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Ethnobotanical Study on Medicinal Plants Used to Treat Human Ailments in Begi District, West Wollega Zone, Oromia Regional National state, Ethiopia.

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List of Abreviation and Acronomys

AAU - Addis Ababa University

AIDS - Acquired immune Deficiency Syndrome

ETB - Ethiopian Birr

FAO - Food & agricultural Organization

GC - Gregorian calendar

IBC - Institution of Biodiversity Conservation

IBCR - institute of Biodiversity Conservation Resources

ICDRA - International Conference of Drug Regulatory Authorities

IHNS - Institution of Haro Amaya Natural Science

IUCN - International Union Conservation of Nature

MOH - Ministry of Health

UK - United Kingdom

USA - United State of America

WB - World Bank

WHO - World Health Organization

WWF - Wild Life Fund

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Abstract

Medicinal plant species is very significant in Ethiopia for biodiversity conservation and indigenous knowledge retention. The objective of the study was to assess traditional use of medicinal plants used to treat human ailments by local communities of Begi district Oromia regional state. This study was conducted from July 2018 to August 2018 and a cross sectional study design was used for the study area. Forty total informants were selected simple random technique from four 'kebeles' of Begi district. Selection of informants was based on the presence of traditional healers and abundance of plants. 10 informants were selected as key informants by purposive random sample technique. Data were collected through semi-structured interviews and field observation with informants. Data were organized and analyzed by excel spreadsheet and the result were presented in tables and graphs. 60 medicinal plant species belonging to 56 genera and 41 families were identified and documented. 24 ailments were identified which are treated by medicinal plants, among which, abdominal cramp was frequently reported. Out of 41 families, Fabaceae, Solanaceae, and Rutaceae were the most reported medicinal plants to treat human ailments in the study area. According to the habit of medicinal plants used in the study area, trees were the most used which account for about 46.67% followed by herbs (33.33%). From collected plant species leaf, (48.33) and its crushed forms were most preferred plant parts used of remedy preparation respectively. Traditional medicinal plants and associated indigenous knowledge are the main system to maintain human health. Thus, in-situ and ex-situ conservation practice and sustainable utilization are required in the community.

Key word: *Knowledge, practice, utilizing, Medicinal, Ethnobotanical, Traditional, and Human health*

1. Introduction

1.1 Background of the study

People in different parts of the world depend on plant resources for their basic needs and are aware of many useful species occurring in their ecosystem. They have continuously developed their traditional knowledge of plant uses and plant resource management (Assefa *et al.*, 2010). Medicinal plants are one part of the plant resources that have a potential capacity for treatment of various diseases. Plants are great source of medicines, especially in traditional medicine, which are useful in the treatment of various diseases (Bako *et al.*, 2005) and used in the commercial production of drugs.

Traditional medicinal plant species is very significant in the world for biodiversity conservation and indigenous knowledge retention. Ethnobotany is the study of how the people of a particular culture and religions makes the use of indigenous plants while the ethno botanist explores how plants are used for food, shelter, medicine and religious ceremonies. It is the relationship between a given society and its environment and in particular the plant world (Aumeeruddy, 1996).

Indigenous knowledge is as old as human civilization but an American botanist, (Harshburger, 1896) who study plants used by the primitive and aboriginal people first coined the term ethnobotany. Since then it has been defined as the traditional knowledge on indigenous communities about surrounding plant diversity and as the study of how the people of particular culture and religion make use of indigenous plants. In fact, medicine and botany have close ties. Many of today's drugs have been derived from plant resources. The earliest recorded history of civilization from ancient culture of Africa, China, Egypt, and Indus Valley revealed evidences in support of the use of herbal medicine by dweller of those regions (Baqar, 2001). Use of plants as sources of medicine has been inherited and is an important component of the healthcare system in Egypt. Keeping the traditional inherent knowledge, nowadays Egyptians still depend on medicinal plants for primary healthcare needs (Abouzid, 2011). 'Traditional' use of herbal medicines implies substantial historical use and this is certainly true for many products that are available as 'traditional herbal medicines'.

An example is the use of Ephedra (Ma huang) for weight loss or athletic performance enhancement (Shaw, 1998). While in some countries, herbal medicines are subject to rigorous manufacturing standards, this is not so everywhere.

Large human population in developing countries is dependent on plant resource for healthcare because allopathic medicine can cure a wide range of disease, but its high prices and occasional side-effects are causing many people to return to herbal medicines which tend to have fewer side effects (Kala, 2005). In last few decades, traditional knowledge on primary healthcare has been widely acknowledged across the world. It is estimated that 60% of the world population and 80% of the population of developing countries rely on traditional medicine mostly plant drugs for their primary health care needs (Shrestha, 2003).

Traditional medicine has maintained its popularity in all regions of the developing world and its use is rapidly spreading in the industrialized countries. In China, for example, traditional herbal preparations account for 30- 50% of the total medicinal consumption. In Ghana, Mali, Nigeria, and Zambia, the first line of treatment for 60% of children with high fever resulting from malaria is the use of herbal medicines at home. In Ethiopia up to 80% of the population uses traditional medicine due to the cultural acceptability of healers and local pharmacologists, the relatively low cost of traditional medicine and difficult access to modern health facilities. Traditional knowledge of medicinal plants and their use by indigenous healers and drug development in the present are not only useful for conservation of cultural tradition and biodiversity but also for community health care and drug development in the local people. The indigenous knowledge on medicinal plants appears when humans started and learned how to use the traditional knowledge on medicinal plants (Emiru *et al.*, 2011). However, environmental degradation, deforestation, agricultural encroachment, over harvesting and/or indiscriminate harvesting and an alarming population growth with increasing demand and consumption are the principal problems, which aggravate the rate of extinction of medicinal plants from their habitat and consequently the loss of important resources of globally significant plant species (Tesfaye *et al.*, 2006).

1.2 Statement of the problem

There are different medicinal plants that have much significance for curing illness. Traditional medicine has a long history of serving people all over the world. In Ethiopia, traditional medicinal practice is still ongoing. The traditional medicinal practitioners perform a central role in providing primary health to the rural inhabitants of Ethiopia. There are many villages in the country and almost every village has one or more traditional healers (Fisseha, 2007).

The current plant use trend in the district shows that the environment is facing problems of resource depletion and loss of indigenous knowledge like other area of the country.

Thus, concerned Ethnobotanical research plays an important role for conservation and sustainable utilization of these medicinal plants. There was no research report in Begi District on Ethnobotanical study of medicinal plants and their conservation status. Consequently, the country losses valuable medicinal plants due to natural and anthropogenic factors in which valuable indigenous knowledge associated with medicinal plants are going to be eroded.

Due to these clear factors and existing knowledge gaps, the current study is focused on medicinal plants of the Begi District.

Research Questions

The following are the basic research question:-

- What are the local and scientific names of medicinal plant species used in the study area?
- What are plant parts used and methods of preparation of medicinal plants in the study area?
- What are the traditional medicinal plants used for treatments of human diseases in the study area?
- What are the management status of medicinal plants and indigenous knowledge of the community?
- What are the existing threats and conservation status of medicinal plants in the study area?

1.3. Objective of the study

1.3.1 General objective

- To investigate Ethnobotany of medicinal plants used to treat human ailments in Begi District

1.3.2. Specific Objectives

- List medicinal plants and diseases treated.
- To identify traditional medicinal sources used for treatments of human diseases.
- To document plant parts used for medicinal purposes and methods of preparation in the study area.

- To assess the practice and management status of medicinal plants and indigenous knowledge of people in the study area.

1.4. Significance of the Study

Accomplishing the aforementioned objective is very important and it may have the following advantages. In one way, the study has the potential to give hint for traditional medicine expert on how to use and conserve the medicinal plants. The significance of the study will help to have valuable information to people who are engaged in this profession and other stakeholders about the issues. It will increase awareness to concerned bodies how much traditional medicinal materials is vital for people's and it also will provide some insight to Biology teachers to understand the people's practice of utilizations in addition it will identify the major problems hindering the assessments of traditional medicine.

On the other hand, the research might be used as a springboard for future researchers working in the area. Furthermore, this study will play great role in providing baseline information for further study.

CHAPTER TWO

2. REVIEW OF RELATED LITERATURE

2.1. Medicinal plants traditionally used in different parts of the world.

Nowadays, medicinal plants are widely utilized in traditional medicine for treating ailments.

There is an increasing interest in public for consumption of medicinal plants since they are inexpensive and widely available (Davidson-Hunt, 2000). Major epidemiological problems confronting the Nandi population are malaria, schistosomiasis, diarrhea, and respiratory diseases according to informants and personal observation (Trotter and Logan, 1986).

The current deforestation trends, which threaten the existence of these plants, make it inevitable that this information be made available (Jellin, 2002). Using traditional medicine especially plant therapy has been considered by researchers in recent years (Chevallier, 1996). Nowadays, medicinal plants constitute important part of traditional medicine in many countries and have special position and value in modern therapeutic approaches (Bahmani *et al.*, 2013). Now medicinal plants and their derivatives constitute more than 20% of medications in developed industrial countries and 80% in developing countries (Rafieian, 2012).

Use of medicinal plants has been the prior choice to resist against diseases. Extracted plants and materials are used to treat different diseases in human (Nasriet *al.*, 2013). This leads to production of drugs of plant origin like morphine, atropine, ephedrine, codeine, reserpine, and vinblastine. Very often available drugs have many side effects. Now to control the pain, drugs such as non-steroidal anti-inflammatory drugs like aspirin, as well as opioids including morphine, meperidine, methadone, tramadol, buprenorphine, nalbuphine and other drugs such as antidepressants, corticosteroids and adjuvant analgesic drugs are used to relieve pain (Abramowice, 1998). Ethno botany deals with the collection of valuable medicinal plants by a group of people and describes their different uses (Safa *et al.*, 2012). Hence, identification of useful medicinal plants is an excellent policy to understand their properties by indigenous inhabitants.

2.1.1 Overview of medicinal plants situation in Ethiopia

Ethiopia is believed to be home for about 6,500 species of higher plants with approximately 12% endemism, and hence one of the six plant biodiversity rich countries of Africa (UNEP, 1995).

The diversity is also considerable in the lower plants but exact estimate of these have to be made.

The genetic diversity contained in the various biotic make up is also high thus making the country a critical diversity hotspot for plants. Ethiopia has a significant portion of two of the world's 35% biodiversity rich areas hotspot. i.e. the eastern Afromontane biodiversity Hotspot and the Horn of Africa-Biodiversity Hotspot (Conservation International at www.biodiversityhotspots.org). These hotspots house a lot of useful wild biodiversity, particularly that of medicinal plants.

2. 1 .2. The traditional medicine system and medicinal plant resources in Ethiopia

Environmental degradation, agricultural expansion, loss of forests and woodlands, over-harvesting, fire, cultivation of marginal lands, overgrazing, and urbanization appear to be the major threats to medicinal plants of Ethiopia. Such a threat poses a significant impact to the future wellbeing of the human and animal populations that have for generations, relied on these resources to combat various ailments. Changing of cultures, habits and lifestyles further aggravate the situation.

