ETHNOBOTANICAL STUDY, CONSERVATION PRACTICES AND THREATS OF MEDICINAL PLANTS AMONG MENJA COMMUNITY: IN THE CASE OF GIMBO DISTRICT, KAFFA ZONE, SOUTH WEST REGION OF ETHIOPIA

MSc. THESIS

BY

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JUNE, 2024

JIMMA, ETHIOPIA

Ethnobotanical Study, Conservation Practices and Threats of Medicinal Plants among Menja Community: In The Case of Gimbo, Kaffa Zone, South West Ethiopia

By

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A Thesis submitted to Jimma University College of Agriculture and Veterinary Medicine, Department of Natural Resource Management, in Partial Fulfillment for the Requirement of Degree of Master of Science in Forest and Nature Management.

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June, 2024

Jimma, Ethiopia

APPROVAL SHEET

Jimma University College of Agriculture and Veterinary Medicine

Program of Study: MSc. in Natural Resource Management (Specialization in Forest Management)

Title: Ethnobotanical Study, Conservation Practices and Threats of Medicinal Plants among Menja Community: In the Case of Gimbo District, Kaffa Zone, South West Region of Ethiopia

I have completed my thesis of research work as per the approved proposal and have been evaluated and accepted by advisors. I also declare that this thesis is my original work and has not been presented for an award of a degree, diploma or certificate in Jimma University or any other University. Hence, I hereby kindly request the department to allow me to present the finding of my work and submit my thesis.

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We, the thesis advisors have evaluated the content of this thesis and found to be satisfactory, executed according to the approved proposal, written according to the standard and format of the University and ready to be submitted. Therefore, we recommend that the student has fulfilled the requirements and hence can submit the thesis for examination with our approval as advisors.

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Decision/suggestion of department graduate council (DGC)

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BIOGRAPHICAL SKETCH

The author, Getahun Gero Tesema, was born on April 29/1994 G.C at Yeyibito in Gimbo district, Kaffa Zone of South western Region peoples of Ethiopia. He attended primary education at Bitta Woshi Primary School from 2002 to 2009 G.C and joined Chena secondary School from 2010 to 2011. Then he learned preparatory education in shishinda and Bishaw w/yohannis secondary and preparatory schools. Then, he joined Mizan-Tepi University in 2014 and graduated with a BSc degree in Natural Resources Management in July 2017 G.C. Soon after graduation, he was employed in Decha district Office forest and environment protection and worked for consecutive 8 months there. And then he was applied to Bonga University and worked there for three years. Then, he joined to school of graduate students of JUCAVM in September, 2021 to follow his MSc. Studies in natural resource management specialization on Forest Management.

Acknowledgment

First of all I thank the almighty God for helping in all aspects of my life. I would like to express my deepest gratitude to my advisors Dr.Tibebu Alemu and Mr. Dereje Bekele for their constructive suggestion and consistent advice starting from the beginning to the completion of this research work and also I would like to thank all the informants' participated and Menja community of Gimbo District for their willingness to share their knowledge about medicinal plants used in the study area. I would also like to thank Mr. Mengistu Meshesha for supporting me during the fieldwork. I would also like to thank Mr. Asamenew W/Gebre`el for his support during specimen collection and species identification. Furthermore, I express my gratitude to development agents and informants of the study area for providing me with all important information during the study. Jimma University also deserves gratitude for the financial support to undertake the study for other supports for accomplishment of my MSc class properly. Finally, I would like to acknowledge all of my family and other peoples who encourage me during my studies.

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Abbreviation and Acronyms

AYUSH	Ayurveda, Yoga and Naturopathy, Unani, Siddha, and Homeopathy (India)
ICF	Informant Consensus Factor
IBC	Institute of Biodiversity Conservation
FGD	Focus Group Discussion
MPs	Medicinal Plants
WHO	World Health Organization
SNNPR	Southern Nations Nationalities and Peoples Region
SPSS	Statistical Package for Social Science

ABSTRACT

Traditional knowledge of medicinal plants and their use by indigenous cultures are not only useful for conservation of traditions and biodiversity, but also for healthcare and drug development in the present and future generation. The main objective of this study was to identify and document medicinal plant species used by Menja community to treat human and livestock disease in Gimbo District, Keffa Zone of Southwestern Regional state of Ethiopia. A total of 92 sample respondents were selected by using simple random sampling technique. The data were collected by using semi-structured interview, focus group discussion with the selected 16 key informants and field observation. The collected data were analyzed by descriptive statistics, preference ranking, direct matrix ranking, Informants consensus and informant Consensus Factor. *A total of 59 medicinal plant species belonging to 36 families were identified. The most abundant growth forms of the medicinal plants were herbs and the least forms were climbers. About 44.1% were used to treat human, 33.9% species were used to treat livestock and the remaining 22% of species were used to treat both human and livestock. The most abundant families from the collected species were Asteraceae 11.9% followed by Fabaceae 8.5%, Apiaceae, Poeaceae and Rutaceae contained 5% of species in each and others were also identified in study area. The major threatening factors to medicinal were agricultural expansion, wood extraction, charcoal production, climate change, construction, over grazing, illegal encroachments, industrialization and urban expansion. It can be concluded that the study area is rich in various types of medicinal plant species and Menja communities of the study area are highly dependent on medicinal plant resource for themselves and their livestock health care. Menja communities of the study area are highly dependent on medicinal plant resource for themselves and their livestock health care. Traditional healers of Menja community should have to conserve the medicinal plants on their garden and teach the way to conserve to their neighbors in order to expand the knowledge of conservation.*

Keywords*: Abundant, Conservation, Medicine, Plants*

1. INTRODUCTION

1.1. Background and Justification

People around the world started manipulating remedial plants before the advent of modern or allopathic medicine to prevent various ailments (Tefera & Kim, 2019). The World Health Organization (WHO) reported that 80% of populations in the world depend on plants used in traditional medicine to alleviate a wide range of diseases (World Health Organization, 2010). Traditional knowledge of medicinal plants and their use by indigenous cultures are not only useful for conservation of traditions and biodiversity, but also for healthcare and drug development in the present and future (Andarge *et* al.2015; Gijan and Tussie, 2018). It should be noted that plants produce diverse natural products, including bioactive metabolites, phenolics and antioxidants (Khan et al., 2020; Bari *et al*., 2021)

In Ethiopia, there is a long history of using medicinal plants to treat a variety of diseases. Eighty percent of the human population and 90% of livestock in Ethiopia rely on traditional medicine, as many plants species have displayed medicinal value for some diseases of human and livestock (Gonfa *et al,*. 2015). The indigenous people in Ethiopia have developed their own specific knowledge to use, manage and conserve plant resources, which gave traditional medicine its diverse nature (Yimam *et al*., 2022). In addition to inadequate provision of modern medicine, culture-associated traditions and the relatively low cost of the plants used in traditional medicine were the major factors for the high dependency on traditional remedial plants in the country (Kidane *et al*., 2018).

The diverse ethnic groups, long history of using traditional remedial plants and the existence of different topography provide Ethiopia with an enormous traditional medicinal plant reservoir and indigenous knowledge (Tahir *et al*., 2021). However, most traditional knowledge is kept in secrecy because healers only pass on their knowledge to family members, mostly to the oldest son. Besides, indigenous knowledge on plants in Ethiopia is subject to loss since it is usually transmitted orally (Giday *et al*., 2003). Agricultural encroachment, firewood collection, charcoal production, plant use for house and fence construction, overgrazing, and urbanization were reported to be factors for the dwindling of natural vegetation in general and medicinal plants in particular. The ethno botanical knowledge on uses of some medicinal plants is secreted and transferred from one generation to the next orally (Megenase *et al*. 2019).

In order to serve the health needs, various conservation measures must be undertaken. Conservation is an act of careful preservation and protection of natural resources or habitats

of medicinal plants especially through planned management (Ministry of AYUSH, 2020). It will keep check on their rational and legal collection and maintain their biodiversity in the wild (Kasagana and Karumuri, 2011). The accelerated loss of species and habitat destruction worldwide has increased the risk of extinction of medicinal plants (Applequist *et al*., 2020). The conservation and sustainable use of medicinal plants have been studied extensively (Uprety et al., 2012). Various sets of recommendations have been compiled regarding their conservation, including the establishment of systems for species inventorying and status monitoring, and the need for coordinated conservation practices based on both in situ and ex situ strategies (Engels and Ebert, 2021).

According to Amde *et al*., (2020) the cause of threats to medicinal plants in the study area can be grouped into natural and anthropogenic factors. Menja people in the area of Bench Sheko, produce various productive products such as pots, cultural equipment such as "Kanta" for carrying agricultural produce, netting and hen coops, and firewood and charcoal. Menja people live on the edges of settlements, near the forest, and not within the community (Freeman & Pankhurst, 2003).

The Manjo people, who are believed to be indigenous to the area (Leikola, 2014), are forced to live far away from villages of people with regular status and occupied marginal areas not as such productive for farming (Chernet, 2008). Thus they are unable to harvest even for subsistence. Due to this fact, the Manjo regularly involve in non- farm sector such as hunting, exploitation of forest products like charcoal and firewood for sale. The income earned from this sector is insignificant that it compelled the Manjo to lead destitute life. They have also lesser access to social services such as education, health services and office woks, which in turn leads to further isolation (Tarekegn and Mengistu, 2019).

On top of this, the sector in which they involve has adverse impact on natural environment and wild life. In this regard describes that poor people often put unsustainable burden on the natural resources in their immediate environment (Goodstein and Stephen, 2017). Therefore, Menja community use more wild plants and animals to eat and for medicines for human and livestock treatment if they get sick. As the result the need for doing this research on this title is to assess and explore the medicinal plants they use from forest in traditional way for treatment.

1.2. Statement of the Research Problem

Ethiopia is endowed with diverse biological resources including about 6,027 species of higher plants, with approximately 10% endemic (IBC, 2014), hence making it one of the six

plant biodiversity rich regions and of these, more than 62.5% of the forest areas are found in southwest region of Ethiopia where most of the medicinal plants are confined and have been used as a source of traditional medicine to treat different human and livestock ailments (Yirga, 2010). A large proportion of the people living in the region depend on direct herbal medicine to treat a wide range of human ailments (Alebie, 2017).

