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ETHNOBOTANICAL STUDY OF TRADITIONAL MEDICINAL PLANTS IN SELECTED VILLAGES OF GOZAMIN DISTRICT NORTH WEST ETHIOPIA

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Wisdom at the source of the Blue Nile

Bahir Dar University

School of Post Graduate Studies College of Science,

Biology Department

ETHNOBOTANICAL STUDY OF TRADITIONAL MEDICINAL PLANTS IN SELECTED VILLAGES OF GOZAMIN DISTRECT, NORTH WEST ETHIOPIA MSC THESIS

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BahirDar, Ethiopia

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Department of biology

ETHNOBOTANICAL STUDY OF TRADITIONAL MEDICINAL PLANTS IN SELECTED VILLAGES OF GOZAMIN DISTRICT NORTH WEST ETHIOPIA

A Thesis Submitted to the School of Graduate Studies in Partial Fulfillment of the Requirements of Degree of Master of Science in Biology (Botany)

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APPROVAL SHEET

As a thesis research advisor,I hereby certify that I have read and evaluated this thesis prepared,under my guidance,by Metsehet Yinebeb entitled as 'Ethnobotanical Study of Traditional Medicinal Plants in Selected Villages of Gozamin District North West Ethiopia',I recommended the paper to be submitted as fulfilling the requirements for degree of MSc in Botany (Biology).

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As member of the bord of examiners for the MSc theses open defence examination, we certify that we have read and evaluated the theses prepared by Metsehet Yinebeb and examined the candidate.We recommended the thesis to be accepted as fulfilling required by the degree of master of science in biology.

Chairperson _____ Signature _____Date _____

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DECLARTAION

I, the undersigned, declare that this MSC thesis is my original work and has not been presented in other universities for the same purpose. All sources of materials for this work have been dully acknowledged. The author and Bahir Dar University reserve all rights to this work. No any material in any work can be reproduced what so ever without the permission of the fore stated right bearers.

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Date of submission: 25/9/2014

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ABBRIVATIONS AND ACRONYMS

EVM	Ethnoveternary medicine
FL	Fidelity level
GAO	Gozamin woreda agricultural office
GHO	Gozamin woreda health office
IBC	Institute of Biodiversity Conservation
ICF	Informant Consensus Factor
IK	Indigenous Knowledge
IUCN	International Union for Conservation of Nature
MP	Medicinal plant
TM	Traditional medicine
WHO	World health organization

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ABSTRACT

An ethnobotanical study on medicinal plants was conducted in Gozamin district, Amhara National Regional State, North West Ethiopia. The overall objective of this study was to assess the status of traditional medicinal plants and to document the associated knowledge of the local communities of the district. Eight villages were selected randomely among the the total 26 villages. In all sample villages 80 informants were selected and interviewed two times. Key informants were selected by purposive random sampling whereas the other informants were selected randomly from the local people of the study area. The ethnobotanical data were gathered through interview and questionnaire. A total of 92 medicinal plants belonging to 83 genera and 50 families were recorded and used to treat both human and livestock ailments. Of these, 82.6% species are used to treat only human ailments, 4.35% species are used for livestock ailments only and 13.04% species are reported for both human and livestock ailments. These medicinal plants are used to treat about 47 types of human ailments and 11types of animal ailments. Of the total documented plant species, the largest diversity of species recorded belongs to four families including the Solanaceae (8.69%), Asteraceae (6.52%), Euphorbiaceae and Fabaceae (5.43%), and Herbs were the major growth form (38.04%). The study showed that the most frequently used plant parts for threating different diseases are leaves (46.6%) followed by roots (25.24%) and seeds (11.65%). Crushing and mixing was the major (43.3%) way of traditional medicinal plants preparation and the most common route of administration was oral (48.54%) while vaginal was the least (0.97%). The main threats to medicinal plants in the study area were new agricultural lands expansion (33.75%) and efferts to conserve traditional medicine plants is negligible. The current study showed that, there is little practice of keeping medicinal plants from damage. It is therefore, recommended that create a conducieve environment for traditional medicine practitioners and train them to share their secretive knowledge to the next generation and People need to be encouraged to cultivate and conserve medicinal plants in their home garden through training or education.

Key words: Ethnobotany, Medicinal plants, conservation, Gozamin district

1. INTRODUCTION

1.1. Background and Justification

Ethnobotany is defined as the study of plants, people and their interaction with environment (Martin, 1995). According to Plotkin (2006), it is defined as the study of the interaction between plants and people, with a particular emphasis on traditional tribal cultures. Additionally, Connie and Steven (2005) described ethnobotany as the study of how people of a particular culture and region make use of indigenous plants, and how they classify, identify and relate to them. It is also described as "a unit of ecological study specializing in the interaction of people and the plant world "(Ford, 1978).Thus, the focus of ethnobotany is on how plants have been or are used, managed and perceived in human societies and includes plants used for food, medicinal, rituals, social life and others. The relationship between plants and human cultures is not limited to the use of plants for food, clothing and shelter but also to their use for religious ceremonies, ornamentation and health care (Khan *et al*., 2007).

The World Health Organization (WHO, 2002) defines a medicinal plant as "any plant, which in one or more of its organs, contains substances that can be used for therapeutic purposes, or which are precursors for chemo-pharmaceutical semi synthesis". This definition distinguishes those plants that are already scientifically tested from those not subjected to a scientific study but are used in the traditional systems of medicine. According to Hamayun *et al.* (2006), a plant containing active chemical constituents in any of its part or parts like root, stem, leaves, bark, fruit and seed, which produces a definite curing physiological response in the treatment of various ailments in humans and other animals, is termed as medicinal plant. The various chemicals work together to reach equilibrium in the body as they do in the plant, and so produce gentle progressive healing within the body tissues (Hamayun *et al.*,2006). Rawal *et al.* (2009) reported that based on plant species having more active biochemical compounds that are curing numerous diseases, possesses commercial and economic value as high valued medicinal plant.

Ethnobotanical usage of medicinal flora has been in practice since time immemorial. Ethno botanical survey studies are the backbone for preserving the indigenous and traditional knowledge. Worldwide, about 85% of the traditional remedies used for primary health care are derived from plants (Prakash, 2008).

Plants have traditionally been used as a source of medicine in Ethiopia for many centuries to combat various human and livestock ailments. In fact, they become an integral part of the culture in the country due to its long history. The indigenous people of different localities in the country have developed their own specific knowledge on the use, management and conservation of plant resources (Pankhurst, 1965).

It is also indicated that Ethiopia has a long historical use of traditional medicine and has developed ways to combat diseases through it. The ways are also as diverse as the different cultures. Healing in Ethiopian traditional medicine is not only concerned with curing of diseases but also with the protection and promotion of human physical, spiritual, social, mental and material wellbeing (Kebede Deribe *et al.,* 2006). 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 Birhane *et al., 2011).*

The use of traditional medicine is still widespread in Ethiopia, and its acceptability, availability and popularity is no doubt since about 90% of the populations use it for health care needs (WHO, 2002). However, according to Mirutse Giday and Gobena Ameni (2003), loss of knowledge has been aggravated by the expansion of modern education, which has made the younger generation to under estimate its traditional value.

Similar to other parts of Ethiopia poor conservation activites of medicinal plants is observed in Gozamin district, though the district is known by good number of plant resourcs and associated traditional knowledge, there is poor documentation of these plant

species and the associated knowledge. The current plant use trend shows that the environment is facing problems of resource depletion and loss of indigenous knowledge like other area of the country. Thus an Ethnobotanical study in this district plays an important role for documentation, conservation and sustainable utilization of these medicinal plants. Therefore, this study has been conducted to document and analyze traditional medicinal plants and their associated knowledge in selected villages of the district.

1.2. Objectives of the study

1.2.1. General objective

The overall objective of this study was to identify the status of traditional medicinal plants and to document the associated knowledge of the local communities in Gozamin district.

1.2.2. Specific objective

The specific objectives of this study were to:

- Identify and document plant species used for medicinal purpose in treating human and livestock health problems.
- Identify habit, parts used to treat diseases, method of preparation and route of administrations of medicinal plants of the study area.
- explore the conservation status of medicinal plants in the study area

1.3. Research questions

1, Which medically important plants species are used by local people to treat their own heath problem and livestock ailments in the study area?

2,Which habit and part of the medicinal plants is useful to treat ailments?

3, what are the conservation status of medicinal plants in the study area?

2. LITERATURE REVIEW

2.1. History of medicinal plants

Humankind has discovered medicinal plants as indispensable cures for many ailments. Since ancient times, plants have been indispensable sources of both preventive and curative traditional medicine preparations for human beings and livestock. Although some cultures used individual natural products as medicines, many traditions propounded powerful combinations with different ingredients known as poultices, tinctures and mixtures. It is reported that the Mesopotamians were the first people to use the herbs like oils of cypress, cedar, liquorice and poppy juice for treating different ailments in 2600 B.C (Wangchuk and Dorji, 2007). Historical accounts of traditionally used medicinal plants depict that different medicinal plants were in use as early as 5000 to 4000 BC in China, and 1600 BC by Syrians, Babylonians, Hebrews and Egyptians (Dery *et al*, 1999). Evidence obtained from observations of animals shows that even chimpanzees use a number of plant species for their medicinal value (Huffman and Wrangham, 1994).

In 1500 BC, Egyptian's developed the Ebers Papyrus that documented some of the 700 drugs including formulas such as gargles, snuffs, poultices, infusions, pills and ointments. and the Indian Ayurvedic Medicine that dates to 1000 BC (Susruta and Charaka) documents the medicinal use of plants like *datura*, *aconitum*, *canabis* and *sarcostemma*. From these ancient cultures, some of the knowledge reached Mediterranean countries through traders and migrations, and it was in Hippocrates's time in 460-377 BC that pharmacognosy reached its summit in Greece. In 300 to 322 BC, Theophrastus, who was a philosopher and naturalist, was the first to deal with the history of plants, which later on helped in the classification of plants, including herbs. In 78 AD, Pedanius Dioscorides, a Greek physician produced *De materia medica*, which described more than 500 medicinal plants and their uses in detail (Wangchuk and Dorji, 2007).