Some medicinal plant species of Ethiopia are reported to have been threatened by the over use or over harvesting for marketing as medicine. A good example is *Taverniera abyssinica* whose slender roots are swathed and small-coiled bundles presented for market. *T. abssynica* is a popular traditional medicine for what is known as sudden disease. It has been reported that Ethiopia has 40 species of Aloe where the sap of some species is used for medicinal, food, cosmetic application and is widely used internationally. Of these 20 species are endemic and 18 are threatened. The 1997 IUCN Red List gives threatened Plants by International trade in Kenya through running and this might soon pose a threat to Ethiopia if appropriate control methods and propagation are not timely put in place. *Prunus africana* is another medicinal plant threatened like *T. abyssinica*.

Forests cover considerable part of the world's terrestrial land surface and support millions of people living adjacent to them (FAO,, 2010; World Bank,,2003). These ecosystems account for significant roles in sustaining environmental integrity through carbon sequestration and hydrological services (Godoy *et al.*,2002) as well as providing subsistence needs and economic benefits to communities through direct utilization and sale (Godoy *et al.*,2002; Larsen and Smith, 2004; Sunderlinet *al.*, 2005; Shackletonet *al.*,2007). Decline in forest area has been recorded

around the world (FAO, 2010) and this had been attributed to natural disturbances and anthropogenic factors (Brook *et al.* 2008) that leads to biodiversity loss either through loss of species or decrease in species' abundance (Brook *et al.*2008). Anthropogenic activities profoundly influence plant diversity, structure in the forest ecosystems of the world and this pressure may lead to irreversible ecological damage (Fashing *et al.*,2004).

Removal of forest biota through extraction of forest products for subsistence or economic purposes influence the floristic composition and forest structure (Fashing and Gathua,, 2004; Fashing *et al.*,2004; Mligo, 2015).Human disturbance affect the size class distribution of forest species and therefore affecting regeneration potential of forest species (Kimaro and Lulandala, 2013; Mwase *et al.*,2007).

2. 1.3.The Role of Traditional Medicine in Ethiopia

The various literature available show the significant role of medicinal plant in primary health care delivery in Ethiopia where 70% of human and 90% of livestock population depend on traditional medicine similar to many developing countries particularly Sub-Saharan African countries. Those plants are part of the economic commodity for some members of the society, which make their livelihood on their collection, trade, and medicinal practices by practitioners or healers. It thus has a substantial potential to contribute to the economic growth and alleviation of poverty in the country. Its proper management protects environment and conserve biodiversity. The traditional health care is deep rooted with oral and written pharmacopoeias. The bulk of the plant matter used for medicinal purposes is collected from natural vegetation stocks that are shrinking with degraded environment and to substantial reduction or dwindling of species of medicinal plants. Those plants that are harvested for their roots, tubers, and bulbs need special attention of conservation. Such attentions should be extended to the woodlands of Ethiopia, which are the sources of most of the medicinal plants followed by the montane grassland/dry montane forest complex. To salvage indigenous knowledge from disappearing, the young generation has a very crucial role to play.

Medicinal plants should be in line with Primary Health Care system of the country and should address the disease prevalence in the country like respiratory infections, diarrhea, malaria, tuberculosis, sexually transmitted diseases, trypanosomiasis, leishmaniasis, schistosomiasis, and other parasitic diseases. Thus medicinal plants and knowledge of their use provide a vital

contribution to human and livestock health care needs throughout the country. Such plants include *Phytolacca dodecandra* and many species of *Maytenus*. The major reasons why medicinal plants are demanded in Ethiopia are due to culturally linked traditions, the trust communities have in the medicinal values of traditional medicine and relatively low cost in using them.

Plants are known to provide social and cultural benefits to various communities around the world. In Africa, some of these plants are essential source for curative and preventive remedies for various ailments (Sindiga, 1995). Utilization of medicinal plants in the sub-Saharan Africa is estimated to be about 70- 80% (WHO, 2002). The proportion might be higher since the use of medicinal plants extends beyond the essential role in healthcare to the coastal areas of Ethiopia have been reported to use ethno-medicinal plant resources to manage different health problems (Pakia, 2001; Kaingu *et al.*, 2013, 2004; Wekesa *et al.*, 2015). The high dependence on traditional medicine can be related to its low cost, availability, efficacy, cultural acceptability and inaccessibility of modern health facilities (WHO, 2002; Kiringe 2005; Bussmann *et al.*, 2006; Owour and Kisangau, 2006; Nanyingi *et al.*, 2008; Kaingu *et al.*, 2011). A number of wild plant species, especially the medicinal and aromatic species, are facing threat from exploitation since only very few of them are cultivated (Schippmann *et al.*, 2002). Thus, threatening their survival in the natural habitats (Jeruto *et al.*, 2008). However, traditional knowledge on natural resource management becomes more successful when integrated with the modern conservation approaches (Berkes and Turner, 2006). This is mainly based on understanding how people interact with their environment and the strategies they use in conserving these environments (Berkes and Davidson-Hunt., 2006). Without clear management strategies, most of the medicinal plant species would be threatened with extinction (Omwenga *et al.*, 2015). Successful solutions to management of wild medicinal plants that recommended in Ethiopia and Kenya include in situ and ex situ conservation (Njoro *et al.*, 2010; Kidane *et al.*, 2014).

Currently, individuals and households reported to undertake conservation of medicinal plants in different parts of Ethiopia (Nanyingi *et al.*, 2008; Bjorå *et al.*, 2015). Public awareness regards to sustainable utilization and conservation of wild plant stocks is equally important in ensuring conservation of medicinal plants in Ethiopia (Bussmann *et al.*, 2006; Jeruto *et al.*, 2008; Kigenet *et al.*, 2013).

2. 1 .4Measuring importance of plant species to communities in Ethiopia

In the recent past, there has been a change towards quantitative ethno botany that determines the relative importance of species to communities (Reyes-Garcia *et al.*,2006; Benz *et al.*,2000). Numerous ethno botanical indices have been developed by different researchers such as informant consensus indices (Phillips and Gentry, 1993a, 1993b; Phillips 1996); informant agreement ratio (Trotter and Logan, 1986); and indices that rely on researcher's subjective allocation of plant importance (Prance *et al.*,1987; Turner, 1988). The most utilized indices are those based on informant consensus (Albuquerque *et al.*,2006) because they tend to eliminate researcher's biasness (Phillips., 1996). The researcher's subjective method is biased because it is influenced by researcher's judgments (Tardio and Pardo-de-Santayana,, 2008). Informant agreement ratio used in determining the effective or the mostly used medicinal plants in treatment of certain ailment (Trotter and Logan 1986; Collins *et al.*2006). Turner(1988) developed a measure of cultural significance as an estimate from quality of use, intensity of use and exclusivity of use. However, Pieroni (2001) modified the index developed by Turner (1988) by developing one that had additional variables such as plant part used; multifunctional food use; taste score; and food-medicinal role among others despite habitat degradation and reduction of wild medicinal plant resources, utilization of these resources is on the rise due to their essential role in health care and other multiple uses such as food, fuel, condiments, and construction. Habitat destruction due to indiscriminate collection of herbal medicine is attributed to the rise in demand for herbal products (Chirchiret *al.*,2006).

Njoroge (2012) reported that increased commercialization of herbal plants, climate change among other factors are key in driving the loss of medicinal plants way of life(Da Silva Sousa *et al.*, 2012).Despite habitat degradation and reduction of wild medicinal plant resources, utilization of these resources is on the rise due to their essential role in health care and other multiple uses such as food, fuel, condiments, and construction. Habitat destruction due to indiscriminate collection of herbal medicine is attributed to the rise in demand for herbal products (Chirchir *et al.*, 2006).

2. 1 .5 Influence of socioeconomic factors on knowledge of medicinal plants in Ethiopia.

The vast knowledge of medicinal plants in the wild held by the older generation can be partly attributed to the experience and knowledge accumulated over the years, as well as the high degree of dependence on herbal medicine in the past as compared to current. In Ethiopia, Kiringe (2005) reported similar results, that the elderly were more knowledgeable than the younger generation. They attributed the high knowledge of medicinal plants of the older generation to their familiarity and longer experience with their environments as compared to the young generation. In Ethiopia Giday *et al.*,(2009) revealed that illiterate individuals are likely to have more knowledge on medicinal plants than their literate counterparts due to exposure of the latter to modernization. The little knowledge on medicinal plants among household heads that had attained higher education is expected to result in less knowledge among their family members. This is because most of the traditional knowledge is passed orally through kinship and from parents to children (Kidane *et al.*, 2014; Kipkore *et al.*, 2014).

2. 1. 6. Cultural and practical values of medicinal plants

Generally, high cultural and practical indices were obtained from cultivated species and those available around homesteads and farms. This confirms that availability and accessibility have significant influence on use values of species. The significant and positive correlation between cultural importance and practical use is similar to the findings of Reyes-Garcia *et al.*, (2006) who reported a positive correlation between practical value and cultural value in Bolivian Amazon. The authors associated this relationship to a positive association of the passive knowledge and actual utilization.

2.1.7. Priority species for the treatment of common diseases

Accordingly, Gathirwa *et al.*,(2008) reported the use of *Lannea schweinfurthii* for treatment of malaria in Ethiopia. However, in Tana River County, Kaingu *et al.*,(2013) reported use of the same species in treatment of female reproductive health dysfunctions. Whereas Gathirwa *et al.*,(2011) reported use of *Carissa edulis* for treatment of gastro-intestinal complaints in Mwingi district of Kenya. Giday (2003) found that the roots of *Carissa edulis* were important against rheumatism in Ethiopia.

2.1.8 Current government policy on medicinal plants development goals in Ethiopia.

Ethiopia has policies and strategies that support the development and utilization of plant resources in a sustainable manner. The policies are reflected under various sectors including environmental protection, development of the natural resources and diversification of the domestic and export commodities. Medicinal plants fit in the development activities that support public efforts in meeting livelihood requirements. There are few institutions concerned with the medicinal plants and assisted through government budgetary support. The Ethiopian Health and Nutrition Institute receives annual budget of about ETB 1.1 million while a Department at IBC concerned with medicinal plant conservation gets ETB 100, 000 per annum. The recent ongoing support made through the project funded by the World Bank namely the conservation and sustainable use of medicinal plants project has an annual budget of ETB 5.9 million per year during the project life. Such a support indicates the importance Ethiopia has given to the sector. The health sector strategy of Ethiopia declares that structural, functional traditional medicine into the official health care system is advantageous for improving the health coverage in the country (Ministry of Health,1995). However suitable institutional mechanisms and detailed implementation strategies and action plans has to be put in place.