Ethno botanical studies on medicinal plants in the country are limited when one considers the multiethnic and cultural diversity of the people, the diverse flora of the country, and the vital role played by traditional medicinal plants in the primary healthcare (Mesfin & Abebe, 2022). Greater numbers of medicinal plants are found in the south and southwestern parts of Ethiopia due to the high biological and cultural diversity in these regions (Anteneh *et al*., 2012). According to Gonfa *et al*., (2020), the result of study in Gera district showed that medicinal plants have continued to be the most affordable and easily accessible source for the treatment of several human and livestock ailments in Ethiopia. The local people exploit their shared knowledge to manage health problems at home by using different plants found around them, before looking for other options regardless of the type of health problem and its intensity in Gera District (Gonfa *et al*., 2020). Kassa et al. (2020) reported that most of the medicinal plant in Sheka zone used to treat human ailments (77%) and 19% of medicinal plant was used treat both human and livestock ailments.

However, the high population pressure and its related consequences like increased need for agricultural land, settlement, fuel wood, house construction and income generation have led to an extreme reduction of medicinal plant in all over their ranges (Behailu, 2010). According to Amde *et al*., (2020) the cause of threats to medicinal plants in the study area can be grouped into natural and anthropogenic factors. Mostly, anthropogenic factors affect the medicinal plants in the area are: agricultural expansion, firewood, charcoal preparation, timber, construction woods, medicinal plants trade for different uses, prolonged drought and wildfire and others are contributing factors to the loss of plant species in general and medicinal plants in particular. The result of the study in Decha district shows that one of the major problems with traditional medicine knowledge is the oral nature of the knowledge. Hence documentation ensures preservation of this delicate knowledge and ensures wider dissemination. It will also result in codification of best practices which can be transmitted across communities in developing countries (Zeleke et al. 2017).

Likewise in other parts of Ethiopia the study area is facing habitat loss and vegetation destruction due to human-induced factors. Also in the study area the ethno-botanical studies of medicinal plants have remained unexplored and no previous studies were conducted in the

area. This strong link suggests a need to conduct ethno-botanical research to document the medicinal plants and the associated indigenous knowledge and to identify threatened plants to take appropriate conservation measures to control further destruction. Therefore, this study was conducted to assess plant species which have medicinal value among Menja community, threats and conservation practices of medicinal plants and its role on forest conservation among Menja Community in Kaffa zone southwest Ethiopia.

1.3. Research Objectives

1.3.1. General Objective

The general objective of the study is to assess medicinal plant species, threats and conservation practices of medicinal plants and its role on forest conservation among Menja community, Kaffa Zone South west regional state of Ethiopia.

1.3.2 Specific Objectives

- ✓ To identify plant species which are used to treat both human and livestock ailments.
- ✓ To identify plant parts used for medicinal purposes, habits of plants, and habitats of different medicinal plant species.
- ✓ To identify the major threats to medicinal plants.
- ✓ To assess the conservation practices of traditional medicinal plants and its contribution to forest conservation in the study area.

1.4. Research Questions

- ✓ Which plant species are used to treat human and livestock diseases?
- ✓ Which parts of medicinal plants are used for treatment and what are the habits and habitats of the plant species?
- ✓ What are the major threats to medicinal plants in the study area?
- ✓ What types of conservation practices are used to traditional medicinal plants and how do these practices contribute to forest conservation in the study area?

1.5. Significance of the Study

Research works on ethno-botanical study and conservation of medicinal plants have not widely done in study area. There is no previous report indicating the conduct of research on documentation, way of utilization, conservation practices, way of transferring knowledge to generation and other issues related with ethno botanical study of medicinal plants among Menja community. The study aimed to generate scientific and modern information that would contribute to documentation, way of utilization, conservation practices, way of transferring to generation and other issues related with ethno botanical study of medicinal plants. The result

of this work may contribute to solve the problems described above and others. In addition, this study generated basic scientific information which might be relevant and used by concerned bodies and stakeholders who are working with science of ethno botanies of different types of wild and home garden medicinal plants species.

1.6. Scope of the study

This research was geographically limited to Menja communities of selected kebeles of the Gimbo district. Generally, the study addresses issues related to the plant species which have medicinal value used by Menja community, threats and conservation practices of medicinal plants and its role on forest conservation in case of Gimbo District. The specific focus of it includes: plant species which are used to treat human and livestock ailments, plant parts used for medicinal purposes, habits of plants, and habitats of different medicinal plant species, the major threats to medicinal plants and the conservation practices of traditional medicinal plants and its contribution to forest conservation in the study area.

1.7. Limitations of the study

It's difficult to address all issues related to plant species which have medicinal value used by Menja community, threats and conservation practices of medicinal plants and its role on forest conservation in case of Gimbo district due to time and finance resource constraints. The study is also limited to only 92 sample households in four kebeles of Gimbo woreda; Yeyibito, Michiti, Yeritechiti and Dakiti Kebeles in Gimbo district of Kaffa Zone, South Western Ethiopia. Therefore there were many limitations such as sufficiency of knowledge of informants, content of sample size and less encouragement of respondents to give available data were the major limitations of this study.

2. LITERATURE REVIEW

2.1. Ethno-botany and Historical View of Traditional Medicinal Plants

Ethno botany is considered as to encompass all studies which concern the mutual relationship between plants and traditional peoples .The term was first used by botanist named John W. Harshberger in 1895 (Balick and Cox, 1996). He defined as the use of plant by aboriginal peoples (Martin, 1995). According to Ford (1994), ethno botany is concerned a wide range of interest of plants in cultural and ecological context. As Cotton (1996) and other pointed out ethno botany has been developed over a year from simple listing into new scientific field with appropriate methodology of documenting and studying indigenous accumulated knowledge on plants which then brought quantitative methods rather than simple listing of plants (Andres, 2006).

Ethiopia has a long history of using traditional medicinal plants to combat disease through it and there is a large magnitude of use and interest in medicinal plants due to socio-cultural acceptability, accessibility, affordability and biomedical benefits of traditional medicinal plants (Dawit Abebe, 2001).

According to some literatures, in the world it was estimated that 25000 to75000 species of higher plants have been used in traditional medicine (Shimomura *et al*., 1997), and in Ethiopia more than 800 plant species are today used in traditional healthcare systems to treat nearly 300 health problems such as mental and physical disorders (Tesema Tanto, *et al.*, 2002). Generally plants have been indispensable and the most important source of both preventative and curative traditional preparations for human beings and livestock (Sofowora *et al*., 2013).

2.2. Indigenous Knowledge and People

Indigenous knowledge is the knowledge possessed by particular community passed though orally or practically from elders to their Youngers as a culture. Indigenous knowledge is knowledge originates from and a bound to local experience which is gained as result of careful observation, trial and error experiments (Martin, 1995). People who lived at certain place for considerable period and who developed knowledge through the day to day interaction to their environment, share knowledge through different means within and across community are considered as indigenous to the area (Barlindhaug and Corbett., 2014). 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 indigenous knowledge is important for sustainable use of resources and sustainable development (Thomas, 1995). The knowledge and application of traditional medicine is one of the widely used indigenous knowledge systems such type of knowledge is ethno medical knowledge which involves traditional diagnosis, collection of raw materials, preparations of remedies and its prescription to the patients (Bahil Etana, 2010).

2.3. Medicinal Plants in Ethiopia

Ethiopia is a country characterized by having wide range of climates and varied ecological conditions, possesses enormous diversity of flora and fauna (Pankurst, 2001). The country possesses a wide range of potentially useful medicinal plants, more extensive indeed than available in many other parts of the world (Abebe, 1986). Medicinal plant species are also part of those many plant species of the country and has long history. In Ethiopia animal disease is another problem which affects the productivity that people gain from rearing. Therefore the people (especially who engaged in the animal has boundary system) use traditional veterinary methods to treat livestock diseases. Plants comprise the largest component of the diverse therapeutic elements of traditional livestock health care practices (Tashale Sori *et al.,* 2004). In Ethiopia, mostly who lived in rural areas use plant derived medicine not only to their livestock but also to themselves and their families (Asfewu Debela, *et al.,* 1999).

Plants have crucial role in treatment of various health problem of human beings starting from ancient time (Fikadu Fullas, 2007) .There are different species of plants are used by different society in traditional way but with only few scientific investigation. Pharmaceutical industries and western research 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 Vanwiik, 1993). Generally plants are used as primary solution for health problem especially for people living in rural areas (Dawit Abebe, 1986).

2.3.1. Plant parts used for medicinal purposes

Different studies showed that different parts of plants were used for medicinal value. According to Megrsa and Woldetsadik (2022) the local communities used different plant parts leaves, fruits, seeds, shoots, roots, barks, flowers, bulbs, sap, stem, leaf and flower, leaf and seed, and rhizome) to prepare traditional medicine. The study by Made et al. (2020) showed that the widely used plant part for the preparation of the remedies in the study area were leaves, followed by roots and seeds. The plant parts which are mostly used for the preparation of the remedies in the study area were leaves and harvesting of leaves has less

impact due to some leaves are leftover on the mother plant (Mulugeta, 2024). Every part of different plant species is used against a variety of ailments and, the most commonly used part is the leaf. In some cases, more than one organ of the same plant species, particularly a combination of parts, is used in the preparation of different therapies. It was also observed that the indigenous people have deep knowledge and age old experience in the right mix of different plant parts to get better treatment of the given ailment (Amsalu *et al*., 2018). Utilization of leaves for drug preparation may not cause detrimental effect on the plants compared to the root (Getachew, 2020).

2.3.2. Habits of plants and habitats of different medicinal plant species

Herbs and shrubs were widely used in the study area. This might be owing to the relatively higher abundance of those species in the study area (Getachew, 2020). The study by Mekonnen *et al*. (2022) showed that the most widely used medicinal plants habit in the study area were herbs followed by shrubs. 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. The majority of medicinal plants used were herbs and most of the medicinal plants were obtained from the wild (Kebebe *et al*., 2022). Most of the medicinal plant species are found in wild forests (Mirutse G., 2007).