In all countries of the world, there exists traditional knowledge related to the health of humans and animals. The importance of traditional medicine as a source of primary health care was first officially recognized by the World Health Organization (WHO) in

the primary Health Care Declaration of Alma Ata (1978) and has been globally addressed since 1976 by the Traditional Medicine Programme of the WHO. That Programme defined traditional medicine as: "the sum total of all the knowledge and practices, whether explicable or not, used in diagnosis, prevention and elimination of physical, mental or social imbalance and relying exclusively on practical experience and observation handed down from generation to generation, whether verbally or in writing" (Rukangira, 2013).

The World Health Organization (WHO) has described traditional medicine as one of the surest means to achieve total health care coverage of the world's population. In spite of the marginalization of traditional medicine practiced in the past, the attention currently given by governments to widespread health-care application has given a new impetus to research, investment and design of programmes in this field in several developing countries in Africa and elsewhere (WHO, 2010).

Since the launch of the first the *WHO Traditional Medicine Strategy 2002– 2005* (WHO, 2002b), there has been significant and steady progress in implementing, regulating and managing traditional medicine in most regions of the world. Although Member States acted on their own initiative, the original strategy document played an important role in supporting their efforts. Statistics on global progress have been extrapolated from the recent WHO Global Survey on traditional medicine and are based on the key indicators outlined in the *WHO Traditional Medicine Strategy 2002–2005* (WHO,2002b).

2.2. Medicinal Plants of the World

The number of plant species which have at one time or another been used in some culture for medicinal purposes, can only be estimated. An enumeration of the WHO from the late 1970s listed 21, 000 medicinal plant species (Penso 1980). In China alone 4, 941 of 26, 092 native species are used as drugs in Chinese traditional medicine (Duke and Ayensu 1985), an astonishing 18.9 percent. 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).one thousand identified

medicinal plant species are reported in the Ethiopian Flora, however, many others are not yet identified (Endeshaw Bekele, 2007). About 300 of these species are frequently mentioned in many sources. Jansen (1981) asserts that Ethiopia has rich medicinal plant lore and points out that almost all plants of the Ethiopian flora are used somewhere somehow medicinally. Other workers on the other hand estimated about 60% of the flora to be medicinal, and most sources give about 10% of the vascular flora to be medicinal (Endeshaw Bekele, 2007). If this proportion is calculated for other well-known medicinal flora and then applied to the global 422, 000 flowering plant species (Govaert, 2001), it can be estimated that the number of plant species used for medicinal purposes is more than 50 000 (Table 2.1).

Table2. 1. Plants that are used medicinally in the world

Country	Plant species	Medicinal plant species	%
China	26,092	4941	18.9
India	15 000	3000	20
Indonesia	22 500	1 000	4.4
Malaysia	15 500	1 200	7.7
Nepal	6973	700	10.0
Pakistan	4950	300	6.1
Philippines	8931	850	9.5
Sri Lanka	3314	550	16.6
Thailand	11625	1800	15.5
USA	21641	2564	11.8
Viet Nam	10500	1800	17.1
Zimbabwe	5000	500	10.0
Ethiopia	6500	1000	15.38
Average	12194	1554	12.74
World	422 000	52 885	

Sources: Duke and Ayensu (1985); Jain and DeFillipps (1991); Groombridge and Jenkins (1994, 2002); Moerman (1996); Padua *et al.* (1999**);** Govaerts (2001); Endashew Bekele (2007)

2.3. Indigenous knowledge and practices of traditional medicine in the world

2.3.1. Indigenous knowledge of traditional medicine

According to Stephen and Justin (2003), indigenous knowledge is knowledge that is unique to a given culture or society. It is the basis for local- level decision making in

agriculture, health care, food preparation, education and natural resource management. 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 Birhane *et al*, 2011).

Traditional people around the world possess unique knowledge of plant resources on which they depend for food, medicine and general utility including tremendous botanical expertise (Martin, 1995). Although various animal and mineral products contribute to human welfare, the plant kingdom is most essential to human wellbeing especially in supplying his basic needs. The relationship between humans and plants is as old as human existence on earth. This close interaction and dependency of humans on plants is studied under the field of ethnobotany. Ethnobotany tries to find out how local people have traditionally used plants for various purposes and how they incorporate plants into their cultural traditions to develop attitudes and beliefs, (Balick and Cox, 1996).Traditional knowledge (TK) is used to sustain the community and its culture and to maintain the genetic resources necessary for the continued survival of the community.

Indigenous people developed this knowledge through practical experience and skill to solve the problems that they faced on day-to-day activity. This life long experience is generally known as indigenous knowledge. It is also referred to as "traditional knowledge", "folk knowledge", "ancient wisdom" or "ethno science" (Woyek and Gorjestani, 1998). Indigenous knowledge encompasses the beliefs, knowledge, practices, innovations, arts, spirituality, and other forms of cultural experience and expression that belong to indigenous communities worldwide.

Indigenous knowledge is the basis for local-level decision making in agriculture, health care, food preparation, education, natural resource management, and a host of other activities in rural communities. Woyek and Gorjestani (1998), also define IK as the

knowledge that is locally situated and related to a more or less set of common values, beliefs, experiences and practices held by a particular tribal group, kinship or indigenous community. It includes practices and technologies, such as seed treatment and storage methods and tools used for planting and harvesting. Traditional knowledge also encompasses belief systems that play a fundamental role in a people's livelihood, maintaining their health, and protecting and replenishing the environment (Stephen and Justin, 2003).

2.3.2. Practices of traditional medicine

The knowledge and qualification of practitioners have a direct bearing on patient safety. The ways in which traditional medicine practitioners obtain their knowledge and skills vary between countries. In some countries, some traditional medicine (TM) practices have become established and practitioners are required to complete an official education/training programme. For instance, in many European countries and in North America, chiropractic, naturopathic, herbal and osteopathy practitioners must be educated in university-level programmes. Similarly, in China, the Republic of Korea, India and Vietnam, doctors practicing specific types of TM must graduate from university. In addition to education/training, many Member States have drawn up regulations for TM practitioners.However, in many developing countries, TM knowledge and skills have been transferred from generation to generation orally, making it difficult to identify qualified practitioners. Member States should consider their own situation, and identify their specific needs. These may include upgrading their knowledge base and skills, supporting collaboration between TM practitioners and conventional health care providers and, where necessary, considering regulation or registration of practices.

Many countries have their own traditional or indigenous forms of healing which are firmly rooted in their culture and history. Some forms of TM such as Ayurveda, traditional Chinese medicine and Unani medicine are popular nationally, as well as being used worldwide.

Health systems around the world are experiencing increased levels of chronic illness and escalating health care costs. Patients and health care providers alike are demanding that

health care services be revitalized, with a stronger emphasis on individualized, person centred care (Roberti, 2012). This includes expanding access to TM products, practices and practitioners. Over 100 million Europeans are currently TM users, with one fifth regularly using TM and the same number preferring health care that includes TM *(http://www.eiccam.eu/home.php?il=1&l=eng)*. There are many more TM users in Africa, Asia, Australia and North America (Barnes, 2007).

2.4. Indigenous knowledge and Traditional Medicine Practice in Ethiopia

Ethiopia, is a country characterized by a wide range of climate and ecological conditions, possesses enormous diversity of fauna and flora (Pankhurst, 2001). The country possesses a wide range of potentially useful medicinal plants, more extensive indeed than available in many other parts of the world. Popular knowledge of plants used by humans is based on thousands of years of experience. By "trial and error", people learnt how to recognize and use plants, including those with a magic-religious function. It is therefore not surprising that some of these plants have chemical compounds of therapeutic value that may be used in the treatment of major diseases such as HIV/AIDS, malaria, cancer, etc (Kelbessa Urga *et al.,* 2004).

Ethiopia in which about 80% of the population in the country use plant based traditional medicine by indigenous knowledge as their major primary health care system (Dawit Abebe,2001). In Ethiopia, the local people from time immemorial have used medicinal plants as traditional medicine to treat different human ailments. These medicinal plants are estimated to be over 700 species (Fassil Kebebew and Getachew Addis, 1996) and most of them are confined to the southwestern regions of the country (Abbink, 1995). There is a high expectation of enormous traditional knowledge and use of medicinal plant species in Ethiopia due to the existence of diverse cultures, languages and beliefs among the people. However, since cultural systems are dynamic (Cunningham, 2001), the skills are fragile and easily forgettable as most of the indigenous knowledge transfer in the country is based on oral transmission (Dawit Abebe and Ahadu Ayehu, 1993).

Ethiopian traditional medical system is characterized by variation and is shaped by the ecological diversities of the country, socio-cultural background of the different ethnic groups as well as historical developments that are related to migration, introduction of foreign culture and religion. Previous studies showed the existence of traditional medical pluralism in the country (Dawit Abebe and Ahadu Ayehu, 1993). Based on historical data, Slikkerveer (1990) identified three medical sub-systems in the highland of Eastern Hararge Zone (Babile area), namely, Cushitic Folk Medicine, Arabic Medicine and Amahara Medicine, which constitute the present indi-genous health care system in the area. These health care sub-systems have their own historical background, perceptions about health and illness, practices and types of healers. Even if there are differences, ethnomedicine of a country is an amalgamation of beliefs (religion and magic) and empirical practices (Slikkerveer, 1990). Based on the varied and extensive range of their practices, some authors have attempted to classify traditional healers as herbalists, surgeons, traditional birth attendants, spiritual healers etc. at local or even at country level. However, they found it difficult to clearly put them into distinct categories based on their specialization and methods of treatment (Vecchiato, 1993).

Generally, knowledge of Ethiopian traditional healing methods is based on oral tradition or medico-magical and/or medico-spiritual manuscripts (Dawit Abebe and Ahadu Ayehu, 1993). Though the country has a long history of written language, at least in the Northern part, the first known traditional pharmacopoeia dates back to the 15th century (Pankhurst, 1990). The vast knowledge surrounding traditional medicine is not fully documented and is conveyed from one generation to the next through word of mouth (Dawit Abebe and Ahadu Ayehu, 1993). Because of this and the aging of the healers (custodians of the information) as well as the persisting negative attitudes of traditional and modern medical practitioners for collaboration, ethno-therapy of the country faces uncertain future (Dawit Abebe and Ahadu Ayehu, 1993).