2.1.9 Sources of supply of medicinal plants in Ethiopia

In Ethiopia, most of medicinal plants used by the practitioner or healers are collected from the natural vegetation. Home based medicinal plants use relies on plants of the home garden crops, weeds and that grow wild around human habitation. The cultivated medicinal plants are mostly produced in home gardens either for medicinal or rather primary purposes. The public knows medicinal plants of home garden, as the knowledge on them is open or public (Zemedede Asfaw, 1999, 2001). Medicinal plants obtained from wild habitats are found in different natural ecosystems of the forests, grasslands, woodlands, wetlands, in field margins and garden fences, as weeds and in many other microhabitats from where they are harvested when the need arises. These are free access resources to all with appropriate knowledge and who want to use them for the family for practicing traditional medicine or for sales. Many medicinal plants are also harvested for non-medicinal values such as for timber implements, fuel wood and other purposes and hence they are subjected to multiple pressures like those that *Hagenia abyssinica* and *Prunus africana* are facing at present. Conservation measures should target habitats of such in danger species. Most traders purchase medicinal plants from collectors. Consumers get their supply

from different sources including from own garden, purchasing from traders and healers. Medicinal plants are also imported informally from e.g. Sudan through border towns like Assosa, Dire Dawa. The domestic supply sources are closely associated with the biodiversity and concentration of forest areas e.g. Jimma, Bale. Traders from Dire Dawa, for example travel to Bale, Jimma, Gonder, and Menz. In Ethiopia, except in a few cases where a few food crops with medicinal value are cultivated, there is no organized cultivation of plants species for medicinal purposes. The reason for this is that the quantities of medicinal plants traded are very small, and there is no organized large-scale value addition and processing. However, there is a potential in the future for increased demand for some of the species and, therefore, it is important to identify them and start the necessary research on the propagation and cultivation techniques. Such program will also provide basis for small enterprises to improve the income generating capacity of the local people.

2. 1.10 Trade in medicinal plants in Ethiopia

A market survey of medicinal plants in rural markets around Bahr Dar (North western Ethiopia) came up with no products entirely targeted for medicine but only a collection of food spices and plant products for cosmetics use including many products used as incense or fumigants or steam bath (HareyaFassil, 2005). Perhaps due to inappropriate seasons for sampling since seasonal variation exists in the products sampled. Most of the local trade of open market is dominated by a few species including *Hagenia abyssinica*, *Embelia schimperi* and *Glinus lotides*. The export trade includes *Catha edulis* and gums from various species of *Boswellia* and *Commiphora* but these plants are known to be primarily traded for their non-medicinal uses the former as stimulants or narcotics and the latter species for cosmetics and other industries. Ethiopia had no legal export and import of products for medicinal use but plants of medicinal importance are exported to Djibouti and other countries as agricultural products.

Traditional medicine has a long history of serving people all over the world. The use of natural products with therapeutic properties is as ancient as human civilization. Mineral, plant and animal products were the main sources of drugs for a long time (De Pasqual,1984). There is an evidence of herbs being used in the treatment of diseases and for stimulating body systems in almost all ancient civilizations.

2.1.11 Ethno medicine research in Ethiopia

Although, only small fractions of the world's plants have been investigated scientifically so far, humankind has already reaped enormous benefits from it (Farnsworth *et al.*, 1985). More than ever, plant diversity remains vital for human well-being and still provides a significant number of the remedies required in healthcare. Forests, particularly tropical forests, represent vast resources of medicinal plants most of which are unexploited. Considering, therefore, the crucial role-played by plant-derived products in human and livestock health, the need for systematic scientific investigation is unquestionable (WHO, 1998).

Since medicinal plants are the main, often only source of traditional medicine for the rural population and are of high demand in the health care systems of this population when compared to modern medicine, ethno medicine activities need special consideration and back-up (Abbiw, 1996). This is partly because modern medicinal services are either unaffordable or unavailable to the vast majority of local people due to their skyrocketing cost coupled to lack of transport to and from health care centers. To preserve indigenous knowledge of plants use in general and of traditional medicine in particular, an Ethnobotanical survey of lesser-studied socio-cultural groups is very crucial. However, in Ethiopia research and documentation on medicinal plants have been started only very recently (Mesfin Tadesse and Sebsebe Demissew, 1992). Limited number of these papers dealt with specific socio-cultural groups in specific areas. When compared to the country's varied flora and the socio-cultural diversity, these studies are incomplete as medicinal plant healing systems differed from culture to culture. Hence, attention should be given to the field of ethno-medicine of the country with all necessary endeavors to have a full picture of the country's medicinal plants potentials.

2.1.12. Traditional therapy by medicinal plants

Since time long established, traditional medicine has played crucial role in combating multiple and complex health conditions affecting the Ethiopian people. It was the only system available for healthcare prior to the introduction of modern medicine for prevention, diagnosis and treatment of social, mental, and physical illness (Dawit Abebe, 1986).

Herbal remedies are part of the entire system of traditional medicine. The use of plant extracts or active substances is generally believed to constitute the major part of the therapy in this system. Study made by Dawit Abebe and Ahadu Ayehu (1993) in northern Ethiopia showed that major portion (87%) of the parts used in traditional medicine come from plant sources, while animal

parts and minerals contribute only a small supply. Apart from their use in the traditional system of medical care at the local level, medicinal plants are currently used in the production of modern drugs as a source of direct therapeutic agents, as raw materials for the manufacture of complex semi synthetic compounds and as taxonomic markers in the search for new compounds (WHO, 1998). Inspire of this, natural products/drugs isolated from only 40 plant species have been incorporated in to modern medicine (WHO, 1998). These products include important therapeutic categories such as antiseptics, steroids, quinine, and artemisinin. These few examples are adequate to indicate not only how modern drug delivery depends on the continuing availability of plant resources but also to explain why the international pharmaceutical industry has rediscovered the crucial role that medicinal plants could play in the development of safe and effective therapeutic agents (Farnsworth, 1985).

CHAPTER THREE

3. MATERIALS AND METHODS

3.1. Description of the study area

3.1.1. Location

The study was conducted in Begi District, West Wollega Zone, and Oromia Regional State west of Ethiopia. The district has currently 43 rural and 2 urban kebeles, based on the information obtained from Begi district agricultural office. In addition to this Begi district is 266 km away from West Wollega Zone and 707 km away from Addis Ababa, in Oromia Regional State (Begi district Agricultural Office, 2018).

Nations and Nationalities occupy the district. Such as Oromo (89%), Amara (4%), Gurage (3%), Gumuz (2%), and others (2%) respectively. The Begi district bounded by Benshangul Gumuz in the north, Gidami in the South, Qondala in the East and Tongo in the West. The district is found between 9°19'38" to 9°21'45"N and 34°31'00" to 34°32'30"E latitude and longitude respectively.

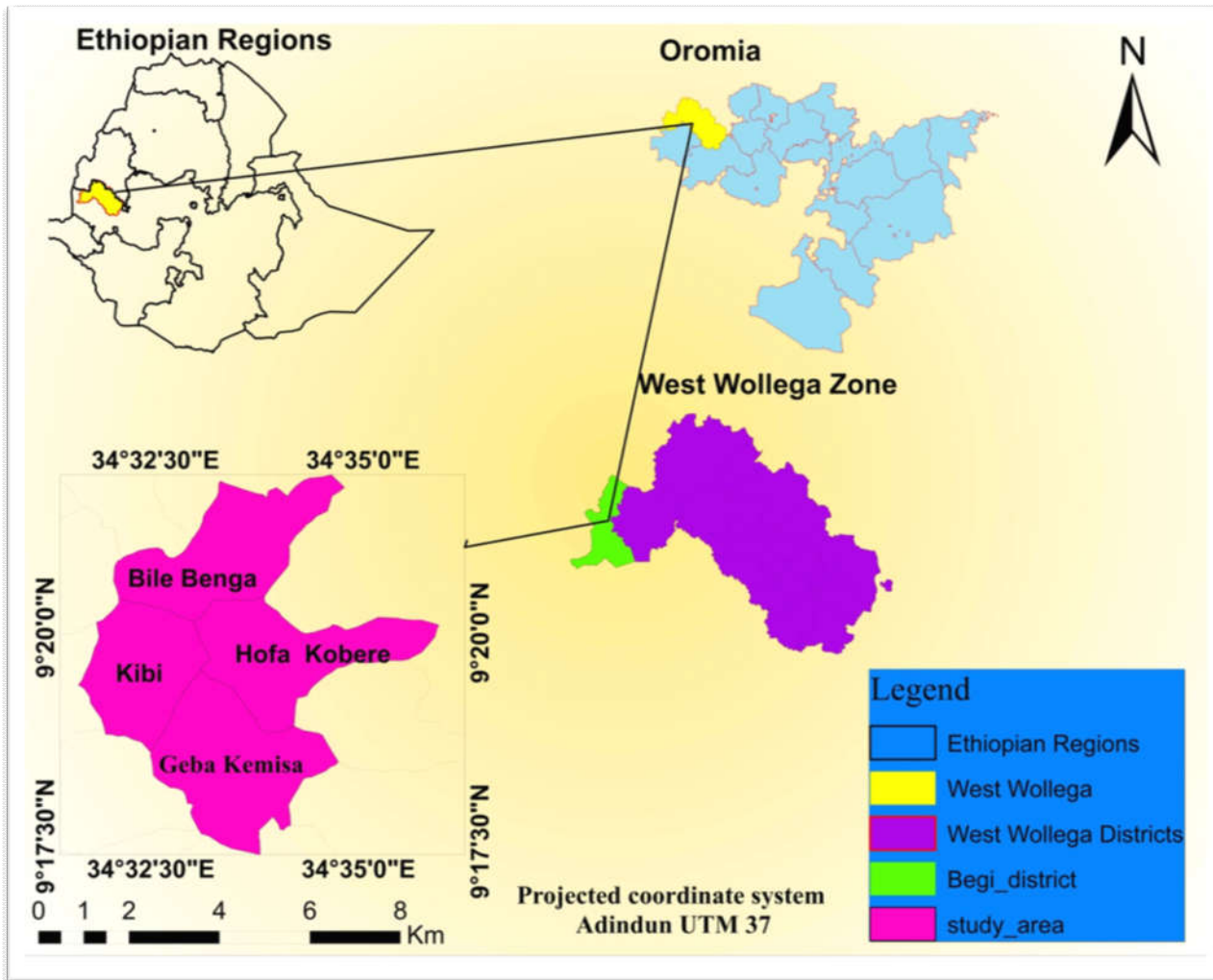


Figure 1: Map of Ethiopia, Oromia and the study area.

3.1 .2 Topography, climate, and soil

Begi District is located at the altitude between 1, 747 to 1,767 meter above sea level. The average annual rainfall ranges from 1,300 mm to 1,460 mm, while the average annual temperature varies between 18.7 to 22.2 degree Celsius. Land is constitutes plateaus, plains, ups, and down with gentle features of landform configuration (Begi District Agricultural Office, 2018).

The rainfall is characterized by heavy rainfall prevalence and rainfall is absent only for three-to four months. The agro-climatic zones of Begi District has similar agro-climatic zone that is said to be Mid-land, which ranges from 1,600 - 2,500 meters above sea level. Rain usually prevails in March to April and June to August. December and January were the driest months in the study area. Generally, the climatic condition of the district can be considered as tropical. The soil type

of the district was fluvisols and black loam soil, which is suitable for agricultural products and the life of the people (Begi District Agriculture Office, 2018).

3.1.3 Vegetation

Ethiopia is a low latitude country; the climatic condition of the study area is tropical in nature. The vegetation zonation is influenced by altitude. The forest was fragmented in the district. Sparsely distributed trees dominantly occupied the district. The major tree species are *Prunus africana*, *Bersama abyssinica* (Begi district Agriculture, 2018).