2.4. How Knowledge of Traditional Health Practitioners Transferred

Popular knowledge of plants used by human is based on thousands of years of experience, by trial and error people learnt how to recognize and use plants including those with magic religious function. Even though these knowledge is popular knowledge of the community few individual attain the detail knowledge about plants that are remedy for various ailments. Such specialists were limited only to those recognized by the community as the knowledgeable person. The narrow possession of the detailed and specialized knowledge because of the system of knowledge transfer which is closed and highly secrete (Miruse Giday, *etal.*, 2003). The local practitioner usually shares their knowledge and mechanism to use plants to their relative or family only (Cunnighum, 1996).

2.5. Threats to Medicinal Plants

According to Birhanu *et al., (2022)*, medicinal plants of Ethiopia as elsewhere in Africa was highly threatened. Nowadays herbal practitioners have to walk far distances for the collections of herbal medicines. This is because of availability of plants in general and medicinal plants in particular have been affected by dramatic decrease in areas of native vegetation. Medicinal plants are at conservation risk due to overuse and destructive

harvesting like root collection (Abebe and Teferi, 2021). As a general, overgrazing, drought, firewood collection, charcoal production, urbanization, agricultural expansion and constructions are the major threated factors to medicinal plants and all vegetation (Morka and Duressa, 2021).

Urbanization is the major threats to medicinal plants and associated knowledge. The degradation of medicinal plant and/ or tax is one of the causes for the losses of the associated knowledge of the plants. The other reason for the losses (threats) of the knowledge of medicinal plant is modern school and refusal to inherit/ practice the knowledge by new generation. The expansion of modern health institutions, schools some environmental and cultural modifications reason for the losses (threats) of the knowledge of medicinal plant (Tilahun, 2021). In addition, Usage of medicinal plants for other purpose than their medicinal value leads to the overexploitation of medicinal plants (Tefera and Kim, 2019). Even though, there are threats to medicinal plants and associated knowledge, the significant numbers of the local people of the area know the importance of conserving the plants. Some people have started conserving the plants by cultivating in home gardens, live fences of the gardens, plantation fields, and so on (Siraj and Azmeru, 2023)

2.6. Conservation of Medicinal Plants

Conservation of medicinal plants refers to the use of medicinal plants in a sustainable way and when necessary conserving those species which are critically endangered. According to Abebe Demissie (2001), conservation should be aimed at conserving maximum diversity within each species to make available for future generation.

Sustainable use of medicinal plants has now grown to be a current issue in Ethiopia because of resource degradation in the lowland and highlands (Yeshiwas et al., 2019). Experience from South Africa would be essential to develop innovative methods for harvesting individual plants (Van Wyka & Prinsloo, 2018). There is some conservation action that has been undertaken around the world designed to protect threatened medicinal plants from further damage (Chen et al., 2016). This includes in-situ and ex-situ conservation measures. In-situ conservation is the conservation of species in their natural habitat. Some medicinal plants have to be conserved in-situ due to difficulty for domestication and management (Bizuayehu & Assefa, 2017; Doffana, 2017). Medicinal plants can be conserved by encouraging their growth in special places; this can be possible in places of worship. They are

usually located close to the homestead; home gardens can accommodate women's food production and household responsibilities (Chen et al., 2016).

Medicinal plants can be conserved using appropriate conservational methods in gene banks and botanical gardens (Zerabruka & Yirga, 2012). Conservation of medicinal plants can also be possible in the home garden, as the home garden is an intentional and perfect farming system for the conservation, production, and improvement of medicinal plants (Amsalu et al., 2018). For poor rural people, medicinal plants represent affordable and locally available resources to address many diseases and health problems. Besides, the damage to valuable medicinal plants due to population pressure, agricultural expansion, and deforestation is extensively reported by the different researchers (Kebede et al., 2017).

3. MATERIALS AND METHODS

3.1. Description of Study Area

3.1.1. Location

The study was conducted in Gimbo district, Kaffa Zone, Southwestern Peoples Region state of Ethiopia. The district is divided in to three municipalities (Ufa, WushWush and Gojeb) and 32 kebeles. Ufa, the administrative center of Gimbo district is found 18 km away from Bonga, the center of the zone and 460 km far from Addis Ababa. The altitude of the area ranges between 1001 to 2000 ma.sl. It is found within the geographical location lies within 7°14'0"- 7°34'0"N latitude and 36°0'0"-36°30'0"E longitude (Figure 1). According to the extrapolated data population data of 2023, the woreda has a population of 125026 people and a total area of 832.5 km2.

Ethiopia has a population of more than 115 million people with over 90 ethnic and Linguistic groups in the country (UNESCO, 2020). One of these groups is the Menja ethnic group, which is located in the southwest of the country. Menja people in the area of Bench Sheko, produce various productive products such as pots, cultural equipment such as “Kanta” for carrying agricultural produce, netting and hen coops, and firewood and charcoal. Menja people live on the edges of settlements, near the forest, and not within the community (Freeman & Pankhurst, 2003). So as to bench sheko zone, Menja people in Kaffa zone live on the edges of settlements, near the forest, and not within the community in Kaffa zone.

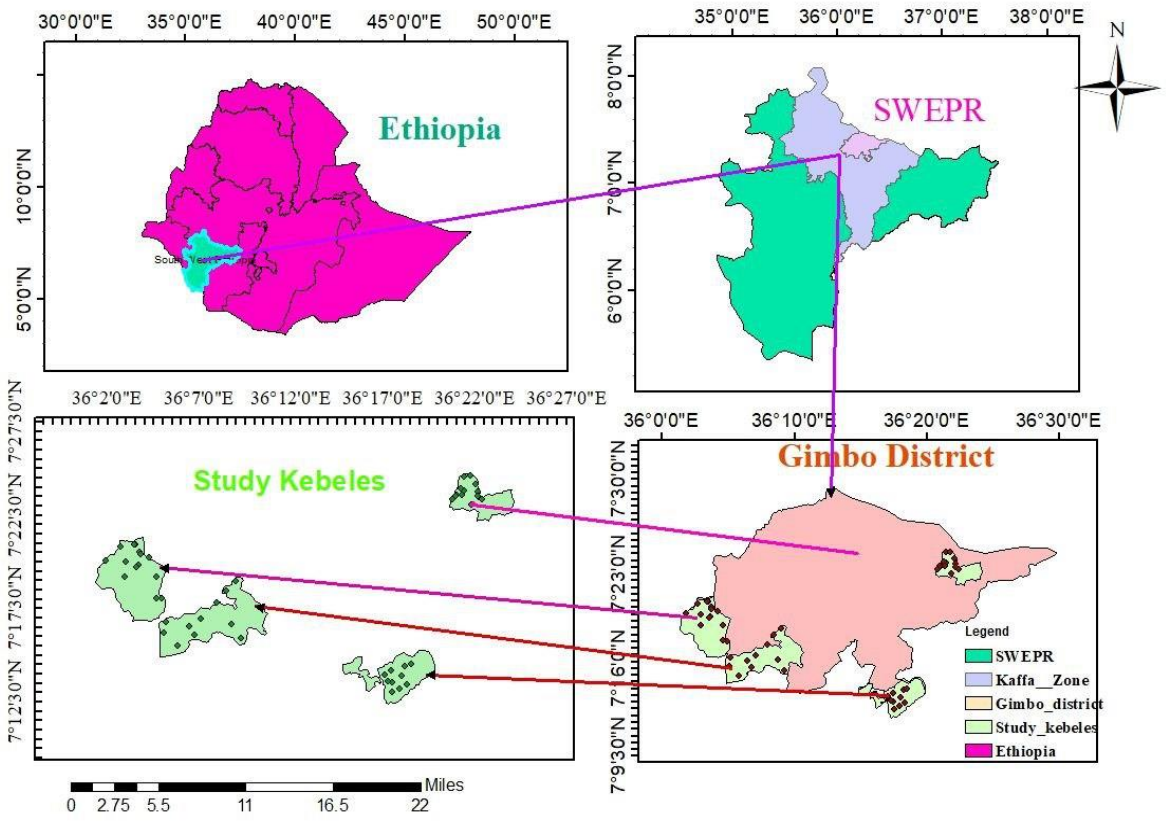

Figure.1. Study area map

3.1.2. Climate

The mean annual temperature ranging between 15.1^{0}C and 22.5^{0}C.The warmest months are February, March and April while temperature drops during the peak rainy months due to the effect of cloud cover (Ayele Kebede, 2011). Gimbo woreda is one of the parts of the southwest Ethiopia highlands which receive the highest amount of rainfall in Ethiopia. The annual rainfall of the woreda is between 1401-2000 mm. The largest amount of rain occurs between May and September. The peak rainy months are June, July and August while December, February, March and April are relatively the drier months (Ayele Kebede, 2011).

3.1.3. Land Use, vegetation and soil

The major land cover of Gimbo Woreda is forest and agriculture associated with human settlement. The forests found in the study area are among the remnant forests in Ethiopia where, different kinds of mammals and birds dwell. The main sources of livelihood are forest utilization, livestock rearing and agriculture (Aklilu et al. 2014a). The most income sources of the population are from small-scale agriculture, wild coffee and other non-timber forest products (Worku, 2015). The forest in this region fragmented with some undisturbed forest parts and large areas of degraded and disturbed forest. Forest in the study area is classified in the vegetation of Ethiopia referred to as moist evergreen mountain forests and located within

altitudinal range of 1100-2700 m. above sea level. The forests in this area are normally the richest in species (Friis et al. 1982) and a source of fuel wood, charcoal and timber (Ensermu and Teshome, 2004).

3.1.4. Socio economic activities and livelihood of the study area

In Gimbo woreda the major livelihood activity is agriculture, though people are also engaged in homestead husbandry. The main agricultural crops cultivated in the woreda are maize, sorghum, teff and haricot bean. In addition to agricultural crops coffee, honey and tea are important means of income in the woreda as cash crops. Cattle, sheep, goats, poultry, donkeys, horses and mules are the major livestock kept by the farmers. According to Yoshida (2008), "Today, most Manjo engage in farming. The lifestyle of the Manjo no longer differs from that of the Kaffa farmers who cultivate staples for food, including maize, sorghum, wheat, barley, tef, enset, beans, and so. Some Manjo cultivate coffee as a cash crop and keep bees, and some are even wealthier than the Kaffa. Like the Kaffa, the Manjo have cows, bulls, goats, sheep, fowl, horses, and so on. Those Manjo who do not own enough land to farm may make their living by selling firewood and charcoal. In this regard the Manjo are now far from being "hunters". The Manjo are also poorly participating in livestock farming. For instance, it is believed to be taboo for a Manjo to eat mutton. Hence, as stated above, the Manjo are dominantly engaged in hunting, firewood and charcoal production and sale as well as pottery. The tradition of hunting among the Manjo people is related to their mythical legend. Because as it has been indicated earlier, the Manjo was believed to have emerged from the ground with net signifying their fate of livelihood (Tarekegn and Mengistu, 2019).