In Ethiopia, traditional medicine remains to be the available health service system for the majority of the population (World Bank, 2000). However, it is often postulated that modern health professionals consider it as a practice that serves no purpose and in their

view its continued existence is merely because of lack of access to modern health care service (Dawit Abebe and Ahadu Ayehu, 1993). Such negative attitudes may possibly stem from misgivings about its biomedical values and probably from many other factors.

2.5. Threats of traditional medicinal plants

African medicinal plant resources may be doomed to extinction by overexploitation resulting from excessive commercialization, habitat destruction and other natural and manmade destructive influences. The acquisition of large scales of land required for cultivation can be a serious obstacle (Rukangira, 2013).

The majority of species of plants in traditional or herbal medical treatments are harvested in the wild rather than cultivated. As a result, many plant species have become extinct and some are endangered. In Ethiopia, traditional medicine as elsewhere in other developing countries is faced with a problem of sustainability and continuity mainly due to loss of taxa of medicinal plants, loss of habitats of medicinal and other categories of plants and cultures(Zemede Asfaw,2001). Medicinal plants utilised in Ethiopia are harvested from the wild. Wild occurring medicinal plant species and the associated traditional knowledge are getting eroded due to natural and manmade factors (traditional values undermined by the new generation) (IBC, 2005).Decline in the knowledge and utilization of medicinal plants of Zay people is due to environmental degradation and intense deforestation (Mirutse Giday, 2001). Debela Hunde *et al.* (2004) also asserted that modern education as having an impact on the medicinal plant knowledge. They pointed out that those students who attended modern schools are showing unwillingness to learn from their parents, which is an evidence for the gradually disappearing traditional knowledge.

2.6. Conservation status of traditional medicinal plants

According to IUCN (1980), Conservation is defined as the management of human use of the biosphere to yield sustainable benefit to the present generation while maintaining its potential to meet the needs of future generation. The knowledge of medicinal plants is commonly secretly passed orally from generation to generation. In this process valuable

information can be lost whenever a medicinal plant is lost or when a traditional medical practitioner dies without passing his/her indigenous knowledge to others (Getachew and Shiferaw, 2002). Hence, documentation of indigenous knowledge and making herbaria for future use is also recommended to conservation of the declining medicinal plants (Muthuswamy and Solomon, 2009).

The vegetation of the world is being changed or destroyed at an alarming rate. The tropical moist forests, home to about half of the world's plants, are in particular danger, declining at an estimated 16.8 million ha/annum according to UNEP/FAO. Combined with exploitation, this is putting many medicinal plants in grave risk of genetic erosion and even extinction. As a solution, there is some conservation actions that have been undertaken around the world designed to protect threatened medicinal plants from further damage (Cunninghum, 1996). This includes *in-situ* and *ex-situ* conservation measures.
The best means of conservation is to ensure that the populations of species of plants and animals continue to grow and evolve in the wild - in their natural habitats. Such *in situ* conservation is achieved both by setting aside areas as nature reserves and national parks (collectively termed "Protected Areas") and by ensuring that as many wild species as possible can continue to survive in managed habitats, such as farms and plantation forests(McNeely and Thorsell, 1991).

Ideally, all medicinal plant species should be conserved as evolving populations in nature. However, these species should also be conserved *ex situ* (i.e. outside their habitat) as well. By ex-situ methods, traditional medicinal plants can be conserved in gene banks, botanic gardens and field gene banks (Zemede Asfaw, 2001).The primary purpose of this is as an insurance policy. However, it also has the advantage that it is usually easier to supply plant material for propagation, for re-introduction, for agronomic improvement, for research and for education purposes from *ex situ* collections than from *in situ* reserves (McNeely and Thorsell, 1991).

The disadvantages of *ex situ* conservation are that the sample of the species conserved *ex situ* may represent a narrower range of genetic variation than that which occurs in the wild. Species conserved *ex situ* can also suffer genetic erosion and depend on continued

human care. In order to conserve useful plants (including medicinal plants), which are threatened due to natural or manmade factors, *in-situ* and *ex-situ* conservation strategies should be complementarily implemented (Abebe Demisse, 2001). Most important of all, *ex situ* conservation should not be used as a reason for failing to safeguard representative samples of the medicinal plants and their habitats in nature. Priority for *ex situ* conservation should be given to species whose habitats may have been destroyed or cannot be safeguarded. It should also be used to bulk up populations of depleted or even locally extinct plants for restocking in nature. In some countries it may be appropriate to conserve all medicinal plants *ex situ*, in others, where for example some medicinal plants are common weedy species, this may not be necessary.

2.7. Uses of traditional medicinal plants

It has been estimated that about 20,000 plant species are used for medicinal purposes throughout the world. According to World Health Organization report (2002b), 70% of the world population use medicinal plants for curing diseases through their traditional practitioners. In sub-continent, plant oriented drugs are used extensively and from a very long time. According to a survey conducted by WHO traditional healers treat 65% patients in Srilanka, 60% in Indonesia, 75% in Nepal, 85% in Mayanmar, 80% in India and 90% in Bangladesh. In Pakistan, 60% of the population, especially in villages is getting health care by traditional practitioners (Hakims), who prescribe herbal preparations (Haq, 1983).

Developed countries, are turning to the use of traditional medicinal systems that involve the use of herbal drugs and remedies. About 1400 herbal preparations are used widely, according to a recent survey in Member States of the European Union. Herbal preparations are popular and are of significance in primary healthcare in Belgium, France, Germany and the Netherlands. Such popularity of healthcare plant-derived products has been traced to their increasing acceptance and use in the cosmetic industry as well as to increasing public costs in the daily maintenance of personal health and well-being. Examples of such beauty-oriented therapeuticals are skin tissue regenerators, anti-wrinkling agents and anti-age creams. Most dermaceuticals are derived from algal

extracts that are rich in minerals and the vitamin B group. Skincare products such as skin creams, skin tonics, etc. derived from medicinal plants are grouped together as dermaceuticals. Also, amongst the poor, cures and drugs, derived from plants, constitute the main source of healthcare products (Hoareau and Da Silva, 1999).

The practice of traditional medicine is widespread in China, India, Japan, Pakistan, Sri Lanka and Thailand. In China, about 40% of the total medicinal consumption is attributed to traditional tribal medicines. In Thailand, herbal medicines make use of legumes encountered in the Caesalpiniaceae, the Fabaceae, and the Mimosaceae. In the mid-90s, it is estimated that receipts of more than US$ 2.5 billion have resulted from the sales of herbal medicines. In Japan, herbal medicinal preparations are more in demand than mainstream pharmaceutical products.

The development and commercialization of medicinal plant based bio-industries in the developing countries is dependent upon the availability of facilities and information concerning upstream and downstream bioprocessing, extraction, purification, and marketing of the industrial potential of medicinal plants. Absence of such infrastructure compounded by lack of governmental interest and financial support restricts the evolution of traditional herbal extracts into authenticated market products. Furthermore, the absence of modernized socio-economic and public healthcare systems reinforces reliance of rural and low-income urban populations on the use of traditional medicinal herbs and plants as complementary aids to routine pharmaceutical market products (Hamayun *et al.*, 2006).

2.8. Plants in Ethno veterinary Medicine

Ethnoveterinary medicine (EVM) is a scientific term for traditional animal health care that encompasses the knowledge, skills, methods, practices, and beliefs about animal health care found among community members (Moreki JC, 2013). Ethnoveterinary medicine (EVM), which is also known as traditional animal health care practices, is defined as local or indigenous knowledge and methods for caring, healing, and managing livestock (Gueye, 1999). It is the study of indigenous knowledge system of animal health

care. EVM was practiced as early as 1800 B.C. at the time of King Hamurabi of Babylon who formulated laws on veterinary fees and charged for treating cattle and donkeys (Schillhorn van Veen, 1996).In order to control the different poultry diseases and thereby prevent high mortality rates, ethnoveterinary practices are widely used by village farmers in Africa. EVM often provides cheaper options than comparable western drugs, and the products are locally available and more easily accessible. In the face of these and other factors, there is increasing interest in the field of ethnoveterinary research and development (Selvaraju *et al*., 2011).

Medicinal plants and knowledge of their use provide a vital contribution to human and livestock health care needs throughout Ethiopia. Ethnoveterinary medicine involves the use of medicinal plants, surgical techniques and livestock management practices to prevent a range of animal disease (Mengistu Gebrehiwot, 2010). In Ethiopia as well as in most developing countries, animal disease remains one of the principal causes of poor livestock performance, leading to an ever-increasing gap between the supply of, and the demand for, livestock products (Teshale Sori *et al*., 2004). Ethno veterinary medicine and related study is one of the most important means of controlling livestock diseases.

Ethno veterinary medicine which refers to traditional animal health care knowledge and practices comprising of traditional surgical and manipulative techniques, traditional immunization, magic religious practices and beliefs, management practices and the use of herbal remedies to prevent and treat arrange of disease problems encountered by livestock holders (Tafesse Mesfin and Mekonnen Lemma, 2001).

Ethno veterinary medicine provides traditional medicines, which are locally available and usually cheaper than standard treatments. Livestock offers in many harsh environments the only way of survival and constitutes a driving force for food security and sustainable development in developing countries like Ethiopia. Stock raisers, both farmers and herders have developed their own ways of keeping their animal health and productivity. They treat and prevent livestock's disease using sometimes age old homemade remedies, surgical and manipulative techniques. These indigenous local animal health care beliefs

and health care practices constitute an ethno veterinary medicine. Gueye (2002) and Masimba *et al*. (2011) pointed out that ethnoveterinary knowledge was mostly in the custody of older men and women who passed it orally to younger generations by word of mouth.