3.1.4. Population and socio- economic condition

According to 2007 housing census, the total population of Begi District was estimated to be 119, 722 of these male 59, 374, and female 60,348. In Begi District the religion are Protestant (9%), Orthodox (15%), Muslim (75%), and Catholic (1%).

The economic activities of the Begi District are 75% farming and 25% are mixed trade (Begi District Agriculture, 2018). The dominant economic sector is agriculture. Agriculture is relied up on the seasonal rainfall and uses traditional method of farming. The cash crops like coffee and khat are used as a source of income whereas some of the food crops like maize, teff, sorghum, wheat, bean and others are used as source of food for domestic use. However, currently they change farming system and cultivating both cash crops and food crops in scientific method using fertilizer, sawing crops in line and scaling up experience.

3.2. The research design

Descriptive survey type of research design was employed to collect data by using semi-structured interviews, observation (guided field walk) and questionnaires to document the traditional knowledge of healers in medicinal plant use for the treatments of human. The representative population samples were taken using purposive sampling procedure. Four kebeles were selected based on the presence of knowledgeable traditional healers and abundance of vegetation resources.

3.2.1 Sample size, and sampling techniques

The total number of participants of this study was fortyhouseholds because the activities require knowledge healers or practitioners and have accumulated knowledge that inherited for generation with ages between 35 and 65 (of which 30 are male and 10 females involved in the study. Out of this, 10(six males and four females) as key informants.

Accordingly, from Begi district of 43 rural and 2 urban kebeles four rural kebeles (Gaba Kamisa, Bile, Bengaa and Hofa Kobaree) were selected purposely based on the presence of traditional healers and abundance of vegetation resources. Ten traditional healers (mostly elders) were purposely selected from each kebele based on the information obtained from community leaders and making the total informants (sample size) 40. Those traditional healers are well-known in the community due to their long year practice in providing service related to traditional health care to the community. From 40 total informants, 10 were selected as key informants because they were assumed as best practitioners. The selection of key informants is done using purposive sample method. The choice of key informants was done following the suggestion made by Martin (1995).

3.2.2 Ethnobotanical data collection

All information regarding traditional knowledge of the local community such as use, preparation, dosage, distribution, threats and conservation status of medicinal plants to treat human ailments were gathered and documented. Therefore, to get accurate or reliable data, only primary data collection methods such as field observation (guided field walks with informants) and interviews (semi-structured way) were used.

3.2.3 Methods of data collection

The reliable information or data were gathered through multiple methods. These multiple methods include group discussion, semi-structured interviews, field observation. The semi-structured interview was the main data collection instrument, but the field observation and focus group discussion were the supplementary data collection instruments.

3.2.4 Semi-structured interviews

Semi-structured interviews were prepared beforehand in English and translated to informants' language, Afan Oromo to make communication smooth during data collection. The interview questions include the local name of medicinal plants found in the area, parts used, preparation method, ingredients added, method of conservation and plant type.

3.2.5 Field observations

During the study, field observations were performed with the help of key informants (guides selected from the local people) who were also interviewed. Full notes on the prevailing facts and information about the history of medicinal plants, plant habitat (cultivated or wild), and plants habit were recorded on site.

3.2.6 Plant specimen collection and identification

Medicinal plant specimens were collected from various habitats of the study area such as wild, home gardens and cultivated land. After collection, specimens were coded with number; their habitat and habit were recorded, pressed by wooden press, dried in range, and made ready for identification. Dried specimens were taken to Jimma University herbarium for identification. The identification was done using published volumes (1-8) of Flora of Ethiopia and Eritrea. Voucher specimens were deposited at Jimma University herbarium.

3.2.7 Method of data analysis

Ex-cell spreadsheet was used to interpret the quantified data. Consequently, percentage and graph were employed to analyze and summarize the Ethnobotanical data obtained from the interviews on reported medicinal plants and associated knowledge.

3.2.8 Ethical issue

The researcher was asked permission from Begi District administration office to collect the data from households found in the District. The researcher also gives orientation for data collectors not to collect unbiased data that is against the norms, culture, value, language, religious etc.

CHAPTER FOUR

4. RESULTS AND DISCUSSION

4.1. Demographic characteristics

Table 1: Demographic characteristics of respondents

Item	Alternative	Number	Percentage
Sex	Male	30	75 %
	Female	10	25 %
Age	15-35	5	12.50 %
	36 – 50	10	25 %
	51 – 65	15	37.5 %
	>65	10	25 %
Religion	Protestant	10	25 %
	Orthodox	6	15 %
	Muslim	20	50 %
Education status	Elementary	37	92.5 %
	Secondary	3	7.5 %
	College diploma	-	-
	Degree and above	-	-
Marital status	Single	1	2.5 %
	Married	39	97.5 %

From the table 1 above describes demographic characteristics of respondents, this contains age, sex, occupational status, religion and educations status of the respondents. Age of respondents indicates knowledge of medicinal plants was imagined to be influenced by the age of the respondent. Therefore, in the study sites, 87.5 % of respondent's age was 36 and above.

4.1 1 Indigenous knowledge of respondents on health

In the study area, health is perceived as special asset provided by God. From discussion made with elders, proverbs were recorded reflecting the values of health to the local people.

To cite few of these:

“Qabeenyii abbaan hin beekne fayyaadha” meaning “a great capital and gift is Health”.

"Fayya qosaa seetee qayyaan laga ceete” meaning “health requires special care”. From these local sayings, it is better to know that health needs care, and is as a great asset and a life instrument for any aspect of life activities in the area.

4. 1. 2 Indigenous knowledge on treatment strategies

In the study site, as the result found showed that treatment strategies could be classified as home remedies, indigenous medicine, and modern medicine. Despite their distinct features and procedures of treatment, these healthcare strategies often overlap, as patients appear to use one strategy after another without taking time to see the effect of each medication. As obtained from group discussion and interviews made during field observation, the local people always exploit their shared knowledge in order to control health problems at home before looking for other options regardless of the type of health problem and its intensity. Accordingly, the sick person is given either traditional medicine plant and /or animal sources that in rare cases mixed with soil or ash or treated spiritually through desire, consulting spiritual men, locally 'Qaallu' or curse-removal spit (locally, 'aagi'). In most cases, all these are employed in combination for the treatment of specific health problems. Seeking modern health service often comes after the above are exhausted or rarely simultaneously. In the study area, local patterns of seeking health care are described in terms of three different but overlapping factors:

Informal access: usually, dislike modern health care institutions, local healers are found within available distance. This was found to affect the decision of the individuals to look for healthcare options. That is, preferring either modern medication to traditional healers or vice versa.

Effectiveness on treatment: according to local knowledge, those matters which the society statements to have lived with, such as those caused by evilspirit ('Seexana'), spirit of dead ('Ekeru'), evil eye ('Buda'), synthetic poison ('Tolcha'), liver diseases (Sabata Waqayo'), urine of bat (Simbira halkaan), infectious eczema ('Sararitii') and rabies ("Sare maratu') are treated at local level by healers. On the other hand, gastritis, cardiovascular problems, mental pain, and gastro- intestinal sickness are often taken to modern health institutions.

Price of treatment: the complications involved in readily getting health service with reasonable cost are factors that limit healthcare choice of individuals or their relations. According to most informants, local healers provide health care with similar practicable and accessible cares.

In the study site, there is traditional instruction among healer and his customer which says " pay once and be treated many times", i.e. once the payment is made for the treatment of a general

health problem, no more pay is asked for continued medications that runs up to the remedial. Even if the user is not in a position to pay any amount of cash at all, he/she may then give the healer a few edges of fresh grass called 'irressaa'. This is simply made for moral satisfaction of both healer and his user. According to information acquired from elders, this 'irressa' has dual purposes: thanksgiving or respect to the healer and preservation of curative properties of the drugs. According to their cultural belief, it is also generally accepted that an herbal drug given free or without any 'irressa', in cash or in kind, will lose its medicinal properties.

Distribution of medicinal plants in Home garden

Table 2: List of home garden medicinal plants (Key: M= Medicine, F= Food, St= Stimulant, Ot=Ornament, T=Tree, H=Herb, S=Shrubs, Se=Spice).

Plant species	Family name	Local name(Afan Oromoo)	Plant habit	Supplementary uses
<i>Nicotiana tabacum</i>	Solanaceae	Tamboo	H	M,St
<i>Catha edulis</i>	Celastraceae	Caatii	T	M,St
<i>Coffea arabica</i>	Rubiaceae	Buna	T	M,St
<i>Ruta chalepensis</i>	Rutaceae	Ciiladamii	H	M,Se
<i>Schinus molle</i>	Anacardiaceae	Qundii barbaree	T	M,Se
<i>Allium sativum</i>	Alliaceae	Qulubii Adii	H	M,F,Se
<i>Zingiber officinale</i>	Zingiberaceae	Jiinjibila	H	M,F Se
<i>Aframomum corrorima</i>	Zingiberaceae	Ogi'oo	H	M,F
<i>Colocasia esculenta</i>	Araceae	Goodaree	H	M,F
<i>Musa paradisiaca</i>	Musaceae	Muzii	H	M,F
<i>Ricinus communis</i>	Euphorbiaceae	Qobboo	H	M,F
<i>Carica papaya</i>	Caricaceae	Pappaayaa	T	M,F
<i>Citrus aurantifolia</i>	Rutaceae	Burtukkanaa	T	M,F
<i>Mangifera indica</i>	Anacardiaceae	Mangoo	T	M,F
<i>Persea americana</i>	Lauraceae	Abukaadoo	T	M,F
<i>Rhamnus prinoides</i>	Rhamnaceae	Geeshoo	T	M,F
<i>Commelina stefania</i>	Commelinaceae	Ababa	H	M ,Ot
<i>Citrus limon</i>	Rutaceae	Lomii	T	M ,F
<i>Moringa stenoptela</i>	Moringaceae	Mooringaa	T	M

4.1.3 Distribution of medicinal plants in each study site.

In the study site totally, 60 medicinal plants were collected. Out of these 60 medicinal plants collected from four sites, the highest number recorded in Gaba kamisa and the least in Bille (Table 3).

Study site	No. of medicinal plants	Percentage of total species
Gaba kamisa	20	33.33%
Hofakobaree	16	26.67%
Bengaa	14	23.33%
Bilee	10	16.67%

Table 3: Total number and percentage of medicinal plants in each study site.

Most medicinal plants were collected from Gaba kamisa as table above indicates 20 (33.33%) followed Hofa kobaree 16 (26.67%), Bengaa 14 (23.33%) and the least in the Bilee 10 (16.67%) respectively. Gaba kamisa study site has highland agro-ecological zone. The result of the study revealed that medicinal plants are unevenly distributed in the different study sites (Table 3).