3.2. Research Design

Gimbo Woreda was selected purposely due to the presence of Natural forest and the Menja community who use traditional medicines around forest area as well as from their farm lands. The study was conducted on four Kebeles, namely Yeyibito, Michity, Dakiti, and Yertechiti from 35 kebeles in the study district which are purposely selected based on the presence of Natural dense forest and Menja community who highly dependent on forest for their everyday livelihood activities and for medicines.

3.3. Sampling Techniques and sample size determination

Lists of total household heads that live around the forests and who use the traditional medicines from the forest were selected from the above kebeles. Then the households for this study were selected by using a simple random sampling technique to obtain the desired

sample size. Therefore, the study area have total household of 670. In the final stage, a total sample household heads was determined by using the (Cochran,1977) formula,

$$n = \frac{z^2 p(1-p)N}{e^2(N-1)+p(1-p)z^2}$$

Where,

n=required sample size

N= total households

z = the table value of chi-square for degree of freedom with a desired confidence level (95%)

p = an estimate of the household proportion

e= the degree of accuracy expressed as a proportion (5%). By using this formula and considering the knowledgeable age of the community the size for this study was 92.

3.4. Data Type and Sources

Both qualitative and quantitative forms of data collected from primary and secondary sources were analyzed in this study in accordance with its objectives. Primary data directly collected from respondents include socio-economic and demographic data, name of medicinal plants, habitats of medicinal plants, threats to medicinal plants and conservation practices. Additionally, secondary data was gathered from already-existing sources, such as books, research reports, dissertations, and published and unpublished literature.

3.5. Tools of Data Collection

3.5.1. Reconnaissance survey

An ethno-botanical reconnaissance survey which focuses on gathering preliminary information about the knowledge and use of medicinal plants in a Menja community was conducted in the study area. This initial assessment helped as guide further in-depth studies on medicinal plants and the healing practices of Menja community. The study sites were selected purposively based on the recommendation from elders, local authorities, and those knowledgeable persons.

3.5.2. Key Informant selection

Sixteen key informants who have knowledge about medicinal plants were selected purposively from the Menja Community of the study area to see the general knowledge of medicinal plants and conservation status depending on their willingness to participate. The selection of informants were followed the methods described by Martin (1995), who indicated that when recording indigenous knowledge controlled by Ethno botanical healers or by certain social groups the selection of key informants is important. Local healers of Menja

community from Menja communities alone were considered as key informants since they are expected to have intensive knowledge of medicinal plants.

3.5.3. Ethno-botanical information

Ethno botanical data like local name of plants, habitats of plants, parts of plants used for medicine, threats and conservation practices of medicinal plants were collected between July and November 2023 based on mainly forest, agricultural field and home-garden tour; semi-structured interview; preference ranking, direct matrix ranking and paired comparison with the selected knowledgeable elders who have knowledge on medicinal plants by applying the methods recommended by Martin (1995) and Cotton (1996). The interviews and discussions were conducted in Kafinono language. Interviews were undertaken in a place where the interviewees were comfortable and free to express their ideas.

3.5.4. Free- listing

Free listing is one of the initial steps in collecting ethno-botanical data. Based on this, twenty three or quarter part of informants were randomly selected to list categorically plant species used for medicinal purpose for Menja community around their environment using their local names that helped to characterize variation in medicinal knowledge and practices among the users of a traditional medicines.

3.5.5. Semi-structured interviews

A pre- prepared interview questions with traditional medicine users were used during data collection such as specific ailments treated with each plant, methods of plant preparation and administration, …etc (Appendix 1). Some of the interviews and questions arose during the time of conversation to collect data regarding the management and conservation practices of medicinal plant species, to what extent conservation practices are undertaken by the people in their home gardens, forest and agricultural lands as well as for what purpose do people, in the study area use the plants (household food supply, construction, fuel wood production for use and for sale, fencing and other purposes).

3.5.6. Plant specimen Collections and identification

During field vegetation data collection with informants, local names, habits and uses of each plant were recorded, numbered, pressed and dried. The identification of the plant specimens was done using different volumes of Flora of Ethiopia and Eritrea books, useful trees and shrubs of Ethiopia. All taxa collected were brought back for identification using taxonomic keys and Flora of Ethiopian and Eritrea and by comparison with already identified specimens that are deposited at National Herbarium (ETH), Addis Ababa University. The exactness of

identification respective to their scientific names was checked and confirmed by experts in the field.

3.6. Data analysis

3.6.1. Descriptive statistics

The collected data was recorded, coded, and stored using Microsoft Excel for Windows 2010. The collected ethno botanical data was analyzed using Statistical Package for Social Sciences software version 27 (SPSS V.27). Thereafter, the most useful information gathered on medicinal use, plant habit, factors threatening medicinal plants, and conservation status of medicinal plants were analyzed by using descriptive statistics. Descriptive statistics such as tables, graphs and charts were used to describe and synthesize data.

3.6.2. Quantifying Medicinal plants

3.6.2.1. Preference ranking

A preference ranking technique was employed with informants to rank some selected medicinal plant species according to their purpose or desirability. According to Martin (1995), preference ranking is one of the methods used to rank five to seven items and arrange those items based on a given criterion. Each rank is given an integer value, 1, 2, 3, 4 and 5 and so on with the most important item given the highest value, while the least important assigned the smallest value. The seven informants were given seven medicinal plant species frequently used for treating wound and asked to arrange them based on personal preferences. The plant believed to be the most effective for treating wound one gets the highest value and the one with the least the lowest value. The numbers are summed for all respondents, giving an overall ranking for the items by the selected group of respondents.

3.6.2.2. Direct matrix ranking

Direct matrix ranking, according to Martin (1995), is one of the analytical tools which involves asking people to order their favorite plants used for medicinal value by taking into account several attributes (medicinal, construction, spices, food and food and medicinal, fuel wood) at a time. For each order, a numerical scale was given in which the highest number would be given the highest value “best” item and the lowest number given to the lowest value “worst”. Based on information gathered from selected informants, seven multipurpose tree species were selected and the informants asked to assign value to each attribute (5 = best, 4 = very good, 3 = good, 2 = less used, 1 = least used and 0 = not used). In the end, the results of seven respondents were summed up to create a matrix that represents the community.

3.6.2.3. Informants consensus

In ethno-botanical studies of medicinal plants, informant consensus refers to the level of agreement among community members (informants) on the use of particular plants to treat specific ailments. It's a statistical method used to identify plants that are potentially more effective or widely recognized for their medicinal properties within a community. In order to evaluate the reliability of information recorded during the interview, informant consensuses values were computed based information gathered. During the course of the study, each informant was visited two times in order to verify the reliability of the data collected. If the information is not held true the original information with what was said during the second visit, the information was considered unreliable and was rejected. High informant consensus for a plant species suggests that it's frequently used and trusted by the community to treat a particular condition. This can be a valuable indicator for further research into the plant's potential medicinal properties.

3.6.2.4. Informant Consensus Factor (ICF)

This is a mathematical formula used to quantify the level of agreement among informants. It considers the number of citations (reports) of a plant used for a specific ailment compared to the total number of species mentioned for that ailment. Values closer to 1 indicate high agreement among informants about a plant's use for a particular condition. Values closer to 0 indicate low agreement or random reporting of plant use.

According to Heinrich et al. (1998), ICF is calculated using the following formula:

ICF = (Nur - Nt) / (Nur - 1)

Nur = Number of use reports (citations) for a specific ailment category

Nt = Number of plant species mentioned for treating that ailment category

4. RESULTS AND DISCUSION

4.1. Demographic and Socio economic Information of respondents

Out of 92 respondents from which 72 (78.3%) were males and 20 (21.7%) were females. The respondents were aged from 15-above 60. Majority of the respondents aged from 46-60 (47.8%) followed by age group of 31-45 (26.1%) followed by age group above 60 years(22.8%) and finally followed by age group of 15-30 (3.3%). The distant of the respondents to the forest is also assessed and the result shows that the majority of the respondents 76.1% were vicinity to the forest about distance of < 5km followed by 21.7 % 5-10 km and finally the remaining 2.2% of the respondents were far apart more than 10km from the nearby forest.

Table 1: Demographic and Socio economic Information of respondents

Characteristics		N	Percent
Age of the Respondents	15-30	3	3.3
	31-45	24	26.1
	46-60	44	47.8
	above 60	21	22.8
Educational level of the respondents	Illiterate	44	47.8
	Read only	29	31.5
	1-8	15	16.3
	Grade 9 and above	4	4.3
Marital status of the Respondents	Married	59	64.1
	Single	4	4.3
	Divorced	14	15.2
	Widowed	15	16.3
Distance from the forest	up to 5	70	76.1
	5-10	20	21.7
	>10	2	2.2

4.2. Ethno medicinal plants used to treat human and livestock disease

A total of 59 medicinal plant species belonging to 36 families were collected and documented which are frequently used for treating human and livestock ailments of Menja Community in Gimbo District as indicated in appendix (II). Among the above families, *Asteraceae* is the leading and contains the highest number of species 7 (11.9%), followed by Fabaceae 5 (8.5%), Apiaceae 3 (5%), *Poaceae* 3 (5%), and *Rutaceae 3 (5%)*. Five families including, *Euphorbiaceae*, *Zingiberaceae*, *Musaceae*, *Lamiaceae* and *Moraceae* contain 2 (3.4%) species each. Lastly the remained 28 families contain 1 (1.7%) of species with in each family. Other similar studies in Ethiopia (Teka *et al*. 2019; Assefa *et al*. 2021; Megersa &Woldetsadik, 2022) have also found that Asteraceae are the major suppliers of medicinal

plants. In addition, Fabaceae (Alemneh 2021), *Rutaceae* (Megersa &Woldetsadik, 2022) Euphorbiaceae (Mamo and Abraha, 2021, and Lamiaceae (Tuasha *et al*. 2018; Tamene *et al*. 2020) were found to be dominant in the study conducted in Damot woyde district of wolaita Zone, Berbere District of Bale Zone, Gurage zone , Yilmana Densa and Quarit Districts of West Gojjam Zone respectively.