Livestock disease has often been described as serious of constraints to both macro-level economic development in Africa and the well-being of millions of poor livestock keepers (Andy, 1999). In Ethiopia, livestock production plays an important role in the lively hood and economy of majority of the population. Ethiopia is one of the leading countries of Africa in livestock population (Mirutse Giday and Gobena Ameni, 2003). Although Ethiopia is rich in its livestock population, it is one of the countries in the world 18 with the lowest unit output. The poor health condition and of its livestock has partially been responsible for the low productivity (Mirutse Giday and Gobena Ameni, 2003). The ever-declining provision of animal health services has resulted in the appearance of a number of epizootic diseases reducing the economic efficacy of livestock production in Africa (Mirutse Giday and Gobena Ameni, 2003). An Ethnovetarinery medicine involves the use of medicinal plants surgical techniques and livestock management practices to prevent and treat a range of animal diseases (Mathias, 1996). The study conducted by Wirtu *et al. (*1999) revealed as the owners, traditional healers, and veterinary professionals provided animal health care.

In spite of its permanent importance as livestock health care system, the various traditional veterinary practices remained undocumented in Africa and Ethiopia (Dawit Abebe and Ahadu Ayehu, 1993). Thus, creation of awareness on Ethno veterinary medicine emphasizing on useful plants used for treatment of livestock has paramount importance to live stock management. In addition, proper documentation and understanding of farmer's knowledge, attitude and practices about the occurrence, cause, treatments, prevention and control of various ailments is important in designing and implementing successful livestock production (Tafesse Mesfin and Mekonen Lemma, 2001).

2.9. Integration of Traditional and Modern Medicines

The use of plants as medicines antedates history as the ancient man was dependent on plants of fulfill his basic requirement including health. The present day knowledge about medicine considered a gift of ancient men to the humankind. The herbal medicines are in great demand in both developed and developing countries in primary health care because of their great efficacy and little or no side effects (Narula *et al*., 2000).

Traditional and modern system of medicine was developed by different philosophies in different cultural background. They looked at health, diseases and causes of diseases in different ways. These differences bring different approaches to health and diseases. These inurns have resulted in attitudes ranging from complete rejection of traditional medicine by traditional medicine practitioners to all a parallel existence with little communication over patient care (Kanno, 2004).

In Ethiopia, some medical doctors trained in Western medicine, as it is not considered to have scientific bases reject knowledge on traditional medicine. However, both old and modern arts of healing should exist together and may be integrated (Kanno, 2004). Even though modern health practitioners stand against the promotion of traditional medicine and its integration with modern health care delivery system (Dawit Abebe and Ahadu Ayehu, 1993), most modern health practitioners have utilized traditional medicine at least once in their lifetime (Getachew Addis *et al*.,2002). It was further confirmed that the practitioners are in favor of utilizing traditional medicine even when conventional care is available. However, these same practitioners have strongly recommended the need for training of traditional healers in dosage determination and about the side effects of the remedies, hygienic preparation and administration of the medicaments as well as proper diagnosis of the health problems as crucial components in the improvement of traditional health practices. Furthermore, collaboration with the healers as well as scientific research in the establishment of mainly efficacy, safety, and contraindication of the medicaments and sustainable utilization of the traditionally used medicinal plants were viewed as vital in the improvement of traditional medicine. These activities were recommended as a key

to the improvement and promotion of traditional medicine and its eventual integration with the modern health care delivery system (Getachew Addis *et al*., 2002).

3. MATERIALS AND METHODS

3.1. Description of the study area

3.1.1. Geographical location

Gozamin district is one of the 20 districts of East Gojjam Zone, Amhara National Regional State, North West Ethiopia. It is located on the main road 299km North West of Addis Ababa and 265 km southeast of Bahir Dar. The altitude of the study district ranges from 800 – 3748m asl. Topography of study district are plain (47%), hilly (32%), Undulated land (9%), Valley (12%). Currently the district comprises 26 Villages of which 25 are rural and 1(one) is Urban Village (GAO, 2013).

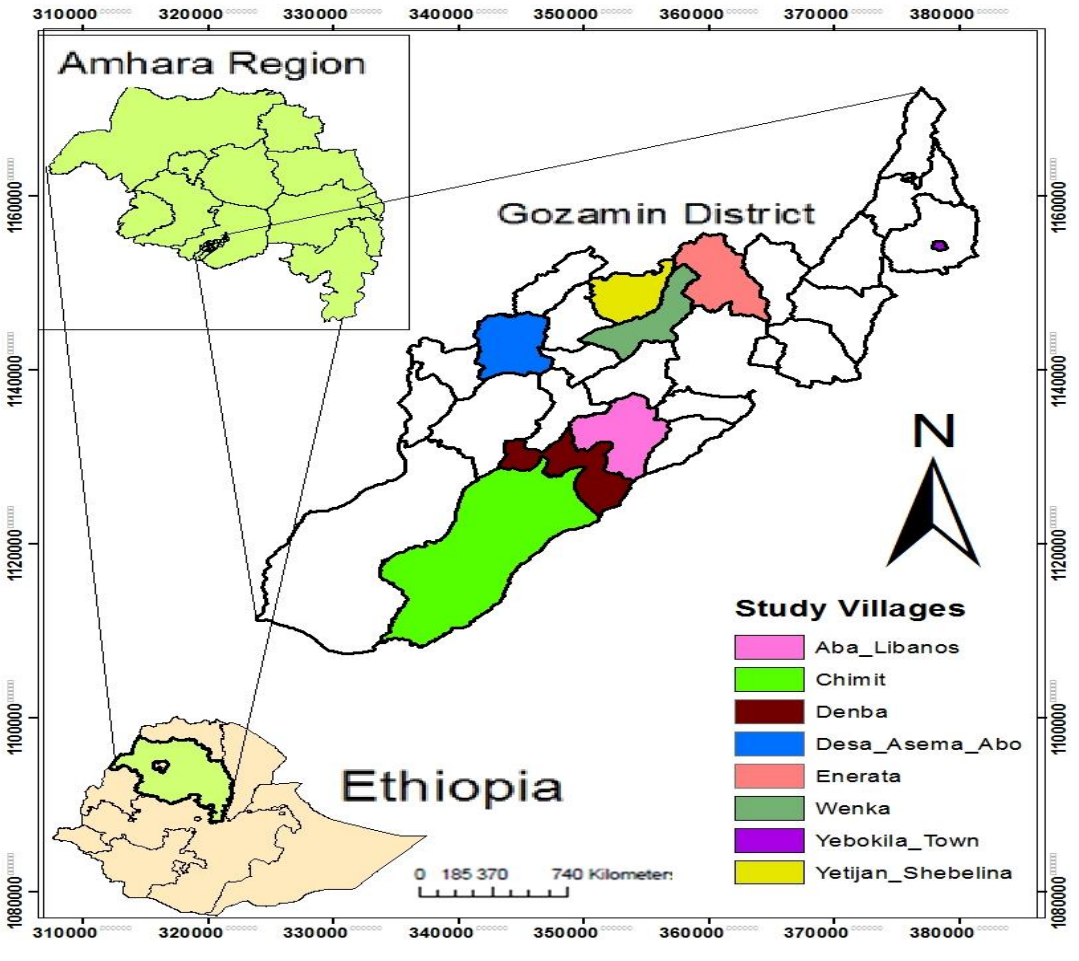

Figure 3. 1. Location map of the study area

3.1.2. Climate

According to the traditional agro classification of Ethiopia the district comprises of "*Dega*" (temperate) (10%), "*Woina Dega"* (mid-temperate) (74%) and "*Kolla"* (tropical) (16%). The highest average temperature is 25^{o}c and the lowest average temperature is 11^{o}c. The highest average annual rainfall ranges 1808 mm and the lowest average rain fall is 1448 mm. Variation does exist in amount and distribution among the three agro ecological zones provided that shortages of rainfall is more severe in hot-temperate-low-land/dry moist than other zones (GAO, 2013).

3.1.3 Land use features and vegetations

The district cover a total area of 121,781 ha of which the largest 49,486 ha is agricultural land (Arable land) followed by grazing lands 48,205.56 ha, forest and shrub 15,594ha vegetation (plantation forest) 1,796ha. The land holding of the household is about 6699.44 ha (GAO, 2013).

Table 3.1.the land use features and vegetation by hectare and percent in the study area

No	**Land situation**	**Area Coverage in (hectare)**	**Percentage**
1	Arable land	49,486	40.64
2	Grazing land	48,205.56	39.584
3	Vegetation(plantation forest)	1,796	1.475
4	House and road coverage	6,699.44	5.501
5	Forest and shrub land	15,594	12.80
	Total	121,781	

3.1.4. Population structure and health care status

The total number of population is about 141,717 (49% males and 51% female) (GHO, 2013). There are six health centers, 27 health posts, 3 private clinics, 1 private pharmacy (drug stores) (GHO, 2013). However, the health service given in the district is below the need of the people. Therefore, people are forced to consult traditional healers. According to GHO (2013) report, the top human diseases in the district are malaria mainly caused by

Plasmodium falciparum and *Plasmodium vivax*, unknown origin of fever, trachoma, tuberculosis, helminths, respiratory tract infection, wounds and others.

3.1.5. Live stock

The numbers of livestock include cattle 153,282, sheep 65,263, goats 6,577, hens 53,457, mules 222, horses 8,820 and donkeys 16,433. However, their productivity is very low as in most places in the country. The major reported livestock diseases are anthrax, black leg, trypanomiasis, bastrolosis ,lump skin disease, sheep pox, African horse sickness, Newcastle (GAO,2013).

3.2. Research methods

3.2.1. Design of study

Most research designs used in Ethnobotanical studies are time consuming and expensive. Thus, a cross-sectional study (i.e. collection of data at one point in time on several variables) with integration of rapid ethnobotanical appraisal approach (REA), where small sample size and area can be taken to sketch out how the community act as the whole (Martin,1995). Therefore, this study was conducted following the principles of Martin (1995).

3.2.2. Study Site Selection

The study was conducted in eight villages that were selected by purposive sampling method based on the information collected on the distribution of medicinal plants, users, availability of practitioners with the help of traditional medicine practitioners, users and from local community health extension workers and elders of the community.