Distribution of medicinal plants in home garden, farmland, and wild

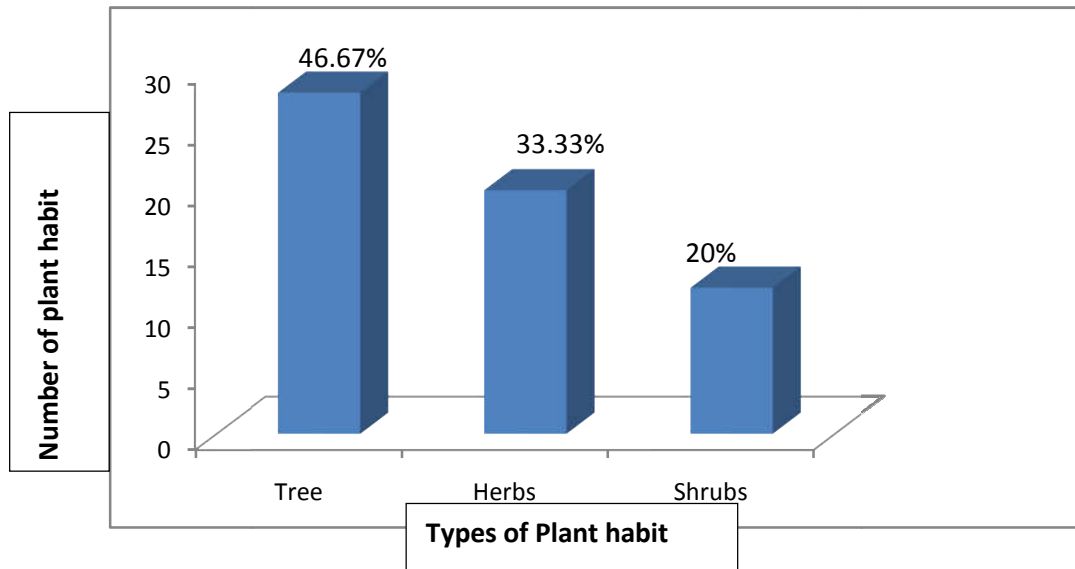


Figure 2: Distribution of medicinal plants in home garden, farmland, and wild

The highest number is trees 28 (46.67%) followed by herbs 20(33.33%) and the least is shrubs 12 (20%).

4.1.4 Diseases frequently treated using medicinal plants in the study area

Table 4. Major human disease and number of plant species used by people of the study area.

No	Disease type	Number of plant species used	Percentage
1	Abdominal cramp	14	23.33 %.
2	Tooth ache	9	15 %
3	Wound	8	13.33 %
4	Fungi diseases and body allergy	4	6.67 %
5	”evil eye”	4	6.67 %
6	Toxicity or man-made toxins	3	5 %
7	hook worm disease	3	5%
8	Tape worm disease	3	5 %
9	High blood pressure	2	3.33 %
10	Diarrhea	2	3.33 %
11	Madness	2	3.33 %
12	Tonsillitis	2	3.33 %
13	Malaria	1	1.67 %
14	Abortion	1	1.67 %
15	Cough	1	1.67 %
16	Kidney disease	1	1.67 %
17	Tuberculosis	1	1.67 %
18	Typhoid	1	1.67 %
19	Chancroid	1	1.67 %
20	Urine of bat	1	1.67 %
21	Inflammation of testis	1	1.67 %
22	Overlap of intestine	1	1.67 %
23	Ascariasis	1	1.67 %
24	Eye diseases	1	1.67 %

In current study, 24 different types of health problems were reported to be treated by medicinal plants. All of these medicinal plants recorded in the study area, 60 species were used to treat human health problems. Among them, 14 species (23.33 %) were used for abdominal cramps, 9 species (15 %) used for teeth infection, 8 species (13.33 %) used for wound infection 4 (6.67 %) species used to treat fungi diseases and body allergy, 4 species (6.67 %) ‘evil’eye, 3 species (5 %) man-made poison, hook worm and tape worm diseases, 2 species (3.33 %) blood pressure, madness, diarrhea and tonsillitis, one species (1.67 %) cough, eye infection, malaria, abortion, kidney, tuberculosis, typhoid, Chancroid, urine of bat, inflammation of testis overlap of intestinal and ascariasis.

4.1.5 Parts of medicinal plants used to treat human ailments

The study revealed that almost all plant parts (leaf, roots, stem, fruit, and seed) are used for preparing different remedies. However, the most frequently utilized plant parts were leaf 29 species (48.33 %) followed by whole plant parts was used nine (15%), roots 8 species (13.33% stem 5 (8.33%) and seed 3 species (5 %).

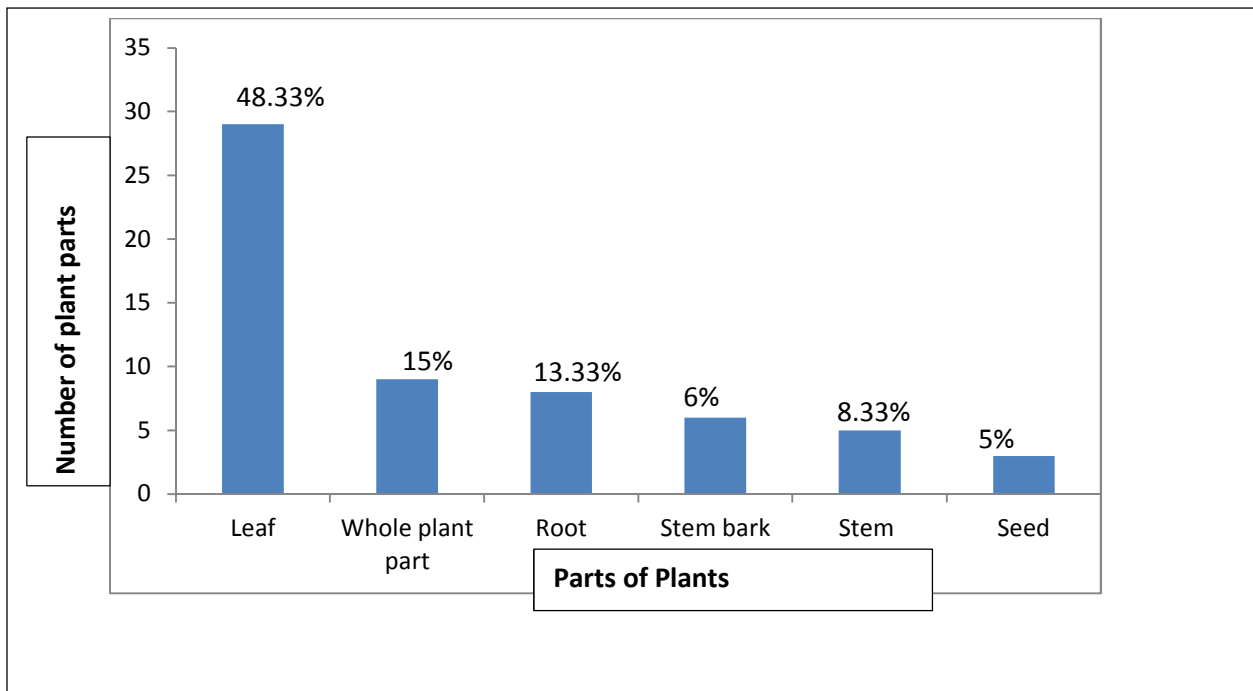


Figure 3: Parts of medicinal plants used to treat human ailments.

4.1.6 Distribution of medicinal plants among plant taxa: Families and species

Medicinal plants collected during this study were dispersed among 41 different plant families, 56 genera and 60 plant species (Appendix 4). The overall analysis of the data revealed that the family Fabaceae, Solanaceae and Rutaceae has the highest number of species, 4 (6.67%); followed by Asteraceae 3 species(5%); Lamiaceae, Euphorbiaceae, Rosaceae, Boraginaceae, Rubiaceae, Anacardiaceae, Zingiberaceae and Brassicaceae 2 species (3.33%) and Polynaceae, Araceae, Passifloraceae, Rhamnaceae, Cyperaceae, Aloaceae, Celastraceae, Caricaceae, Phytolaccaceae, Musaceae, Ranunculaceae, Amaranthaceae, Loganiaceae, Guttiferaceae, Commelinaceae, Dioscoriaceae, Bignoniaceae, Alliaceae, Loranthaceae, Crassulaceae, Myrsinaceae, Sapindaceae, Malvaceae, Cucurbitaceae, Polypodiaceae, Verbenaceae, Acanthaceae, Apiaceae and Moringaceae have

Condition of plant parts used for medicinal purposes

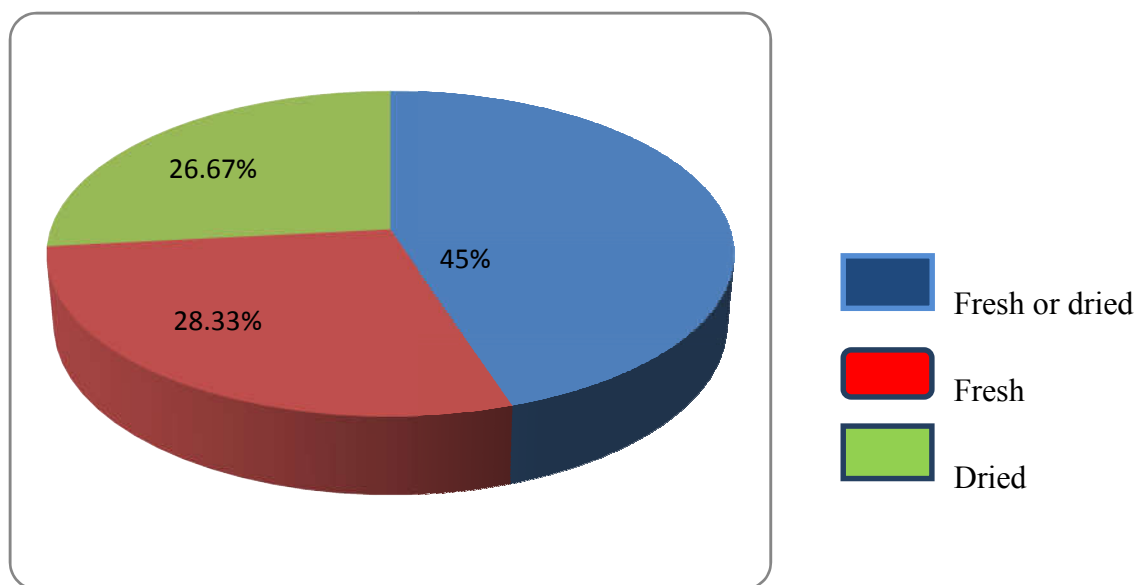


Figure 4: Condition of plant parts used for medicinal purposes.

As indicated in Fig. 4 most medicinal plants 27 (45%) were used in fresh or dried state. As majority of the plants can be used in both forms (fresh or dried), the chance of using medicinal plants under unlike seasons of the year is maximized. During group discussion sessions most informants reported that, they preserve the plant material that they could not find year-round by various ways like pounding and saving the powder and / or hanging the intact plant material in the kitchen.

4.1.7 Preparation of medicine

In the gathering of data regarding the preparation of medicine, informants have described various abilities linked with herbal preparation. These include plant arrangement (whether single or combined), situation of plant material used (fresh or dry) and methods of preparation.