Among this species majority of them 26 (44.1%) are used to treat Human followed by both human and livestock 20 (33.9%) and finally for only livestock 13 (22%). Similar results were obtained from the study of (Megersa &Woldetsadik, 2022; Assen *et al*. 2021) conducted in other parts of Ethiopia where the local peoples use more medicinal plants to treat human diseases than livestock diseases. That could be because people prefer human health problems over livestock health problems, as Kassa *et al*. (2020) justified referred by Megersa and Woldetsadik, (2022).

Compared to previous studies conducted in Ethiopia in terms of number of medicinal plant species, the present study found a low and high number of medicinal plant species. For example, Kassa *et al*. (2020) collected 266 plant species used by Sheka zone communities to treat human and livestock diseases. On the other hand, Teka *et al*. (2019) reported 244 medicinal plants used by Gurage communities. In a similar with current study, Alemneh (2021) collected 112 medicinal plant species in the Yilmana Densa and Quarit districts of the Amhara region. Therefore, the three authors reported more medicinal plants than the present study. Whereas, Megersa &Woldetsadik (2022): Belayneh *et al*. (2012) and Assefa *et al*. (2021) reported 57, 51, and 30 species of medicinal plants, respectively. The difference in the number of medicinal plants could be due to the vegetation of the study area, the number of informants of participant community in the study, the timing and duration of data collection, and the culture.

4.3. Plant parts used for medicinal purpose, habits, and habitats of different medicinal plants

4.3.1 Plant Part Used to Treat Human Ailments

From the total plant parts used for remedy preparation the leaves and the seeds were the most commonly used plant parts for medications. The most widely used plant part for the preparations of medicines were leaves, which accounted for 21 (35.6%) followed by seeds 8 (13.5%), shoot 5 (8.5%), both leaf and seed 5 (8.5%), followed by Bark 4 (6.8%), latex 3 (5%), Root 2 (3.4%), Root and bark 2 (3.4%), and others with the same frequency and

percentage 1 (1.7%). They more prefer leaf because of it is easy to collect and prepare for medicinal purposes.

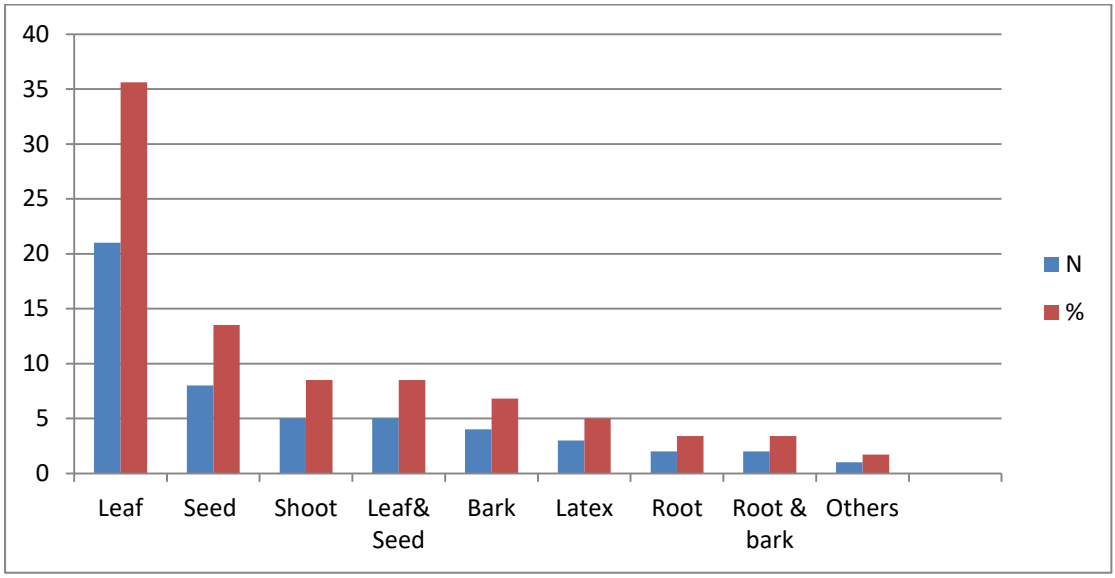

Figure 3. Plant parts used for medicinal purposes

Different research groups reported that leaves or roots are the most important plant parts for preparing traditional medicines in Ethiopia and elsewhere in the world. Among the researchers who reported leaves as the most important part in Ethiopia (Alemneh 2021; Assen *et al*. 2021; Assefa *et al*. 2021; Megersa &Woldetsadik, 2022) widely used plant parts for the preparation of traditional medicine. The preference for leaves over other plant parts is due to their easy availability and simplicity of drug preparation by any family member of the community.

4.3.2. Forms of growth and Habitats of Medicinal Plants

In the study area there are many habits of medicinal plant those are herb, shrub, tree, grasses and climber. The result of analysis of growth forms of medicinal plants revealed that herbs constitute the largest category 21 (35.6%) followed by tree 17 (28.8%), shrubs 13 (22%), Climbers 6 (10.2%) and grasses 2 (3.4%) were recorded. Similar studies conducted in Ethiopia reported the dominance of herbs or shrubs in the use of medicinal plants. Kassa *et al*. (2020) reported that most medicinal plants collected in the Sheka zone were herbaceous species. Also study by Wendimu *et al*., (2023) showed that herbs made up the largest share with 21 species (68%). According to Tefera and Kim (2019), the local communities of Hawassa Zuria District collected herbaceous plants for making traditional medicine. The high use of herbs could be due to their relative abundance and accessibility as a result of the

relatively high availability of herbs for the practitioners (Kassa *et al*. 2020; Wendimu *et al*., 2023).

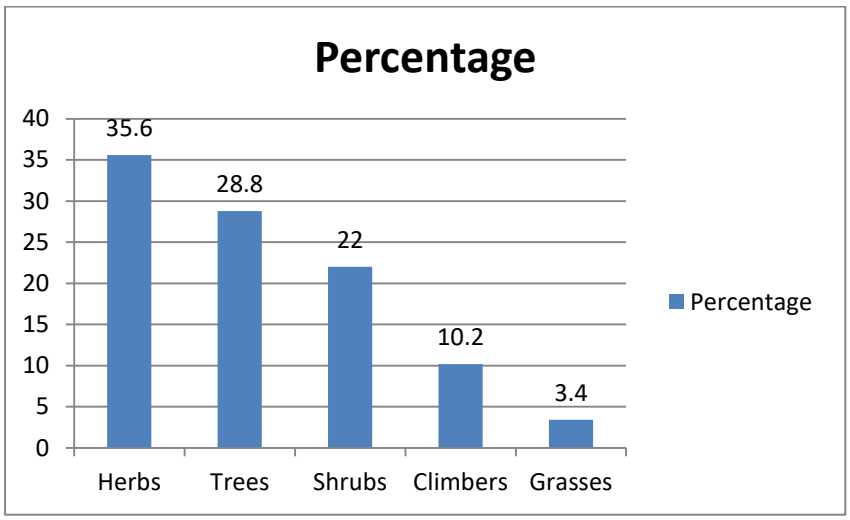

Figure 2: Habits of Medicinal plants

In terms of the habitats of medicinal plants majority of the plants above 37 % were found in both forest and farm land or agricultural land followed by home garden plants 22%, Forest plants18.6%, followed by Farm land plants 13.6% and 6.8% found in both farmland and home garden. Most of the plants found at the garden are planted not only for the medicinal purposes but also for food and spice purposes. This indicates that most of the medicinal plants are multi purposes plants. According to the respondents and focus group discussion most of the medicinal plants were multi purposes plants like timber, charcoal, food, spice, firewood, fencing and house construction purposes.

Table 2: Habitat of the plants in the study area

Habitat of the plants	Frequency	%
Home garden	13	22
Farm land	8	13.6
Forest	11	18.6
HG and FL	4	6.8
FL and Forest	22	37.2
Everywhere	3	5
Total	59	100

4.4. Threats of medicinal plants

In the study area there were many factors reported as the major cause to decline of medicinal plants and other plants. The major factors reported are agricultural expansion, fire wood extraction, illegal encroachment, Overgrazing and industrialization. The result showed that

agricultural expansion is highly affecting with percentage of 24.2%, followed by wood extraction 19%, Other Reasons collectively 16.4%, Illegal Encroachment 15.6%, Overgrazing 15.1%, and the remaining urbanization and Industrialization covers 5.1% and 4.6% respectively as shown in the figure 4 below. In addition to this threats or factors Focus group and key informant discussion revealed that there are other reasons like over harvesting of medicinal plants, extracting medicinal plants for other purposes like food, fodder, timber production, spices Habitat Destruction, Climate Change and lack of awareness and conservation efforts about medicinal plants. The development and expansion of modern medication also reduced the concern and attention of traditional medicinal plants that leads it to non-useful and to be given less attention and as the result some plants become threatened. The previous vegetation site has been changed drastically and the most useful plant species are at risk and they are on the way to be vanished. Similarly, the findings of Megersa *et al*. (2013), and Chekole *et al*. (2015) indicated that intense deforestation became the major threat on MPs in their respective study sites. Berhanu et al. and Kefalew *et al*. (2015) also reported that agricultural expansion was the major factor contributing to the local decline of medicinal plants.

