi'nanni muro su'ma xawisi _____
4. Muro lophitanno baychi hiikkooti? Kalaqamu _____ mannu kayisino _____ woleno xawisi _____
5. Murote dana horonsi'nanni kifile _____
6. Muro xaginaateho horonsi'nanni gade babbande _____ mitteenni _____ karsine _____ woleno xawisi.
7. Xagicho horonsi'nanni gara? shama _____, moola _____ karsine
8. Xagicho wodhinanni xagichu duuno nooheni? dawaro (Ee) ikkituro, yanna mageeshshi geeshsha? _____
9. Hedotenni xagichu bikka dikkote hirranni woyte bande hirranni _____ mitteenni hirranni _____
10. Ollaaho xagichu muro sirchi roore yannara fulannohu hiikku aganiraati?
11. Xagicho hirranni woyte mayinni bikkinanni? _____
12. Hiranno waagi mageeshshaati? _____
13. Horaameeyye waaga hiittoonni baaxxitanno? A. Lowoha B. Shiima C. Xagichu garinni D. Mannu xisso garinni
14. Hiranni xagga giddonni lowo waaga hirannohu hiikkonneeti?
15. Xagicho dikkirate gari xanna albiwaanni la'niro ikkito hiittooti lowote _____ taaloho _____ shiimate
Mashalaqqe Xa'minohu Su'ma _____
Mashalaqqe Xa'minohu Malaate _____

Lowo Kaa'lo'nera Wodaninni Galateemmo!

Appendex 10: Data collection from the informants in the study area



Appendex 11: Market survey