Method of preparing traditional medicine ready to use in the study site

Forms of preparation	Preparation	Percentage
Crushing, pounding, homogenizing in water	11	18.33%
Infusion	9	15%
Chewing	9	15%
Powdered	8	13.33%
Vegetable drug	4	6.67%
Latex collection	3	5%
Sap collection	3	5%
Cooked	3	5%
Warming near fire	2	3.33%
Crushed & smoked	2	3.33%
Baked	2	3.33%
Boiling and inhaling its smoke	2	3.33%
Burned to ash & mixed with honey	1	1.67%
Beating	1	1.67%

Table 5: Describes the local people tend to apply methods such as crushing, smoking and Beating. It was also described that some medicinal herbs and grass have been mixed with food and drinks in such style that they not only take care of the fitness but also give distinctive flavor and taste to it. For example, *Aframomum corrorima*, *Ruta chalepensis*, *Zingiber officinale*, and *Allium sativum* are added to coffee and cheese to recover the flavor and taste and when there is anxiety due to cold or cough.

4.1.8 Dosage of medicinal plants used

People used numerous units of measurement and time management to define the dosage. Units such as finger length (e.g., for bark, root, stem,), pinch /touch/ (e.g. for powdered plant medicine) and numbers (e.g. for leaves, seeds, fruits, and flowers) were used to approximation and dose the

amount of medicine. Recovery from the disease, disappearance symptoms of the sicknesses, declining out of the illness sign and decision of the healer to stop the treatment were some of the standards used in defining period in the direction of the dosage.

However, from the interview made during the study, it was found that there was disagreement among the healers regarding the dosage system used. For example, some informants advised that four or five drops of the latex from *Euphorbia candelabrum/Adaamii/ is* used to treat ascariasis or gonorrhoea, while some suggested that only one drop is sufficient for the same disease. Still some others suggested that they smear the latex accidentally without such quantifying system. Although the full dose resolve is unpredictable from healer to healer, the dose given is depending on age, physical strength, and body weight and health conditions. The healers never order treatments that are taken internally to pregnant women. This result indicates us that there is lack of precision in the resolve of doses in the area.

4.1.9 Side effects of traditional medicinal plants in the study area

According to the local healers, the majority of the traditional medicines slightly have temporary side effects in some cases namely, nausea, headache, stomachache, diarrhea, vomiting or some other simple and mild side effects. However, the indigenous people use some remedial measures to reduce or avoid these side effects, which mostly arise from over dosage.

4.1.10 Mechanisms of knowledge transfer among social groups

Majority of the respondents reported that most of their knowledge was received from their family members and friends secretly. On the other hand, most of the elders kept their knowledge secrecy to generate income and to get sustainable respect from their surrounding community. Moreover, the decline of traditional knowledge through generation is due to interfering and shifts to use more synthetic drugs not only in the urban but also in rural areas. According to the respondents in the study site, traditional medicinal plant knowledge is transferred orally, from their parent or grandparents to their children. This is the main mechanism of traditional knowledge transfer system in our country although this type of transfer cannot guarantee continuity under the current circumstances, where plant resource degradation and loss is severe.

Methods of administrations and external applications of herbal medicine

Methods of administration	No of species	Percentage
Oral	34	56.67%
External	22	36.67%
Nasal	3	5%
Anal	1	1.67%

Table 6: There are different methods of administration of traditional herbal medicines prepared by local community in the study area. In this study oral administration was the dominant route of application that accounted for 34 (56.67%) followed by external application 22 (36.67%), through nasalthree (5%) and anal one (1.67%)table 6. Moreover, some healers reported that some medicines could be applied in different forms. For example, *Bersama abyssinica* and *Rumex nepalensis* when used for muscular pain, can be taken either orally, nasally or dermal and *Solanum incanum*, and *Vernonia species* when used for being cleared of impotency taking it either orally, brushing the teeth by its root or just carrying the root in the pocket. Such flexible choices enable the patient to choice the technique that she/he favors. The reality of such diversified methods of application is revealing of the properly broader knowledge of the people in the area in using medicinal plants. In the other hand, spiritual value is accompanying with *Stereospermum kunthianum*. As advised by informants having a piece of *S. kunthianum*/Bottoroo/and *Olea europae* that are taken from either the root or bark, in pocket or as the toothbrush, is believed to avoid a person from evil eye and man-made-poison. Although these spiritual acts are rigid to be explained scientifically, they can give psychological assurance to the users. Some of the informants informed that limitations are mandatory when patients take certain types of remedies. For example, a patient who takes remedy in contradiction of tapeworm (made from *Glinus lotoides*) and Ascariasis (made from *Bersama abyssinica*) should not take any food item six hours before and after the direction of the medicine. Similarly, a patient who takes remedy counter to rabies, hookworm severely hides from shadow of humans.

In general, traditional healers treat diseases like spider poisons, fibril illness (dhukkubamichii), evil eye, and hepatitis (dhukkubaSimbirahalkaan) by traditional medicinal plants than they search for modern treatment. Traditional beliefs have an indirect contribution to the conservation of plants of medicinal importance, since they limit excessive harvesting of these plants in one way or another.

4.1.11 Preference ranking of medicinal plants in the study area

When there are different species prescribed for the same health problem, people show preference of one over the other. For instance, *Allium sativum* is the most effective in treating abdominal cramp, followed by *Zingiber officinale* and the third effective medicinal plant is *Citrus limon*, *Solanum dasyphyllum* ranked 4th, *Cynoglossum amplifolium* and *Mangifera indica* ranked 5th each, and the less preferred to treat abdominal cramp was *Bersama abyssinica*.

Preference ranking of seven medicinal plants on their degree of treating abdominal cramp were prescribed by ten local healers of key informants (1=Least; 2= Good; 3=Very good; 4=Excellent).

Table 7. Preference ranking of medicinal plants to treat abdominal cramp

Scientific name	Respondents (1-10)										Total	Rank
	R ₁	R ₂	R ₃	R ₄	R ₅	R ₆	R ₇	R ₈	R ₉	R ₁₀		
<i>Allium sativum</i>	3	4	3	3	2	3	4	4	2	4	32	1 st
<i>Zingiber officinale</i>	4	3	3	3	4	3	3	3	3	2	31	2 nd
<i>Citrus limon</i>	3	3	1	2	3	3	2	2	3	1	23	3 rd
<i>Solanum dasyphyllum</i>	3	2	1	1	2	3	3	1	1	2	19	4 th
<i>Cynoglossum amplifolium</i>	3	3	2	3	1	1	1	1	1	1	18	5 th
<i>Mangifera indica</i>	2	1	2	1	3	3	2	1	1	2	17	6 th
<i>Bersama abyssinica</i>	2	1	3	3	1	1	1	1	1	2	16	7 th

4.1.12 Paired comparisons of medicinal plants used to treat teeth infection

Paired comparisons were made to determine the most favored medicinal plants among the six species that were used to treat toothache. For medicinal plants that were identified by the informants to be used in treating teeth ache, a paired comparison was made among seven of them

using eight informants to know their rank. Accordingly *Nicotina tabacum*, stood first followed by *Allium sativum*, *Zingerber officinale*, *Datura stramonium*, *Vernonia amygdalina*, and *Drynaria volkensii*.

Table 8: Comparison of some medicinal plants to treat teeth ache/infection/.

Scientific name	Respondents							Total	Rank
	R ₁	R ₂	R ₃	R ₄	R ₅	R ₆	R ₇		
<i>Nicotiana tabacum</i>	4	2	3	3	4	3	3	22	1 st
<i>Allium sativum</i>	4	3	2	1	3	3	3	19	2 nd
<i>Zingerber officinale</i>	3	3	2	2	2	1	2	15	3 rd
<i>Datura stramonium</i>	3	2	1	3	1	2	1	14	4 th
<i>Buddlejapolystachya</i>	2	1	2	2	1	1	3	12	5 th
<i>Vernonia amygdalina</i>	1	1	1	1	2	1	2	9	6 th
<i>Drynaria volkensii</i>	1	1	1	1	1	1	1	7	7 th

4.1.13 Threats to medicinal plant resources in the study area

Agricultural expansion and lack of modern ways of cultivation of traditional medicinal plants were indicated as major threats in the study sites and also the disaster is that the knowledge on medicinal plants depth and width become lesser and lesser due to its secrecy, unwillingness of young generation to gain the knowledge, influence of modern education, religious and awareness factors, which all results in gradual disappearance of indigenous knowledge on medicinal plants. In the study area, medicinal plants that are harvested for local use do not result in threat. Instead, most endangered medicinal plants of the area were threatened due to other uses like: over-harvesting for commercial purposes, destructive harvesting practices, habitat loss resulting from forest degradation and agricultural encroachment. Thus, the need for agricultural land and population pressure severely threatened plant species in general and medicinal plants in particular. Significant numbers of animals graze and browse on vegetation in their wild habitat. They put an actual effect on vegetation during dry season, as the availability of browse and graze able vegetation is limited. These in turn affect the survival of medicinal plants and associated knowledge.

4.1.14 Conservation of medicinal plants in the study area

People of the study area manage the local vegetation to not only meet their fodder, fruits, construction, fuel wood, commercial values, cultural and spiritual needs but also for their medicinal attributes, as the knowledge is with them. According to the informants from the study area, the knowledge on medicinal plants passes from generation to generation as there is opportunity of knowledge exchange and transfer to the young's.

Plants are also left as fragments of forest in agricultural field due to their uses as timber source, for construction, fuel wood and ritual values. Thus, plants are managed and conserved because of their ritual and material values, which open the way for the possibilities in conservation of vegetation of the locality in general and medicinal plants in particular. Here, the intermixing of multi-purpose tree species by farmers on their farmland is evidence to management practices in the area. This type of management practice should not be disregarded as it benefits the indigenous people and encourages them to conserve plants of medicinal value with indigenous practices. In the area, about 33.33% of medicinal plants collected were reported as cultivated in home garden. For example, taking the lateral root without damaging the main root, soiling and/or transplanting the part (root, stem, or leaf) left behind and taking only small portion at a time. Only carefully chosen families or tribes in the community make some traditional medicines. Thus, not all healers harvest the medicinal plant. This would decrease the rate of plant employment. For some sicknesses such as *Tinea versicolor* (Bolale), once a plant or its part is used as a cure, there is restriction on a person not to eat and cut the plant any more. However, if a person unsuccessful to do so, he/she will progress the disease again. In some cases after the patient is treated for a specific disease such as hookworm ('Sabata Waqayyo') and jaundice for example, the patient is made to travel around a middle-aged *Acacia* tree to get outing off the evil spirits. The patient there after, never cuts the plant and even never calls up on the name of the plant. This result shows that the revealed plant species are being well maintained at least by patients treated for these ailments.

Most plant remedies are not collected on 'cagino' days (Wednesday, Friday and the 5 or 6 Pagume days are locally called cagino days). This is believed to maintain of the effectiveness of the remedies. The employment could reduce the rate of harvesting of medicinal plants. Traditionally, it is illegal to gathering the healthy and propagative plants in the presence of the miss happen and non-fruiting (seeding) plant.