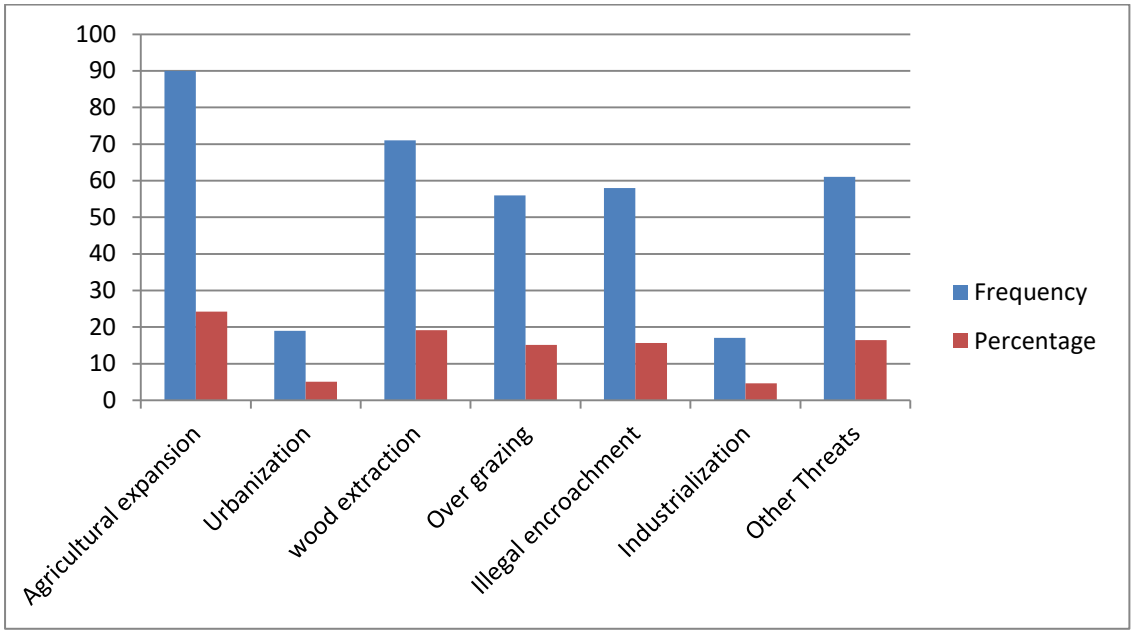

Figure 4: Threats to medicinal plants in the study area

The major threats to medicinal plants in the study area were mostly anthropogenic factors such as: agricultural expansion, urban expansion, illegal encroachment, firewood, charcoal preparation, timber, construction woods, medicinal plants trade for different uses such as food, spice and others are contributing factors to the loss of plant species in general and medicinal plants in particular. Similar findings were also reported in Ethiopia by Amde *et al*.,

(2020), Chekole *et al*. (2015) and Behailu (2010) that showed the need for agricultural land and for other uses severely threatened plant species in general and medicinal plants in particular.

The result of this study shows that there is extremely decreasing of medicinal plants in the study area. 96.7% of the respondents revealed that medicinal plants are decreasing highly and only 3.3% of the respondents revealed as there is stability of medicinal plants used by Menja community. In terms of endangered species in the study area, majority of the respondents 71.7% revealed that there is endangered species and the remaining 28.3% revealed that there is no endangered species. This indicates that respondents who have knowledge on Medicinal plants identified endangered species and those who have no enough knowledge cannot identify the endangered species.

Table: 3. Endangered species in the study area

Scientific name	Family	Local Name
Artemisia afra Jacq. ex Willd.	*Asteraceae*	Aa'I macoo
Cordia africana Lam.	*Boraginaceae*	Di'o
Dalbergia lactea Vatke	*Fabaceae*	Bitii bitoo
Ensete ventricosum (Welw.) Cheesman)	*Musaceae*	Taaye Uuxo
Echinops kebericho Mesfin	*Asteraceae*	Qapheroo
Nigella sativa L.	*RanuncuIaceae*	A'aafo
Solanum americanum Miller	*Solanaceae*	Achoo
Lepidium sativum L.	*Brassicaceae*	Shiippoo
Trigonella foenum-graecum L.	*Fabaceae*	Giraaro

4.5. Conservation Practices of Traditional Medicinal Plants

The Menja community in southwest Ethiopia relies on medicinal plants for their healthcare needs. But there are no that much enough conservation activities for medicinal plants in the study area. The result of this study shows that majority of the respondents used the medicinal plants which are grown naturally and by planting it in home garden. But the reason for planting is not more for conserving, rather the plants are not forest plants and some of them are planted by fearing to travel to forest.

Table 4: Way of adapting medicinal plants

Way of adapting medicinal plants	Responses	
	N	Percent
Naturally Grown	4	4.3

By Planting	6	6.5
By Both Ways	82	89.1
Total	92	100

The result of the study shows that majority of the respondents revealed most of the plants adapted by both planting and naturally grown which accounts for 89.1% followed by planting 6.5% and naturally grown 4.3%. In terms of planting the medicinal plants majority of the respondents plant the medicinal plants because of the plants are not forest plants which accounts for 76.7% followed by to conserve 22.4% and finally the reason for planting medicinal plants is fear of travelling to forest which accounts for 0.9%. This shows that there is no enough knowledge for conservation of medicinal plants in the Menja community. Also the study revealed that there are low conservation projects in some of the study areas. The study revealed that majority of the respondents 68.5 % responded as there is no conservation project and the remaining 31.5% responded as there is conservation project. But the projects are working for not purpose of medicines instead they are organized for general forest conservation and other purposes like spices production. Also the contribution of these projects are only organizing people and giving direction but do not support any financial cases. Some studies are related with this result, such as; some traditional practitioners in the study area have brought the different curative plans from different corners and started to conserve these Medicinal plants by cultivating at home gardens (Amsalu *et al*., 2018). Asfaw (2001) in his findings reported that the home-garden is a strategic and ideal farming system for conservation, production, and enhancement of Medicinal plants and valuable Indigenous Knowledge. The same information was also documented by Behailu (2010).

4.6. Knowledge share of Knowledge of Medicinal plants

According to the survey, knowledge transfer of medicinal plants is most of the time orally and it passes secretly for selected family members, especially who trusted and respecting traditional practices. The highest number of transfer of knowledge about the medicinal plants is secretly to trusted family members that accounted for (53.3%) followed by partially for some selected relatives and friends (41.3%), and others remaining (5.4%) respondents revealed that knowledge transfers freely for those peoples who want to know about it. The findings of the study showed that as people become older and older their knowledge of traditional medicine becomes better. This result was line with some previous reports from Ethiopia such as (Tefera and Kim 2019; Desalegn *et al*., 2022).

The result about knowledge of traditional medicines shows that elder men know more with percentage of 51.4%, followed by elder women 39.5%, young men 7.9% and young women

1.1%. Older people have knowledgeable of medicinal plants and plays a critical role in transferring traditional medicinal knowledge on medicinal plants to the next generation orally. There are other studies that support this idea, such as (Tefera and Kim, 2019; Kassa *et al*. 2020; Abebe 2021; Desalegn *et al*., 2022).

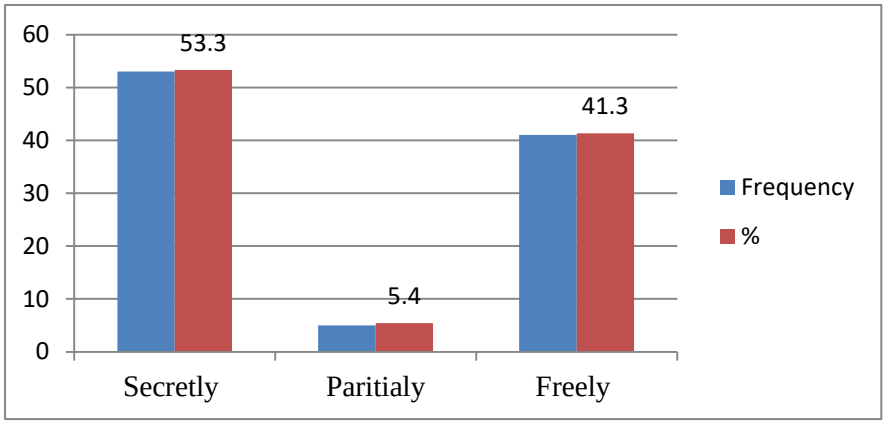

Figure 5: Knowledge with in the Menja community

Also male peoples know more about traditional medicines than women because of men always work outside and women work more in house and also male discuss freely each other about medicine because of they can have chance for meeting at day to day activities than women. Most of the informants were elders that indicated the trend of transferring knowledge is usually at old age. In terms of the perception of the community to accept knowledge transfer the respondents revealed that there is low perception of community to accept 54.3% followed by medium 26.1, very low 17.4 and 2.2% revealed as high perception. As key informants and focus group discussion the respondents revealed that young people have no willing to accept traditional medicinal plants and considers traditional medicinal users back ward peoples. But some of the respondents revealed that some young people accept knowledge transfer when the elders and knowledge full peoples have willing to transfer.

4.7. Quantifying Medicinal plants

4.7.1. Informant consensus

From the total traditional medicinal plants identified, ten traditional medicinal plants were identified as the commonly known and used species by the local communities in the study area. The outcome of this study showed that some of the medicinal plants are popular and had the highest informant consensus. *Zingiber officinale* ranked first mentioned by 70.6% of informants. The popularity of this medicinal plant is due to people's preference for the species to treat malaria illness, cough and stomach ache in the community by collecting it from the home gardens and by buying it from nearby market places. Subsequently, *Ocimum*

lamiifolium was ranked second mentioned by 67.4% informants while *Ruta chalepensis* was ranked third which is mentioned by 65.2 % informants.

Table 5: Informant consensus of medicinal plants

Scientific name	Local name	Informants' agreements (%)	Rank
Zingiber officinale Rosc.	Yanjiballoo	70.6	1st
Ocimum lamiifolium Hochst, ex Benth	Daamo	67.4	2nd
Ruta chalepensis L.	Caddiiraammoo	65.2	3rd
Prunus africana (Hook.f.) kalkm	Oomo	60.9	4th
Cordia africana Lam.	Di'o	60.9	4th
Trigonella foenum-graecum L.	Giraaro	57.6	6th
Lepidium sativum L.	Shiippoo	57.6	6th
Ekebergia capensis Sparm	Orooroo	54.4	8th
Piper capense L.f.	Turifo	46.7	9th
Lagenaria Siceraria (Molina) Standl.	Buqqoo	42.4	10th

4.7.2. Preference Ranking

If a number of species are prescribed for the same ailment, people would tend to show preference of one over the other. Thus, preference ranking of seven MPs which were used for treating wound was conducted after selecting seven key informants. The informants were asked to compare the given MPs based on their preference and to give the highest number (5) for the medicinal plant which they thought most effective for treating wound and the lowest number (1) for the least effective plant in treating the wound. The results showed that *Prunus africana* was the most preferred for treating wound followed by *Rhamnus prinoides* and *Geranium arabicum* as indicated in the table 6 below.