Table 3.2. number of informants in selected villages

Study villages	Number of informants
Wenka	15
Aba libanos	11
Denba	9
Chimit	9
Yebokela	7
Enerata	9
Yetjan shebalima	12
Desa asema abo	8
Total	80

3.2.3. Selection of Informants

A total of 80 informants between the ages of twenty (20) and ninety (90) were randomly selected for the study regardless of sex and social status and educational background. It was done by collecting informants list that were have MP knowledge from knowledgeable elders and selected from those by tossing a coin and using him/ her as informant whenever head of the coin was up and if he /she volunteer to participate. Non-volunteers were not included in the study. Out of these, ten key informants were selected by purposive random sampling based on the recommendations of local authorities, knowledgeable elders and health extension workers**.**

3.2.4. Data collection

The study was conducted from November 25, 2013 to May 1, 2014 based on semi-structured interview (appendix 4), observation and guided field walk in different villages of Gozamin district. To collect information about indigenous knowledge on health, local names of plants and their sources (wild/cultivated/homegarden), part (s) used, method of preparation, diseases treated, dosage, route of administration, conservation practices were obtained through interviews. Information was also gathered from respondents on both the harmful and useful aspects of these medicinal plants. This was done after awareness creation by explaining the aim of the study for informants.

Representative specimens of Medicinal plants were collected from the wild and cultivated areas, to make the identification easier. The identification was done by various

volumes of the flora of Ethiopia and Eritrea (Edwards *et al.,* 1995; Hedberg *et al*., 2003; Hedberg and Edwards, 1989; Hedberg and Edwards, 1995;Mesfin Tadesse, 2004), coloured plant identification filed guide of Azene Bekele (2007), Natural Data Base for Africa, (Ermias Dagne, 2009). Those medicinal plants not identified by using their local names identified in Ethiopian biodiversity institute.

3.2.5. Observation and Field walk

During data collection, the traditional medical practitioners used to provide information on medicinal plant growing habit, local name and to explain his / her ethno medicinal knowledge of the medicinal plant species. Then after, all the important informations about the particular medicinal plant species were recorded.

Figure 3.2. Data collection in Wonka villages by the researcher

3.2.6. Data Analysis

3.2.6.1. Descriptive statistics

The data was anaiysed by Descriptive statistical methods such as percentage and frequency. It was used to analyze and summarize the data on the most useful information gathered on medicinal plants reported by local people. These include medicinal value, application, methods of preparation, route of application, disease treated and educational background.

3.2.6.2. Informant consensus

In order to evaluate the reliability information recorded during interview informants were contacted two times for the same idea and the validity of the information was proved and recorded following the methods of Alexiades (1996).

3.2.6.3. Preference ranking

Preference ranking on medicinal plants was conducted following the methods of Martin (1995) using ten key informants who were selected based on recommendations from elders, local authorities and heads of the traditional medicines associations' office. It was done on the basis of healing malaria to see the contribution of herbalists against this .different diseases.This disease was selected(as it is the most frequently seen disease in the study area). Accordingly, ten medicinal plants were selected to be ranked preferentially by key informants on the basis of treating malaria giving the highest value (10) for best plants in treating malaria and the least value (1) for plants with lower treating power as compared to other plants. On the other hand, seven plants were ranked on the basis of their treating power of different diseases giving the highest value (7) for the best plants in their treating power of different diseases and the least value (1) for plants with low potential of treating different diseases.

3.2.6.4. Direct matrix ranking

Direct matrix ranking was conducted following Martin (1995) and Cotton (1996). This was conducted considering several attributes of medicinal plants such as their use as food, medicine, firewood, building, charcoal and making fence. These were the common uses of medicinal plants reported by key informants. On the other hand Based on the information gathered, six multipurpose tree species were selected out of the total 92 medicinal plants and seven use diversities of these plants were listed for seven selected key informants to assign use values to each species. The seven use values include medicinal, food, firewood, construction, charcoal, fencing and furniture making. By adding the scores given, it was possible to compare use values of medicinal plants and to identify the main cause for over harvesting of the plants. Based on information gathered

from informants, the average value of each uses diversity for a species was taken and the values of each species summed up and ranked.

3.2.6.7. Fidelity level index

Fidelity level (FL) is the percentage of a certain plant species used for the same major purposes or ailment to treat. Accordingly FL was calculated for medicinal plants used to treat malaria and healing wound two of the diseases that frequently reported in the district and to see the contribution of herbals against human mortality by these diseases.

FL is calculated as:

$$FL\ (\%) = (Np/N) \times 100,$$ Where:

- Np is the number of informants that claim a use of a plant species to treat a particular disease
- N is the number of informants that use the plants as a medicine to treat any disease

Accordingly, FL index was calculated for seven medicinal plants used for treating malaria (4) wound (3) species each as described by Alexiades (1996).

3.2.7 Ethical Considerations

Data collection was performed after permission was obtained from Gozamin Woreda administrative offices and the individuals who were targeted for the research.

4. RESULT AND DISCUSSION

4.1. Educational Status of Informants

The distribution of informants with respect to educational status shows that illiterate informants were the largest number (31.25%).

Table 4. 1. The educational status of informants

Educational status	Number of informant	%of informant
Illitrate	25	31.25
Basic education	22	27.50
Religious education	10	12.50
Primary school	14	17.50
Secondary school	8	10.00
College and above	1	1.25
Total	80	

4.2. Indigenous Knowledge of Local People on Medicinal Plant

This study showed that most of the informants (86%) have acquired the traditional knowledge on medicinal plants, from their parent, 12.5% got from religious education (mostly from Orthodox Church), and others have acquired from experience practiced in their local villages. Most of the illiterate informants have not willingness to pass their knowledge to the next generation particularly to those who are not part of their family. Their reason was they could lose their income. However, informants who are educated either basic education or from 1 upto college were positive to train their knowledge to others if they can get incentives.

Regarding age group, a rich knowledge of traditional medicine is mainly found among the elderly members 61-90. Young people do not have much knowledge compared with elders that is an indication of decline of the knowledge of traditional medicine in addition to secrecy. This might be related to the disinterest of young generation on traditional medicine. Various studies in different parts of Ethiopia have reported that transfer of medicinal plants knowledge have been affected by modernization like access to modern education and health services (Fisseha Mesfin, 2009 and Tesfaye Hailemariam *et*

al.,2009).Concerning to educational status, there was knowledge difference between the informants in the study area. Informants who are educated in religous schools had good knowlage on different medicinal plants for both livestock and human ailments. The use of knowledge analysis showed that it is directly proportional to age increment. This finding agrees with works of Hussien Adal (2004) in North Shoa Zone of the Ahmara National Regional state.

4.3. Distribution of Medicinal Plants Among Taxa

The number of medicinal plants documented was 92 species in 84 genera and 50 families. In terms of species Solanaceae has eight species (8.69%) followed by Asteraceae (Compositae) 6(6.52%), Fabaceae (Liguminosae) and Euphorbiaceae 5 species (5.43%) each, Cucurbitaceae, Rosaceae, Lamiaceae, 4 species (4.34%) each, Polygonaceae, oleaceae 3 species (3.26%). Similarly the families Acanthaceae, Apocynaceae, Asclepiadaceae, Brassicaceae, Rutaceae,Thymelaceae, Vitaceae, Myrtaceae share 2 species (2.17%) each while the rest families are represented by one species (1.08%) only(Appendix 1 and Table 4.4). This reveals the higher diversty and utilization of medicinal plants by the local community of the study area.

The familiy Solanaceae was found to have the largest number of medicinal plants followed by Asteraceae. Similar studies by Tilahun Teklehaymanot *et al.* (2007), Haile Yinger *et al*. (2008) and Fisseha Mesfin *et al*. (2009) have reported that Solanaceae made the largest proportion of medicinal plants in zegie peninsula, southwest Ethiopia and Wonago District respectively. On the other hand, in their representative study sites Endalew Amenu (2007), Mirutse Giday *et al*. (2009), Muhamed Adefa (2010) and Nurya Abdurhaman (2010) have also reported that Asteraceae made the largest proportion of medicinal plants in Chelya District,Bench ethnic group,Tuhuledere and Ofla Districts respectively. This indicates the wider utilization of Solanaceae and Asteraceae by different local communities in different parts of Ethiopia.

Table 4. 2. Medicinal plant species documented in the study area

No.	Family	Number of MP genera	Percentage (%)	Number of MP species	Percentage (%)
1	Solanaceae	5	6.01	8	8.69
2	Asteraceae	5	6.01	6	6.52
3	Euphorbiaceae	4	4.81	5	5.43
4	Fabaceae	5	6.01	5	5.43
5	Cucurbitaceae	4	4.81	4	4.35
6	Lamiaceae	4	4.81	4	4.35
7	Rosaceae	4	4.81	4	4.35
8	Oleaceae	3	3.61	3	3.33
9	Polygonaceae	1	1.20	3	3.26
10	Acanthaceae	2	2.40	2	2.17
11	Apocynaceae	2	2.40	2	2.17
12	Asclepiadaceae	2	2.40	2	2.17
13	Brassicaceae	2	2.40	2	2.17
14	Myrtaceae	2	2.40	2	2.17
15	Rutaceae	2	2.40	2	2.17
16	Thymelaceae	1	1.20	2	2.17
17	Vitaceae	2	2.40	2	2.17
18	And other 33 families	1	39.6	1	35.87

4.4. Habit of medicinal plants

The habit of medicinal plants in the study area showed that herbs were the most common and ranked first with 35 species (38.04%), and parasites were the list with one species (1.08%) (Figure 4.1).