4.2 Discussion

The use of traditional medicine is still wide spread in Ethiopia and suitability, availability and popularity is no reservation as about 80% of the populations use it for health care needs (WHO, 2002). According to Kanon (2004) easy accessibility, effectiveness on treatment and reasonable cost in receiving health services are the major reason in preferring traditional medicine than modern medicine. Traditional healers were found to play vital role in the primary health care coordination of the rural people as they treat peoples who had little access and could not afford the cost of modern medication.

The study that male informants in the study area had knowledge of traditional medicinal plants more than female participants. This may be male achieved their tasks out of their home, consequently, they could have chance to learn the useful values of medicinal plant species from their daily association with plant species. In addition to this, healers preferred male to transfer their indigenous medicinal knowledge due to their probability male alone could the medicinal plant species from far site and forests. The highest numbers of species were stated by participants from the Male informants (Berhane *et al.*, 2014). The present in agreement with the results reported for the Counter ethnic communities in southwestern Ethiopia by Gidayet *al.*, (2013) that the male informants have greater plant knowledge than females, because boys were favored for the transfer of medicinal plant knowledge. A higher number of Muslim religion follower informants were included because of their number of populations in the study area.

The reason for finding of large number of traditional medicinal plants species and linked uses in Begi district could be connected to the diversity, landforms, and favorable climatic conditions that preserved varieties of plant species. In the study area, families such as, Fabaceae, Solanaceae and Rutaceae the highest number of species represented by higher number of medicinal plant species contribution for remedy preparation. This could be an indication that the study area consists of significant diversity of medicinal plant species within these families. These families are among the largest families in the Flora of Ethiopia and Eritrea (Thulin, 1989). According to Bekalo *et al.*, (2009) family Fabaceae, Solanaceae, and Rutaceae were reported as having used in preparation of remedies and represented by highest number of medicinal plants. These families have also high involvement in research reports of (Tadesse *et al.*, 2005; Amenu, 2007; Luleka *et al.*, 2008 and Yineger *et al.*, 2008).

This finding is a good indicator for the presence of a significant diversity of medicinal plant species in the area. Furthermore, the presence and utilization of such a large number of medicinal plants by people in the study area indicates that of the people continue to employ indigenous medicinal practices even after the arrival of modern medicines.

Most medicinal plants were more available in the wild areas (Appendix 3) and have been cultivated by households in the home gardens. Future efforts need to give outstanding attention to conserve them around human habitations (Flatieet *al.*, 2009). This study indicates that the healers mostly collected medicinal plants from wild sources or the natural environment than home gardens (Appendix 3). The fact that most of the remedies were found in the wild environment is a great threat to their existence with the current rate of habitat destruction and transformation. The situation, covered on natural factors, resulted in shortage of some medicinal plants. This study also shows that some species of medicinal plants and their utilization are more popular than the others in treating human's health problems which are popular in the study area have local name and well known by the local people or healers.

According to the informants in the study area, the reason behind the appreciation of these medicinal plants can be recognized to the wide range of health problems that they treat or to the abundance of the plant in the area for easy access. Whereas the less recognized and less popular plants do not have local name, even some medicinal plants that have local name were not commonly utilized by many people of the study area. Generally, based on the information obtained from the respondents in the study area, certain species were independently cited more than six times by different informants for their medicinal uses to treat human ailments. As indicated in table 4, major uses of medicinal plants for treatment of different diseases ranges, such as abdominal cramp and teeth infection. The result of the study also indicated the highest amounts of medicinal plants were used in treating abdominal cramp and teeth infection. This result indicates that *Nicotiana tabacum* is much better over other plant species cited in treating teeth ache in the study area. These traditional remedies definitely, need to be confirmed through scientific investigations to identify those that may provide alternatives for modern drugs.

The number of human ailments and number of medicinal plant species documented in the study area were different because of one type of human ailments is treated by many medicinal plant species and also many types of medicinal plant species were treating a single ailments.

Trees are the most growth forms of plants used medicinally in the study area. This could be due to relative abundance and accessibilities of herbs as compared to the other growth forms as noticed during field observation (Bekalo *et al.*, 2009) and could be because herbs are relatively rich in bioactive constituents (Coley *et al.*, 1988). According to Stepp (2004) herbaceous plants are more toxic than others, the property of which has made herbs as most required form of medicine and this is linked to the selection strategy of the medicinal flora of indigenous people for their healthcare. Studies conducted by Mesfin(2007), Giday *et al.*,(2009), Awas and Demissew (2009) also showed the dominance of herbaceous species as medicinal plants in communities elsewhere.

According to Dawit Abebe and Ahedu Ayehu (1993) medicinal plant harvest that involves roots, leaves, bulbs, barks and stems have serious effect on the survival of mother plants.

From methods of application, drinking was the most frequently and widely used method of traditional drug application in the study area. This is in agreement with Amenu (2007) and Birhane *et al.*,(2011). Oral application was the highest and most commonly used method of administration followed by external application (table 6). This finding agrees with the findings of Dawit Abebe and Ahedu Ayehu(1993).Both oral and external route permit rapid physiological reaction of the prepared medicine with the pathogens and increase its curative power (Mesfin, 2007).Traditional remedy was also externally in the form of smoke in the study area. Whereas those taken through nasal were powdered, smoked, or boiled in water and the patient breath the powder or inhale the smoke or the steam being covered with pieces of clothan example of medicinal plants used as such remedy in the study area are *Plectranthus edulis* (Dinnicha Oromoo) and *Nicotiana tabacum* (Tambou).Some reported medicinal plants wellmanagements used for other than medicine preparation.Hence, the medicinal plants are more exposed to extinction. Unless conserved, medicinal plants may be highly eroded in the study area. Hence, the sustainable utilization of medicinal plant species should practice through awareness raising and conscious protection *in situ* and *ex situ*. Blade *et al.*, (2015).

5. CONCLUSION AND RECOMMENDATION

5.1 CONCLUSION

Assessment and understanding of the traditional medicinal plant species is important for their sustainable management, utilization, and biodiversity conservation. Quantitative analysis of traditional medicinal plants species diversity will be useful in forest management and conservation. The overall traditional medicinal plants species in the study site reveals that contribution of tree to the total population was highest followed by herbs and shrubs. It shows traditional medicinal plants of tree species in the wild is good and the future communities may be sustained unless there is any major environmental stress or interference exerted by human activities. This study showed that traditional medicine, mainly involving the use of medicinal plants, is playing an important role in meeting the primary healthcare needs of the people in the study area. Due to the receiving of traditional medicinal plants around the study area and restricted access to modern healthcare facilities, using medicinal plants are measured as the key continuous practice among the society.

Generally, 60 species of medicinal plants are documented in the study area used in the treatment of different types of human health problems and categorized under 56 genera and 41 families. Healthy problems such as, abdominal cramp, teeth infection, rabies, wound, Evil eye, cough, eye infection, and snake bite were the major recognized ailments in the study area.

Most medicinal plant species collected from each study site was from their natural habitat and home garden. Regarding the growth, forms of medicinal plants tree are widely used followed by herbs, shrubs, climbers, and trailers respectively. Peoples of the study area mostly prepare the remedies from leaves and this utilization of more leaves than other plant parts do not put medicinal plants under pressure compared with using of root or stem.

No studies have been made in the assessment and utilization of traditional medicinal plants in Begi District. Such knowledge or information is critically important to document the relative importance of the traditional medicinal plants resources of the district. Humans and natural factors are the major threats to plants species in general. As suggested by most informants, in the area, the human threats including agricultural expansion, over grazing and natural

factors such as extended dry time and termite problems are mentioned to be major threats for decrease of medicinal plants.

The presence of numerous cultural traditions was found to have both beneficial and damaging influences on medicinal plants. For instance, some of these beliefs give to medicinal plant management as they decrease the degree of collecting of the plants, while others contribute to decline of the knowledge on traditional medicine and medicinal plants.

Systematic management plan is required for the conservation of vegetation and sustainable use of available resource. Quantitative analysis of diversity of traditional medicinal plants of species recorded from the present study may provide baseline information for formulating conservation and management strategies of the present forest. The Begi districts forest currently protected by the government because of need of serious attention for conservation and management.

Concerning conservation practice, some local people have sophisticated medicinal plants for different uses. Cultivation of medicinal plants is mostly due to other uses such as for food and spice. There are tiny labors towards the conservation practice of certain medicinal plants. The District Agricultural and Rural Development offices and State Forest Office have also conserve the forest or vegetation of the area which is the main source for medicinal plants, and thus in turn, the source for linked indigenous knowledge. Therefore, the present study is to initiate to assess the traditional medicinal provide information on the assessment and utilization of traditional medicinal plants, management, sustainable, utilization and conservation of the traditional medicinal resources in Begi District.

5.2 RECOMMENDATION

Based on the conclusions derived from the findings the following recommendation was suggested.

- Classifying honestly effective medicinal plants and stimulating their production and cultivation accomplished through frank collaboration between local administrators and healers.
- Creating conservation measures strategies to ensure the sustainability of multipurpose and extensively used medicinal plants as most medicinal plants are obtained from the wild. This can be achieved by:
 - Inspiring /stimulating/ people to grow medicinal plants in the home gardens, mixing with crops in farmlands and live boundaries.
 - Special attention and all possible endeavors /activities/ must be made to use the traditional medicine and traditional medicinal plants in the study site.
 - The indigenous knowledge and skill of traditional medicine practitioners must be encouraged and protected.
 - Promoting the institution of local botanical garden starting at least at the district level.
 - In-situ and ex-situ conservation activities should be practiced in the district through training model farmers to ensure the continuity of threatened medicinal plants.
 - Farmers should be encouraged to participate in training program, which will facilitate implementation of modern technique of cultivation, collecting, processing, storage, and sustainable uses of medicinal plants.

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Appendix 1: Checklist Questions used for Interview.

1. What are the parts of the medicinal plant collected for medicinal use?
2. Would you tell the management practices by indigenous people?
3. Are there conditions that forbid taking the medicine such as pregnancy and others?
4. How is the medicinal plant (s) preserved (if any)?
5. Are there members of the community who frequently use the medicinal plant?
6. Are there economic groups who mostly or occasionally use these medicinal plants?
7. Are there routines in the use of medicinal plants?
8. Is (are) the medicinal plants(s) marketable?
 - A) Which age group? B) Which plant species? C) Source? D) Benefits?
9. How is the knowledge passed from elders to younger in your area?
10. How does modernization interfere with traditional medicinal system?
11. Are there threats to medicinal plants?
12. Are there traditional medicinal plants conservation methods in the area?
13. Are medicinal plants currently cultivated in your area?

Appendix 2: List of Questions used for focus group discussions.

1. Are there taboos in the use of some medicinal plants in the locality?
2. Do you have information on edibility and other uses of the plant besides its medicinal uses/value?
3. What are give-and-take impacts of plant-human interactions?
4. What are your ideas on the health and treating strategies on the diseases occurring in your areas?

Appendix 3. List of home garden medicinal plants.