Table 6: Preference Ranking of medicinal plants used to treat wound

List of medicinal plants	Respondents (R1–R7)								
	R1	R2	R3	R4	R5	R6	R7	Total	Rank
Prunus africana (Hook.f.) kalkm (Oomo)	4	5	5	5	4	3	4	30	1st
Rhamnus prinoides L'Herit (Geesho)	5	4	5	4	3	4	4	29	2nd

*Geranium arabicum Forssk. (*Shuure atto*)*	*4*	4	4	4	3	3	5	27	3rd
Justicia schimperiana (Hochst. ex Nees) T. Anders(sharsharo)	3	4	4	3	3	4	5	26	4th
*Lobelia giberroa (*Shaambuuro*)*	4	4	4	3	3	3	3	24	5th
Vernonia amygdalina Del.(Giraawoo*)*	4	2	3	4	3	3	2	21	6th
Albizia gummifera (J.F.Gmil.) GA.Sm. (Caato)	3	2	3	2	2	2	3	17	7th

4.7.3. Direct matrix ranking

Many MPs were found to be used for different purposes in addition to their medicinal values. The major uses include firewood, furniture, forage, charcoal, and eating. For ranking seven key informants were asked to give value, 5 to the most used plant for that particular purpose and 0 to the least used one. In view of that, *Cordia africana* was found to be the most multipurpose plant scoring 160, followed by *Croton macrostachyus* scoring 120, and the least one was *Piper capense L.f* having score of 111 (Table 7). The highest direct matrix ranking on the topic of *Cordia Africana* was also reported in (Amsalu *et al*., 2018; Gebeyehu *et al*. 2014). This confirms that as the value is getting high the plants have multiple uses in the context of the local community. Direct matrix of randomly selected MPs with different uses including medicinal value on given use criteria revealed that MPs broadly collected for different purposes such as food, charcoal, construction, fencing, firewood, forage, furniture, and the like were also indicated (Belayneh *et al*., 2012; Amsalu *et al*., 2018).

Table 7: Direct matrix ranking for the multipurpose

List of medicinal plants	Use categories (purposes of medicinal plants)						Total	Rank
	Medicine	Edible(for Food)	Fire wood	Furniture	Forage	Charcoal		
Cordia Africana	30	22	30	35	20	23	160	1st
Croton macrostachyus Del. (waago)	34	-	34	6	18	30	120	2nd
Eucalyptus globulus Labill.(Nacce baarizaafo)	28	-	31	24	10	25	118	3rd

Piper capense L.f. (Turifo)	30	30	10	-	31	10	111	4th
*Maesa lanceolata Forssk. (*Caggoo*)*	26	11	31	2	7	28	105	5th
Ensete ventricosum (Welw.) Cheesman)(Taayo)	33	35	-	-	30	-	98	6th
Aframomum corrorima (ogiyo)	28	27	6	-	20	-	71	7th

Direct matrix ranking for the multipurpose of seven medicinal plants /average score of 7 key informants (5 to the most used plant for that particular purpose to 0 the least multipurpose used one)/.

4.7.4. Informant consensus factor (ICF)

The informant consensus factor was calculated on the identified disease categories and medicinal plant species used for treating them (Table 8 below). It is calculated as: ICF=nur–nt/(nur –1). Where, ICF: Informants Consensus Factor, nur: number of use citations in each category, and nt: number of species used. Values closer to 1 indicate high agreement among informants about a plant's use for a particular condition whereas values closer to 0 indicate low agreement or random reporting of plant use. The results of the study showed that diseases that are frequent in the study area have higher informant consensus factor. From the table 8 below, medicinal plants for Ascaris & tape worms have highest ICF (0.96) and Stomach ache &Gastritis have lost ICF (0.72). It is further shown that medicinal plants that are effective in treating certain diseases and well known by community members also have higher ICF values.

Table 8: ICF for the common disease categories in the study area

common disease categories	Species	Use citations	ICF	%
Ascaris & tape worms	2	28	0.96	96
Malaria	3	35	0.94	94
Tooth ache & Tonsils	4	44	0.93	93
Common cold & cough	6	72	0.93	93
Head ache, Evil eye, Devil sickness	9	70	0.88	88

Wound, skin cut, Fire burn	15	61	0.77	77
Stomach ache &Gastritis	16	54	0.72	72

5. CONCLUSION AND RECOMMENDATION

5.1. Conclusion

The general objective of the study is to assess plant species which have medicinal value among Menja community, threats and conservation practices of medicinal plants and its role on forest conservation. A total of 59 medicinal plant species belonging to 36 families were identified. From collected 59 medicinal plants of the study area majority 44.1% were used to treat human followed by both and livestock. These also show the depth of indigenous knowledge and practice on medicinal plants to treat ailments. This indigenous knowledge of medicinal plants is owned by older age people. It can also be concluded as herbs constitute the main source of traditional remedies followed by tree and shrub species. Leaves were also found to be the most frequently used plant parts followed by seeds for preparation of human and livestock remedies.

Medicinal plants mainly threatened by factors such as firewood collection, overgrazing, charcoal production, illegal encroachment, and agricultural expansion have all been recognized as contributing factors to the loss of most of medicinal plants. The oral knowledge transmission, refusal of young people to gain the indigenous knowledge, the influence of modern medication, and partial way of transfer of knowledge were the major threats to indigenous knowledge of medicinal plants used by Menja community. The results show that there is no enough knowledge for conservation of medicinal plants in the Menja community. In general from the result of the study, it can be concluded that the study area is rich in various types of medicinal plant species and largely from forest and farm land. Menja communities of the study area are highly dependent on medicinal plant resource for themselves and their livestock health care.

5.2. Recommendation

On the basis of the findings of the study, the following recommendations are suggested:

- ✓ The local community and traditional healers must protect the indigenous knowledge from threat by changing transferring way of the knowledge from oral to written.
- ✓ Agricultural expansion, illegal encroachment, firewood collection, construction, overgrazing, and charcoal production were identified as the main threat of medicinal plants in study area due to this the district administration of Gimbo should protect the forest left in the study area from further destruction.
- ✓ Traditional healers of Menja community should have to conserve the medicinal plants on their garden and teach the way to conserve to their neighbors in order to expand the

knowledge of conservation.

- ✓ Concerning bodies should develop projects that can reduce dependency on forest based energy sources and change by modern energy sources that minimize dependency on forest products like fire wood and charcoal.

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APPENDIX 1

Jimma University

Questionnaire

This semi- structured survey questionnaire is prepared for formal interview of household head on **ethno botanical knowledge, threats and conservation practices of medicinal plants among Menja community in Gimbo District, Keffa Zone, South Western Ethiopia**, Southwest Ethiopia.

Dear Respondent: This questionnaire will be filled for research purpose only. The outcome of this research will help to identify the major medicinal plants along with threats and its conservation practices. It is believed that it will assist the community, the government and non-government organizations in documenting traditional medicines and in discovery of modern medicines; threats will be also identified, therefore, conservation status and practices in Gimbo district will be recommended. I confirm you that all data will be treated confidentially and only average information will be published. Therefore, I kindly request the cooperation of respondents in filling out the questionnaire accurately considering the importance of the study. Thank you for your time and cooperation in advance!

Part I. Household Characteristics- General information

1. Name of Kebele _____ 2. Sex _____ 3. Age _____

4. Marital status i) married ii) single iii) divorced iv) widowed

5. Level of education i) illiterate ii) Read only iii) 1-8 grade iv) Grade 9 and above

6. Number of family members i) 1-3 ii) 3-5 iii) 5-7 iv) more than 7

7. Distance of house from forest patches

i) Vicinity to forest (up to 5 km) ii) Moderate (5 to 10km) iii) Far (Above 10km)

8. Occupation: i) Farmer ii) Daily laborer iii) Merchant

iv) Government employee v) Others_____

Part II. Research objective related questions

1. List of medicinal plants used for human and livestock ailments

List of medicinal plants	Human (H)/livestock (Ls)		Habitat of plants (source)	Life forms	Part of plant used	Condition of preparation	Way of administration	Ailment treated by the plant	Code of specimen
	H	Ls							

2. Who knows more about traditional medicines against human and livestock ailments in your area?

i. Children ii) Young men/women iii) elder men /women

3. Do you have enough knowledge on medicinal plants? i) Yes ii) No

4. What is the way knowledge share within community in your area?

i) Freely ii) Secret iii) partially

5. What is the perception of local community to accept knowledge share of medicinal plants

i) High ii) medium iii) low iv) very low

6. Is there any threats on medicinal plants in your environment? ("Yes" or "No")._____

If yes, what you think are the threats?

More than one answer is also possible

i) Agricultural expansion ii) urban expansion iii) industrialization d/ wood extraction iv) overgrazing v) illegal encroachment vi) others, specify

7. List other major threats of medicinal plants in your locality.

_____

_____

_____

8. Is there any medicinal plant species in danger of local extinction due to environmental change? ("Yes" or "No")._____If yes, list down

_____

_____

_____

9. What is the trend of availability of medicinal plants in your locality?

i) Increasing ii) Decreasing iii) Stable

10. List socioeconomic factors that threat medicinal plants?

_____

_____

_____

11**.** Is there any medicinal plant conservation project on your locality? ("Yes/No")._____.

12) What are the conservation practices of medicinal plants in your locality?