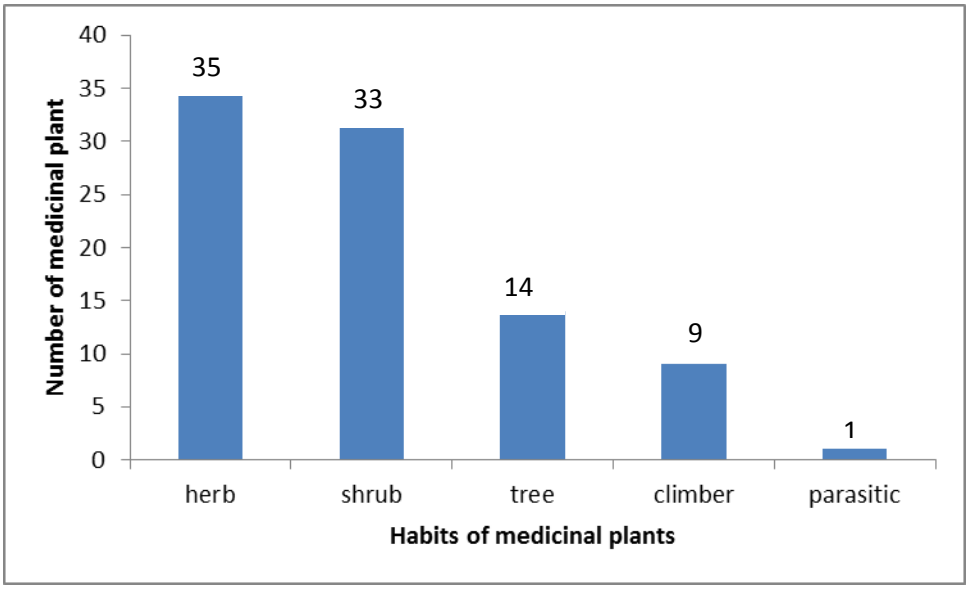

Figure 4.1. Habits of medicinal plants in the study area

The dominance of herbs is due to easy availability to local people and their abundance in the area. This finding is inline with most medicinal plant inventories in Ethiopia (Debela Hunde, 2001; Ermias Lulekal, 2005; Endalew Amenu, 2007; Eskedar Abebe, 2011 and Azimeraw Tadege, 2012,) Welenchti, Mana Angatu, Chelya, Debark and Awabel districts respectively reported herbs as the most dominant growth form of medicinal plants. In contrast to this, Fesiha Mesfin *et al. (*2009) and Alemayehu Kefyalew (2010) have reported that shrubs constitute the largest proportion of medicinal plants in their research areas Wonago and Ada'a Districts respectively. This difference might be due to herbs are less functional for charcoal making which is the second threat in the study area or ecological and indegnous knowlage difference.

4.5. Habitat of Medicinal plants

In this study the habitat of medicinal plants were categorized as wild, home garden cultivated land and both home garden and wild. Among the 92 medicinal plants identified, 52 species (56.52%) were growing in the wild (Figure4.2).

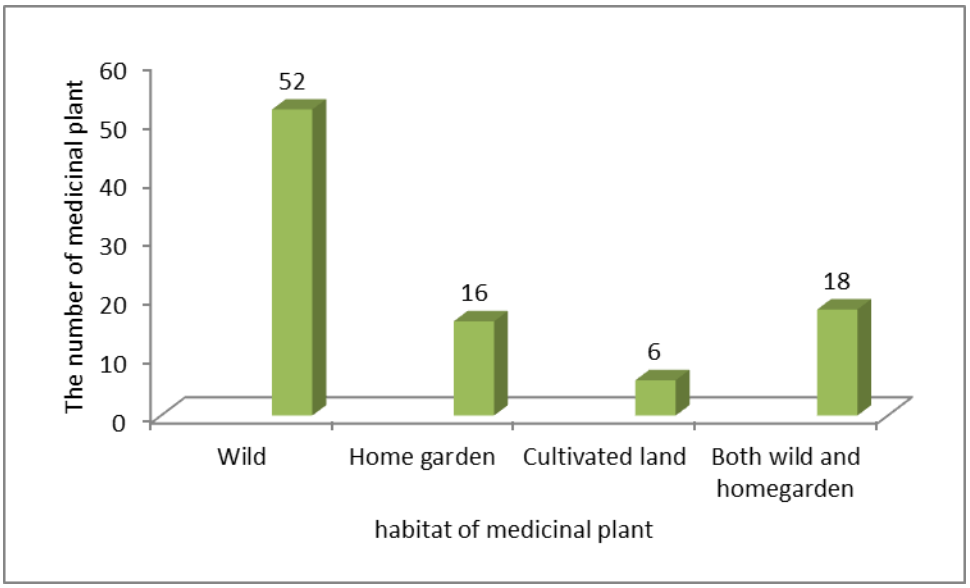

Figure 4.2. The Habitat of medicinal plants in the study area

The result showed that, most of the medicinal plants (about 56.52%) were identified from the wild, while few of these (about 6.52%) were found in the cultivated land and 17.39% from home gardens. This is also true in other ethnobotanical studies conducted in different parts of the Ethiopia such as that of Ermias Lulekal *et al*. (2008), Tesfaye Hailemariam *et al*. (2009) and Seyoum Getaneh (2009) that documented higher number of medicinal plants documented in the wild rather than in the home garden and cultivated lands. This indicates that local community are not yet cultivate large number of medicinal plants in their homegardens and prefer to collect them in the wild.

Although few number of medicinal plants are kept near homes and are used medicinally, they are not only cultivated for medicinal value, but also for other purposes like shade, live fence, food, cash income, spice and others. Generally, in the current study area, there is less practice of cultivating medicinal plants in the home gardens and cultivated lands. This is in line with the findings, of Zemede Asfaw (1997), which also indicated that medicinal plants cultivated in home gardens were few (about 6%) in Ethiopia. Similarly medicinal plant practioners have argued that most of the medicinal plants have been collected from the wild not very far from their villages. In recent times, however, due to different anthropogenic factors and the disappearance of medicinal plants in the wild

some of the knowledgeable local communities started cultivating medicinal plants in their home gardens. In line with this study, many informants prefer the collection of medicinal plants from the wild than cultivate in their own house territory as they easily harvest most of the medicinal plants from their native vegetation (Getaneh Gebeyehu, 2011).

4.6.Types of Human and Livestock Diseases in the Study Area

Data collected from the informants showed that, there are a total of 58 traditionally known human and livestock ailments in the study area. Out of these, 47(81.03%) of them are human and 11 (18.96%) of them livestock ailments. Some traditional healers use the same plant species for treating different diseases of human and livestock. Medicinal plants in the study area were more for the treatment of humans than cattle or other domestic animals. The current study was agreed with the previous study carried out in Loma and Genabosa districts of Dawro Zone, Southeren Ethiopia (Mathewos Agize *et al*., 2013) medicinal plants were more of human.

4.7. Medicinal Plants Used to Treat Human and Livestock Ailments

A total of 92 traditional medicinal plants that belong to 83 genera and 50 families were identified and documented (appendix1). Out of these medicinal plants, 76 species (82.61%) are used for treatment of human ailments and four species (4.35%) are used to treat livestock ailments only. On the other hand, 12 species (13.04%) are used for treatment of both livestock and human ailments. This shows that large numbers of traditional medicinal plants are present in the study area that is used for different disease treatment. Therefore, the local people use medicinal plant remedies for diseases occurred in their locality. Similarly different researchers reported different number of medicinal plants in their studies. For instance, Muhamed Adefa (2010) documented 105 medicinal plants in Tehuledere district, South Wollo of Ethiopia, Ermias Lulekal *et al*. (2008) 230 medicinal plants in Mana Angetu district, South eastern Ethiopia, Tilahun Teklehaymanot and Mirutse Giday (2007) 67 medicinal plants in Zegie peninsula, North western Ethiopia, Mirutse Giday *et al*. (2009) 35 medicinal plants from Bench ethnic group and Haile Yinger and Dilnesaw Yewhalew (2008) 27 medicinal plants in Sekiru district, Jimma zone of Ethiopia. This difference in distribution might be due to the ecological

difference among the study areas that belongs difference in the distribution of medicinal plants and/or difference in cultural and indigenous knowledge of the local people of the study sites.

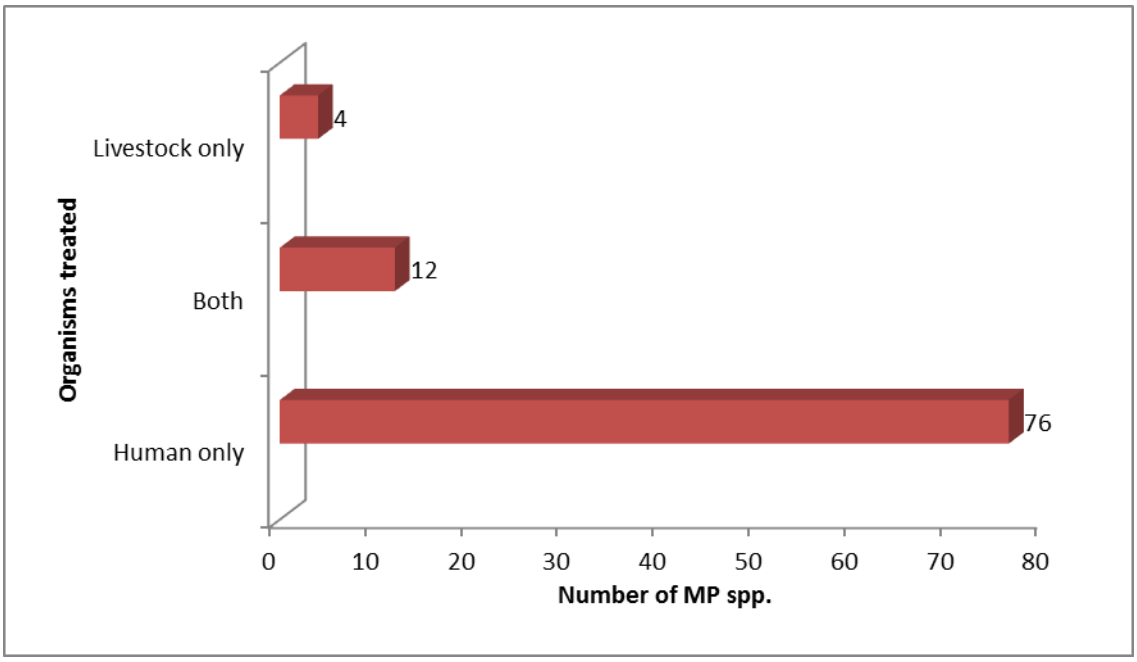

Figure 4.3.Medicinal plants used for treatment of human, livestock and both human and livestock ailment

4.7.1. Plant parts used treat ailments

With regard to the medicinal values, different parts of the plants are reported to be used for treatment. The most frequently utilized plant part is leaves 48 (46.6%)(Figure 4.4).The preference of leaves to other plant parts could be due to ease of preparation and the relative safety to use them than other parts of plants. This was also indicated in other ethnobotanical studies in the country (Tesfaye Hialemariam *et al*., 2009; Haile Yineger and Delenasaw Yewhalaw, 2007; Haile Yineger *et al*., 2008; Tesfaye Awas and Sebsebe Demissew,2009; Mirutse Giday *et al*., 2009) that leaves were the largest plant part employed for the preparation of remedies. Other research findings also argued that roots are widely used followed by leaves in their study sites (Tilahun Teklehaymanot and Mirutse Giday, 2007). This may be due to ecological difference among the study areas that bring difference in distribution of medicinal plants.