Plant species	Family name	Local name	Plant habitats	Supplementary uses
<i>Aframomum corrorima</i>	Zingiberaceae	Ogi'oo	H	M,F
<i>Allium sativum</i>	Alliaceae	Qulubii Adii	H	M,F,Se
<i>Carica papaya</i>	Caricaceae	Pappaayaa	T	M,F
<i>Catha edulis</i>	Celastraceae	Caatii	T	M,St
<i>Citrus aurantifolia</i>	Rutaceae	Burtukkanaa	T	M,F
<i>Citrus limon</i>	Rutaceae	Lomii	T	M ,F
<i>Coffea arabica</i>	Rubiaceae	Buna	T	M,St
<i>Colocasia esculenta</i>	Araceae	Goodaree	H	M,F
<i>Commelina stefania</i>	Commelinaceae	Ababa	H	M ,Ot
<i>Mangifera indica</i>	Anacardiaceae	Mangoo	T	M,F
<i>Moringa stenopetala</i>	Moringaceae	Mooringaa	T	M
<i>Musa paradisiaca</i>	Musaceae	Muzii	H	M,F
<i>Nicotiana tabacum</i>	Solanaceae	Tambooo	H	M,St
<i>Persea americana</i>	Passifloraceae	Abukkadoo	T	M,F
<i>Rhamnus prinoides</i>	Rhamnaceae	Geshoo	T	M,F
<i>Ricinus communis</i>	Euphorbiaceae	Qobboo	H	M,F
<i>Ruta chalepensis</i>	Rutaceae	Ciiladamii	H	M,Se
<i>Schinas mole</i>	Cyperaceae	Qundii barbaree	T	M,Se
<i>Zingiber officinale</i>	Zingiberaceae	Jibinbila	H	M,F Se

Hint:

M=Medicine, F= Food, Se= Spine ,St = Stimulant, Ot= Ornament ,H= Herb, T= Tree, S=shrub

Appendix 4. List of collected plant specimens

No	scientific names	Family	Local name	Part to used	Plant habitats	Disease treats
01	<i>Zingiber officinale</i>	Zingiberaceae	Jibinbila	Whole part	H	Abdominal cramp & toothache
02	<i>Allium sativum</i>	Alliaceae	Qulubii Adii	Root	H	Abdominal cramp & malaria
03	<i>Croton macrostachyus</i>	Euphorbiaceae	Bakkan niisaa	Leaf	T	Antifungal , Hook worm & abdominal Cramp
04	<i>Citrus limon</i>	Rutaceae	Loomii	Fruit	T	Ant toxic substance , blood pressure
05	<i>Solanum dasyphyllum</i>	Solanaceae	Hiddii waraab essaa	Root & Leaf	S	Abdominal cramp & antifungal of feet
06	<i>Nicotiana tabacum</i>	Solanaceae	Tambo o	Leaf	H	Toothache & anti poisons
07	<i>Cordia africana</i>	Boraginaceae	Wadde essa	Stem bark	T	Wound
08	<i>Bidens sp</i>	Asteraceae	Keeloo	Leaf	H	Wound & Diarrhea
09	<i>Carica papaya</i>	Caricaceae	Paappayaa	Fruit	T	Abdominal pain, Abortion ,Tap worm & consumption abdominal
10	<i>Persea americana</i>	Lauraceae	Abukaa doo	Fruit	T	Abdominal pain
11	<i>Datura stramonium</i>	Solanaceae	Asaang ira	Leaf	H	Toothache

12	<i>Aloe macrocarpa</i>	Aloeaceae	Argisaa	Leaf	S	Wound
13	<i>Catha edulis</i>	Celastraceae	Caatii	Leaf	S	Cough
14	<i>Ruta chalepensis</i>	Rutaceae	Cilaadd amii	Leaf	S	Kidney
15	<i>Moringa stenopetala</i>	Moringaceae	Moriin gaa	Leaf	T	Blood pressure & kidney
16	<i>Gossypium arboretum</i>	Malvaceae	Jirbii	Leaf	H	Wound
17	<i>Buddleja polystachya</i>	Buddlejaceae	Qayyis a	Stem bark	T	Toothache
18	<i>Stereospermum kunthianum</i>	Bignoniaceae	Botoro o	Stem bark	T	Tap worm
19	<i>Tapinanthus globiferus</i>	Loranthaceae	Dheertu u bunaa	Leaf	S	TB
20	<i>Cynoglossum amplifolium</i>	Borangiaceae	Maxxa nnee	Root	S	Abdominal cramp
21	<i>Vernonia amygdalina</i>	Asteraceae	Eebicha	Leaf stem	T	Tooth ache
22	<i>Coffea arabica</i>	Rubiaceae	Buna	Seed	T	Diarrhea and Typhoid
23	<i>Phytolacca dodecandra</i>	Phytolaccaceae	Andood ee	Root	S	Chancroid
24	<i>Olea europaea sub species cupsidata</i>	Oleaceae	Ejersa	Stem bark	T	Eye evil & constipation
25	<i>Kalanchoe petitiana</i>	Crassulaceae	Maraasi saa	Leaf	S	Abnormal man- made poisons
26	<i>Lannea schimperi</i>	Anacardiaceae	Foorica	Stem bark	T	Tap worm & abnormal man
27	<i>Millettia ferruginea</i>	Fabaceae	Sootall oo	Seed	T	Wound
28	<i>Momordica foetida</i>	Cucurbitaceae	Inbaaw	Leaf	S	Wound

			oo			
29	<i>Vernonia auriculifera</i>	Asteraceae	Reejiii	Stem	T	Eye evil
30	<i>Senna didymobotrya</i>	Fabaceae	Sanaam akii	Leaf	T	Eye evil
31	<i>Ricinus communis</i>	Euphobiaceae	Qobboo	Leaf	S	Wound
32	<i>Commelina stefania</i>	Commelinacea	Haanca bii	Leaf	T	Allergic /miichii/
33	<i>Drynaria volkensii</i>	Polypodiaceae	Ballees saa laaftoo	Whole part	S	Toothache
34	<i>Plectranthus punetatus</i>	Lamiaceae	Diinich a booyye e	Leaf	H	Body allergic
35	<i>Rhamnus prinoides</i>	Rharnaceae	Geesho o	Leaf	T	Tonsil
36	<i>Clausena anisata</i>	Rutaceae	Ulmaay ii	Stem	T	Tooth ache
37	<i>Guzoita scabra</i>	Asteraceae	Tuufoo	Leaf	S	Wound
38	<i>Mangifera indica</i>	Anacardiaceae	Mango o	Stem bark	T	Abdominal cramp
39	<i>Euphorbia candelabrum</i>	Euphorbiaceae	Adaami i	Whole part	T	Wound
40	<i>Colocasia esculenta(L.) Schott</i>	Araceae	Goodar ree	Stem	S	Abnormal cramp & urine of bat
41	<i>Aframomum corrorima</i>	Zingerberaceae	Ogiyoo	Seed	S	Chancroid
42	<i>Maesa lanceolata</i>	Myrsinaceae	Abbayy ii	Cell wall	T	Cough
43	<i>Bersama abyssinica</i>	Sapindaceae	Lolchii	Cell wall	T	Abdominal cramp

			saa			,Cough & man-made Poisonous
44	<i>Rumex nepalensis</i>	Polygonaceae	Timijjii	Root	H	Abdominal cramp
45	<i>Celosia antherminthia</i>	Amaranthaceae	Henber essoo	Leaf	S	Kosso diseases
46	<i>Pentas lanceolata</i>	Rubiaceae	Suruma Leenca a	Leaf	S	Body damage
48	<i>Trifolium pretense</i>	Fabaceae	Siddiss a	Whole part	H	hook worm
49	<i>Amphicarpa africana</i>	Fabaceae	Gohaa	Root	H	Inflammation of test
50	<i>Hypericum quartinianium</i>	Guttiferaceae	Ulee foonii	Leaf	T	Ofkaaltii dubarttoota
51	<i>Dioscorea sagittifolia</i>	Dioscoriaceae	Burii	Root	H	Overlap of intestinal
52	<i>Musa paradisiaca</i>	Musaceae	Muzii	Fruit	S	Abdominal cramp
53	<i>Prunus persica</i>	Rosaceae	Kookii	Leaf	T	Tonsillitis
54	<i>Solanum incanum</i>	Solanaceae	Hiddii Saree	Leaf	S	Tooth ache
55	<i>Justicia schimperiana</i>	Acanthaceae	Dhum muuga	Leaf	S	'Evil'eye
56	<i>Lippie javanica</i>	Verbenaceae	Kusaay ee	Leaf	T	Abdominal belly
57	<i>Ocimum gratissimum</i>	Lamiaceae	Anccab bii	Leaf	S	Body allergic
58	<i>Prunus africana</i>	Rosaceae	Oomii	Stem bark	T	Tooth ache & Hook worm
59	<i>Brassica carinata</i>	Brassicaceae	Raafuu	Leaf	H	Abdominal

						consumption
60	<i>Daucus crota</i>	Apiaceae	Kaarota	Root	H	Eye diseases

Appendix 5: Lists of plant families identified in the study area with number of genera and species

Families	No of genera	%	No of Species	%
Fabaceae	4	6.67%	4	6.67%
Solanaceae	4	6.67%	4	6.67%
Rutaceae	4	6.67%	4	6.67%
Asteraceae	3	5%	3	5%
Rosaceae	2	3.33%	2	3.33%
Boraginaceae	2	3.33%	2	3.33%
Anacardiaceae	2	3.33%	2	3.33%
Rubiaceae	2	3.33%	2	3.33%
Brassicaceae	2	3.33%	2	3.33%
Lamiaceae	2	3.33%	2	3.33%
Euphorbiaceae	2	3.33%	2	3.33%
Polygonaceae	1	1.67%	1	1.67%
Araceae	1	1.67%	1	1.67%
Passifloraceae	1	1.67%	1	1.67%
Rhamnaceae	1	1.67%	1	1.67%
Cyperaceae	1	1.67%	1	1.67%
Zingiberaceae	1	1.67%	1	1.67%
Aloaceae	1	1.67%	1	1.67%
Celastraceae	1	1.67%	1	1.67%
Caricaceae	1	1.67%	1	1.67%
Phytolaccaceae	1	1.67%	1	1.67%
Musaceae	1	1.67%	1	1.67%
Ranunculaceae	1	1.67%	1	1.67%

Amaranthaceae	1	1.67%	1	1.67%
Loganiaceae	1	1.67%	1	1.67%
Guttiferaceae	1	1.67%	1	1.67%
Commelinaceae	1	1.67%	1	1.67%
Dioscoriaceae	1	1.67%	1	1.67%
Bignoniaceae	1	1.67%	1	1.67%
Alliaceae	1	1.67%	1	1.67%
Loranthaceae	1	1.67%	1	1.67%
Crassulaceae	1	1.67%	1	1.67%
Myrsinaceae	1	1.67%	1	1.67%
Sapindaceae	1	1.67%	1	1.67%
Malvaceae	1	1.67%	1	1.67%
Cucurbitaceae	1	1.67%	1	1.67%
Polypodiaceae	1	1.67%	1	1.67%
Verbenaceae	1	1.67%	1	1.67%
Acanthaceae	1	1.67%	1	1.67%
Apiaceae	1	1.67%	1	1.67%
Brassicaceae	1	1.67%	1	1.67%
Moringaceae	1	1.67%	1	1.67%