13. Are the conservation practices getting support from non-users? ("Yes" or "No")_____ .If yes, from government or NGO? _____How they support?_____

14. From where have you get medicinal plants?

i) from home garden ii) from farm lands iii) From forest

15. If your answer for above question is forest, how is the forest from your home?

i) up to 5 km ii) 5-10 km km iii) above 10 km

16. If your answer for the above question 13 is home garden or farm land you adopted into your garden? i) Naturally grown ii) By planting

17. If your answer for above question 15 is by planting, why you planted it?

i) by fearing to travel distant forest ii) To conserve the species iii) It is not forest plant

Part III. Question for Key Informant Interview (KII) & Focus Group Discussion (FGD)

1. What are the major factors that affect knowledge of medicinal plants?

i) Environmental factors _____

ii) Socio-economic factor _____

2. Which factors do you think affect more than others?_____

3. What are your major medicinal resources from your locality?

4. What are the major agricultural activities that affect the medicinal plants?

5. What problems are you facing by using traditional medicinal plants?

6. What problems are Manja communities facing from the declining medicinal plants in your locality?

7. What are the possible solutions for sustainability of medicinal plants in your local?

8. What are Specific ailments or conditions treated with the plants?

9. What method of preparation do you use for medication?

10. What are other purposes associated with the plant? List them

APPENDIX II

List of Identified Medicinal Plants used by Menja Community

Scientific name	*Family*	*Local name*	*Habit*	*Source*	*plant part used*	**Human or Livestock**
Acmella caulirhiza Del.	*Asteraceae*	Shishiimo	H	FL& Forest	Shoot	Human
Aframomum corrorima (Braun) Jansen	*Zingiberaceae*	Ogiyoo	H	Everywhere	Leaf & Seed	Human
Albizia gummifera (J.F.Gmil.) GA.Sm.	*Fabaceae*	Caattoo	T	HG&FL	Steam	Human
Allophylus abyssinicus	*Sapindaceae*	Shee'oo	T	Forest	Bark	Livestock
Arundinaria alpina K. Schum.	*Poaceae*	Shinaatoo	T	FL	Shoot	Livestock
Artemisia afra Jacq. ex Willd.	*Asteraceae*	Aa'I macoo	H	HG	Leaf	Human
Asparagus africanus lam.	*Asparagaceae*	Ufoo	C	FL& Forest	Leaf	Human
Bersama abyssinica Fresen	*Melianthaceae*	Booqqoo	T	Forest	Bark	Livestock
Bothrocline schimperi olivi & Hiern.	*Asteraceae*	Yameshoo	Sh	FL& Forest	Leaf	Both
Brucea antidysentrica J.F	*Simaroubaceae*	Nuuqesho	T	FL& Forest	Leaf	Both
Clausena anisata (Willd.) Hook.f. ex Benth.	*Rutaceae*	Imicoo	Sh	FL& Forest	Leaf	Both
Clerodendrum myricoides (Hochst) Vatke	*Lamiaceae*	Aggiyoo	Sh	FL& Forest	Leaf	Both
Coffea arabica L.	*Rubiaceae*	Bunoo	Sh	Everywhere	Seed & Leaf	Human

Cordia africana Lam.	*Boraginaceae*	Di'o	T	FL& Forest	Shoot	Both
Coriandrum sativum	*Apiaceae*	Deebo	H	HG	Leaf &seed	Human
Croton macrostachyus Del.	*Euphorbiaceae*	Waago	T	FL& Forest	Shoot, bark, latex	Human
Cymbopogon citratus (Dc.) Stapf	*Poaceae*	Toochoo	G	HG	Leaf	Human
Dalbergia lactea Vatke	*Fabaceae*	Bitii bitoo	C	Forest	Leaf	Livestock
Dracaena steudneri Engl.	*Dracanaceae*	Yuddo	T	FL& Forest	Leaf	Livestock
Ensete ventricosum (Welw.) Cheesman)	*Musaceae*	Genee uuxo	H	HG	Root & Bark	Human
Ensete ventricosum (Welw.) Cheesman)	*Musaceae*	Taaye Uuxo	H	HG	Root & Bark	Human
Echinops kebericho Mesfin	*Asteraceae*	Qapheroo	H	HG	Root	Both
Ekebergia capensis Sparm	*Maliaceae*	Orooroo	T	Forest	Bark	Livestock
Eragrostis tef (Zucc.) Trotter	*Poaceae*	Haagee gaashoo	G	FL	Seed	Human
Erythrina abyssinica Lam. ex D.C.	*Fabaceae*	Beroo	T	FL&HG	Leaf	Both
Eucalyptus globulus Labill.	*Myrtaceae*	Nacce Baarizaafo	T	FL	Leaf & shoot	Human
Ficus sur Forssk.	*Moraceae*	Caaroo	T	Forest	Latex	Livestock
Ficus thonningii Bhume	*Moraceae*	Xigaago	T	Forest	Latex	Livestock
Foeniculum vulgare Mill.	*Apiaceae*	Maci wollaaggoo	H	HG	Leaf	Human
Geranium arabicum Forssk.	*Geraniaceae*	Shuure atto	H	FL	Leaf	Human
Ipomoea batatas (L.) Lam.	*Convolvulaceae*	Noocee doqqoo	C	HG	Leaf & root	Human
Justicia schimperiana (Hochst.	*Acanthacea*	Shari sharo	Sh	HG&FL	Leaf	Both

ex Nees) T. Anders	*e*					
Lagenaria Siceraria (Molina) Standl.	*Cucurbtaceae*	Buqqoo	C	HG	Seed	Human
Lepidium sativum L.	*Brassicaceae*	Shiippoo	H	FL	Seed	Both
Linum usitatissimum	*Linaceae*	Muttoo	H	FL	Seed	Human
Lobelia giberroa	*Lobeliaceae*	Shaambuuro	Sh	Forest	Leaf & Steam	Livestock
Maesa lanceolata Forssk.	*Myrsinaceae*	Caggoo	Sh	FL& Forest	Shoot	Both
Maytenus arbutifolia (A. Rich.) Wilczek	*Celastraceae*	Shikko	Sh	FL& Forest	Leaf	Both
Nigella sativa L.	*RanuncuIaceae*	A'aafo	H	HG	Seed	Both
Ocimum lamiifolium Hochst, ex Benth	*Lamiaceae*	Daamo	Sh	FL& Forest	Leaf	Both
Olea europaea *subspp cupsidata L*	*Oleaceae*	Yahoo	T	Forest	Leaf	Human
Phytolacca dodecandra L'Hérit.	*Phytolaccaceae*	Yingaamo	H	FL& Forest	Root & Seed	Both
Piper capense L.f.	*Piperaceae*	Turifo	H	FL& Forest	Leaf, steam &seed	Both
Prunus africana (Hook.f.) kalkm	*Rosaceae*	Oomo	T	FL& Forest	Bark	Livestock
Rhamnus prinoides L'Herit	*Rhamnaceae*	Geesho	Sh	HG&FL	Seed	Human
Rumex nepalensis Spreng	*Polygonaceae*	Gorechoo	H	Everyw here	Seed	Both
Ruta chalepensis L.	*Rutaceae*	Caddiiraammoo	H	HG	Leaf	Human

Sanicula elata Buch.-Ham. ex D. Don	*Apiaceae*	Xappelesho	H	FL& Forest	Leaf	Human
Sapium ellipticum (Hochst.) Pax.	*Euphorbiaceae*	Sheddoo	T	FL& Forest	Leaf & bark	Both
Satureja paradoxa	*Lamiaceae*	Naddoo	H	FL& Forest	Leaf	Human
Solanum americanum Miller	*Solanaceae*	Achoo	H	FL& Forest	Leaf	Human
Solanecio mannii (hook f.) C. Jeffery	*Asteraceae*	Amitii balloo	Sh	Forest	Shoot	Both
Trigonella foenum-graecum L.	*Fabaceae*	Giraaro	H	FL	Seed	Both
Urera hypselodendron (A. Rich.) Wedd.	*Urticaceae*	Imaamoo	C	Forest	Latex	Both
Vepris dainellii (Pichi-serm) Kokwara	*Rutaceae*	Mengeerexxoo	T	Forest	Leaf & Seed	Livestock
Vernonia amygdalina Del.	*Asteraceae*	Giraawoo	Sh	FL& Forest	Leaf & Latex	Livestock
Vernonia auriculifera Hiern.	*Asteraceae*	Danggirettoo	Sh	FL& Forest	Leaf	Livestock
Vica faba L.	*Fabaceae*	Aato	H	FL	Leaf &seed	uman
Zingiber officinale Rosc.	*Zingiberaceae*	Yanjiballoo	H	HG	Root	Human

APPENDIX 3

Plant Families of Medicinal plants Used in the study area

Families	Frequency	Percent (%)
Asteraceae	7	11.9
Fabaceae	5	8.5
Apiaceae	3	5
Lamiaceae	2	3.4
Poaceae	3	5
Rutaceae	3	5
Euphorbiaceae	2	3.4
Zingiberaceae	2	3.4
Musaceae	2	3.4
Moraceae	2	3.4
Celastraceae	1	1.7
Rubiaceae	1	1.7
Urticaceae	1	1.7
Acanthaceae	1	1.7
Phytolaccaceae	1	1.7
Oleaceae	1	1.7
Lobeliaceae	1	1.7
Sapindaceae	1	1.7
Maliaceae	1	1.7
Rhamnaceae	1	1.7
Myrsinaceae	1	1.7
Piperaceae	1	1.7
Dracanaceae	1	1.7
Rosaceae	1	1.7
Melianthaceae	1	1.7
Linaceae	1	1.7
Brassicaceae	1	1.7

Ranunculaceae	1	1.7
Polygonaceae	1	1.7
Solanaceae	1	1.7
Convolvulaceae	1	1.7
Geraniaceae	1	1.7
Asparagaceae	1	1.7
Cucurbtaceae	1	1.7
Boraginaceae	1	1.7
Simaroubaceae	1	1.7
Myrtaceae	1	1.7
Linaceae	1	1.7
Total	**59**	**100**

APPENDIX 4

Plants parts used for medication

Plant parts used	Frequency	percentage
Leaf	21	35.6
Seed	8	13.6
Shoot	5	8.5
Leaf and seed	5	8.3
Bark	4	6.8
Root and bark	2	3.4
Latex	3	5
Root	2	3.4
Leaf and steam	1	1.7
Leaf and latex	1	1.7
Shoot, bark and latex	1	1.7
Steam	1	1.7
Root and seed	1	1.7
Leaf , seed and steam	1	1.7
Leaf and shoot	1	1.7
Leaf and Root	1	1.7
Leaf and bark	1	1.7
Total	59	100