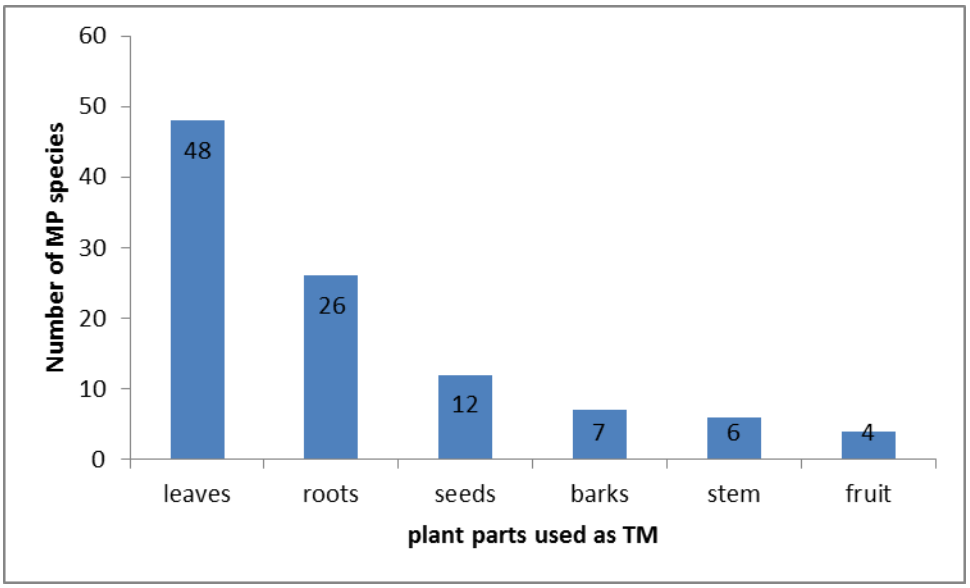

Figure 4.4.Plant part used as medicines that used for human and livestock ailments in the study area

4.7.2. Methods of preparation

The local community use different forms of remedy preparations and applications to treat human and livestock diseases. The common forms of preparations are Crushing and mixing (43.3%), powndding (14.17%), squeezing (10%), chewing (7.5%), crushing (6.77%), and others. The present finding indicated that Crushing and mixing was the most widely used mode of preparation. This finding was agreed with the previous results of (Kalayu Mesfin *et al*., 2013) and disagreed with (Yirga Getachew, 2010) in which 32 (36.4%) preparations were made in the form of powder, 29 (32.9%) followed by crushed and pounded, and 12 (11.3%) in the form of chewing of plant parts used for treatment of human health problems(Table 4.3).

Table 4. 3.Ways of preparation of medicinal plants used to treat human and livestock

Method of Preparation	Number of MP preparation	% of preparation
Crushing and mixing	52	43.3%
Ponding	17	14.17%
Squeezing	12	10 %
Chewing	9	7.5%
Crushing	8	6.77%
Squeezing and mixing	8	6.77%
Decoction(boiling)	5	4.16%
Tie	4	3.33%
Latex collection	2	1.66/%
Mixing and tie	2	1.66%
Immersed	1	0.83%

4.7.3. Routes of Administration

Medicinal plants are applied through different route of addminstration. The major routes of administration in the study area are oral, dermal, and nasal. This finding showed that the highest mode rout administration of these medicinal plants were oral (48.54%) and the list was vaginal (0.97%) mode of application(Figure 4.5). So the present finding was agreed with the previous finding of Ermias Lulekal (2005) that reported both oral and dermal routes permit rapid physiological reaction of the prepared medicines with the pathogens and increase its curative power in Mana Angatu district.

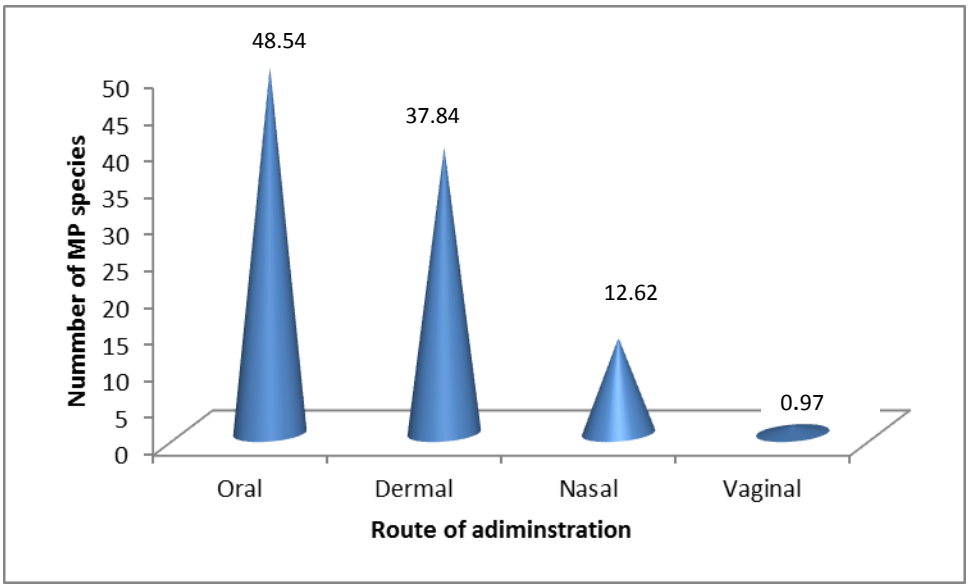

Figure 4.5.Route of administration of medicinal plants in the study area

4.8. Economical Importance of Ethnoveternary medicinal Plants

In the current study, all respondents agreed that they used EVM to treat different diseases of their cattle, sheep, and chickens in their locality. Their reasons were EVM is the only option for most of them as there are almost no veterinarians working in rural villages of the district, it can be easily administered, mostly given orally, most EVM products are effective to some extent especially those with anti-helmintic properties, for example *Lycopersicum esculentum and Millettia ferruginea* were found to be effective against *leech infestation,* it is cheap and readily available, livestock owners were already familiar with EVM. In line with this study, farmers in Africa use EVM because MP either can be collected at no cost or are cheap to obtain (Gueye, 1997). Thus, the use of EVM can be considered sustainable as it is economical, culturally acceptable and ecologically sound (Gueye, 1999).This study showed that EVM is very significant in the local villages of the study district.

4.9. Distribution of Medicinal Plants in Study Villages

Informants from different study sites reported different number of medicinal plants. Wenka, Denba, and Abalibanos have the highest number of medicinal plants reported

villages respectively while Chemit and Yetijan are the least reported Villages .This might be difference in indigenous knowledge of traditional medicine among the local people.

Table 4. 4.Number of medicinal plants reported by each study site

No.	Study sites	Number of informants	Number of medicinal plants reported by informants
1	Yetejan	12	48
2	Wenka	15	82
3	Yebokla	7	52
4	Aba lebanos	11	64
5	Denba	9	67
6	Asabeabo	8	60
7	Chemet	9	46
8	Enerata	9	50
	Total	80	

4.10.Informant Consensus

Plants that are popular due to the wide range of diseases that they treat have local names and well known by the local people/healers. Many of the informants for their medicinal uses against human and livestock ailments cited certain species. The outcome of this study showed that some medicinal plants are popular than the other and highest informant consensus goes to *Allium sativum* which is cited by 58 informants. The popularity of this medicinal plant is due to people preference to treat malaria and evil eye in the community. *Zehneria scabra is* cited by 52 informants, Verbascum *sinaiticum* cited by 46 informants, *Phytolacca dodecandra* cited by 38 informants, *Ruta chalepensis* cited by 37 informants and 30 informants cited *Clerodendrum myricoides* species which take the 2nd ,3rd, 4th, 5th and 6th ranks respectively(Table 4.5) . This wide utilization of such plants by the local people in the study area might be due to 1, the efficaciousness of plants proved may be through long time experience 2, the ease accessibility of the species in the

locality. For instance as stated above *Zehneria scabra* is the most available medicinal plant used in the treatment of febrile that has symptom of fever and headache.

Table 4. 5.List of medicinal plants and the corresponding informants

Scientific Name	Local name	No. of informants	%of informants
Allium sativum	*"Nechi shinkurti"*	58	72.5
Zehneria scabra	*"Haregresa"*	52	65
Verbascum sinaiticum	*"Ketetina"*	46	57.5
Phytolacca dodecandra	*"Endode"*	38	47.5
Ruta chalepensis	*"Tenadam"*	37	46.2
Clerodendrum myricoides	*"Misrich"*	30	37.5
Jasminum Grandiflorum	*'' Tembelel"*	29	36.25
Solanum anguivi	*"Zerch embouy"*	27	33.75
Laggerabcrispata	*"Kes bedeji"*	26	32.5
Withania somnifera	*"Githewa"*	18	22.5
Stephania abyssinica	*"Ye ayt-jero (etse-eyesus"*	17	21.25
Cucumis ficifolius	*"Yemdir embouy"*	17	21.25
Lagenaria siceraria	*"kil"*	16	20

4.11. Preference Ranking of Common Disease

In the study area, Malaria was reported to be the most common disease. Ten medicinal plants were reported as more effective to treat malaria. Ten traditional healers (key informants) ranked these ten plant taxa based on their perception of the degree of effectiveness. The informants were asked to compare the given medicinal plants based on their efficacy and to give the highest number (10) for the medicinal plant which they thought highest effective in treating malaria and the lowest number (1) for the list effective plant in treating malaria. *Coccinia adoensis* scored 84 ranked first indicating that it is the most effective in treating malaria followed by *Gladiolus abyssinicus* and the least effective was *Dodonaea angustifolia* (Table 4.6) this disagree with (Fissea Mesfin, 2007) in wongo district which reported *Vernonia amygdalina* was the most effective in treating malaria. This might be due to the Indigenous knowledge difference of the local people of the study sites.

Table 4.6. Preference ranking of medicinal plants used for treating malaria

List of medicinal plants	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	Total	Rank
Calpurnia aurea	3	4	6	3	8	9	3	7	9	1	47	6
Withania somnifera	7	6	8	7	6	7	9	10	8	10	78	3
Allium sativum	6	10	5	6	7	6	7	2	5	6	60	5
Coccinia adoensis	9	7	10	8	10	10	8	9	10	3	84	1
Dodonaea angustifolia	2	1	3	1	3	4	6	1	2	4	27	10
Gnidia involucrata	4	3	2	4	2	3	2	3	4	2	29	9
Gladiolus abyssinicus	10	8	9	10	9	8	5	6	7	9	81	2
Clerodendrum myricoides	1	2	1	2	5	1	4	8	6	7	37	8
Cucumis ficifoliu	5	5	4	5	4	2	1	5	1	8	40	7
Stephania abyssinica	8	9	7	9	1	5	10	4	9	5	67	4

On the other hand, a single plant species may be used to treat different diseases. In this case, people show preferences towards plant species having healing potential of different diseases. Likewise, preference ranking performed by ten key informants for seven selected plant species (Table 4.7) on the basis of treating different diseases showed that *Allium sativum* is the most preferred followed by *Cucumisficifolius.* (Muhamed Adefa, 2010) also reported that *Allium sativum* is the most preferred followed by *Nigella sativa* in Tehuledere district, South Wollo, Ethiopia. From both preference ranking, we could understand that the most favored species are usually the most efficacious, at least in the context of the people who use them.

Table 4.7. Preference ranking of seven selected medicinal plants on the basis of healing different diseases by key informants (Note. 7 is the greatest healing potential and 1 is the least healing potential)

Scientific name	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	total	rank
Cucumis ficifolius	**5**	**6**	**3**	**4**	**6**	**5**	**7**	**4**	**7**	**6**	**54**	**2**
Allium sativum	**6**	**7**	**7**	**6**	**4**	**7**	**5**	**5**	**5**	**5**	**57**	**1**
Justicia schimperiana	**3**	**1**	**3**	**5**	**1**	**3**	**2**	**3**	**1**	**4**	**26**	**6**
Lepidium sativum	**1**	**4**	**6**	**7**	**7**	**6**	**1**	**6**	**6**	**7**	**51**	**3**
Rumex nepalensis	**4**	**2**	**1**	**3**	**5**	**4**	**4**	**4**	**1**	**2**	**30**	**5**
Stephania abyssinica	**7**	**5**	**4**	**5**	**3**	**1**	**6**	**7**	**3**	**1**	**42**	**4**
Calpurnia aurea	**2**	**3**	**5**	**1**	**2**	**2**	**3**	**2**	**2**	**3**	**25**	**7**

4.12. Direct matrix Ranking

In the study area, many medicinal plants were used for different purpose other than their medicinal value. The major uses include medicine, food, firewood, charcoal, fence, construction and furniture. For this, seven key informants were requested to give average value score for direct matrix ranking of six medicinal plants with use diversity (Use values given from 0 to 5: 5 = Excellent, 4 = Very good, 3 = Good, 2 = Less, 1= Least and 0 = No use). The result of the direct matrix ranking showed that *Eucalypts globulus* stood first in being the most multipurpose medicinal and *Hagenia abyssinia* was the least. The present finding was agreed with the previous finding of Eskedar Abebe (2011) and Ambachew Benor (2013) which reported *Eucalypts globulus* is the most multipurpose plant in Debark and Lay-gayint Districts respectively(Table 4.8). This showed that medicinal plants are widely harvested for different purposes.

Table 4.8 .Direct matrix ranking for six species and main use in the study area

Main use	**plant species**					
	Croton macrostachyus	*Eucalypts globulus*	*Myrica salicifola*	*Olea europaea subsp. cuspidata*	*Vernonia amygdala*	*Hagenia abyssinia*
Medicine	4	4	5	3	5	4
Food	1	1	0	1	0	0
Fire wood	4	5	4	4	4	2
Charcoal	4	5	4	5	1	0
Fence	4	5	2	4	5	2
Construction	4	5	5	5	3	5
Furniture	5	5	5	5	1	5
Total	26	30	25	27	19	18
Rank	3rd	1st	4th	2nd	5th	6th

4.13. Fidelity level Index

Analysis of percentage of informants claiming the use of certain plant species for the same major purposes could not be taken as the only criteria in providing the efficacious of plant species (Muhamed Adefa, 2010). Furthermore, fidelity level is useful for identifying the informants most preferred species used for treating certain ailments. The

medicinal plants that are widely used by the local people have higher FL values than those that are less popular. Fidelity level shows the percentage of informants claiming the use of a certain plant species for the same major purpose (Ugulu,2011).This is designed to quantify the importance of the species for a given purpose (Friedman *et al* ., 1986).The fidelity level was calculated on those frequently reported diseases by informants so as to identify the most important species. It was calculated for medicinal plants used to treat malaria and wound and the result revealed that *Withania somnifera* and *Brucea antidysenterica* have the highest medicinal value against malaria and wound respectively, though they have low value of informant consensus. Hence, informant consensus could not be taken as the sole measure of the potential efficacy of any medicinal plant in fidelity level index analysis. For example, *Allium sativum* was reported by 72.5% of the informants, with FL value of 0.43 and is found to be the second species followed by *Withania somnifera* (FL=0.8), used in the treatment of malaria. Similarly, Muhamed Adefa (2010) reported that *A. sativum* as the second prior plant species to treat malaria in Tehuledere District, Northeast Ethiopia and Endalew Amenu (2007) reported it as the first prior plant species used for treating malaria in Ejaji area (Chelya district), West Showa. This could be due to medicinal knowledge difference between peoples in different parts of the country.

Table 4.9 .Fidelity level index for plant species used to treat malaria and wound in the study area

Ailments	Species	% of informants	Np	N	Fidelity index(Np/N)
Malaria	*Ruta chalepensis*	46.25	7	37	0.18
	Withania somnifera	22.5	15	18	0.83
	Cucumis ficifolius	21.25	7	17	0.4
	Allium sativum	72.5	25	58	0.43
Wound	*Stephania abyssinica*	21.25	9	17	0.53
	Brucea antidysenterica	12.5	8	10	0.8
	Calpurnia aurea	20	10	16	0.63

4.14. Conservation and Threats of Medicinal Plants in the Study Area

In the study area, the protection of forests in many villages from any human and domestic animal interference kept medicinal plants from damage. Although this is a good start, in many parts of the local area the medicinal plants are highly threatened. People of the study area, know the benefit of conserving medicinal plants however; the effort of conserving medicinal plants is less. Unlike others, local healers are trying to conserve medicinal plants in their home garden. One of the informant (local healer) called Dereje Awoke said in our discussion (field walk in his homegarden) "I am trying to conserve a lot of medicinal plant in my home garden. This is important for me because 1/ it minimizes scarify to collect them from wild when patients visit me to get relief from their ailments 2/ I have been conserving the precious plant which are now damaging by different threats".

There are different factors that cause for the threats of the medicinal plants in the study area. The major factors are; charcoal making, fire wood collection, collection of construction woods, overgrazing and agricultural land expansion. Informants ranked new agricultural lands expansion as the most serious threat to the medicinal plants followed by charcoal making and overgrazing and fire wood collection were the least threats in the sudy district (Table 4.10). Similar study by Fisseha Mesfin (2007) in Wonago District showed that, there are different threats of medicinal plants such as agricultural expansion (24.4 %), fire wood collection and others.

Table 4.10 .The threats of medicinal plants in the study area

Threats of medicinal plant	Number of informant	% of informant
New agricultural lands expansion	27	33.75
Charcoal making	24	30.00
Collection of construction woods	9	11.25
Overgrazing	16	20.00
Fire wood collection	4	5.00
TOTAL	80	

5. CONCLUSION AND RECOMMENDATIONS

5.1. Conclusion

The study showd that knowledge and usage of medicinal plants for the treatment of various ailments among peoples in Gozamin district is still a major part of their life and culture. It also provided evidence that medicinal plants continue to play an important role in the healthcare system of the community in the district. 80% of the population use medicinal plants.

Ninety two medicinal plants are recorded of which 76 species are noted to treat human ailments only while 4 species are documented to treat livestock ailments only and 12 species are used to treat both livestock and human ailments. Most of the medicinal plant species collected and identified from the wild. Herbs are highly utilized for medicinal purpose followed by shrubs and trees and climbers and parasitic medicinal plant were the least utilized. Leaves were the most common plant parts that are used for human and livestock remedies. Most of the medicinal plants are administered orally while crushing and mixing is the best way of preparation of medicinal plant used to treat both human and livestock ailments.

All medicinal plants have not equal importance as there were medicinal plants mostly preferred by local people of the study area for treatment of the same disease they acquire the knowledge through long experience and able to differentiate the most efficacies medicinal plants for treatment of the ailments. The conservation status of medicinal plants in the study area is low though very few local healers start to conserve in home garden. The major threats to medicinal plants and the associated knowledge in the study area are new agricultural lands expansion. This has greatly affected the availability of medicinal plants and the indigenous knowledge of the people.

Although the study area is enriched with medicinal plants and indigenous knowledge of traditional medicine, the conservation status and the continuation of knowledge to the next generation is endanger.

5.2. Recommendation

Based on the above results and conclusion, the following recommendations are forwarded:

- Identify medicinal plants and encourage their production and cultivation both in the wild and home garden.
- Create a conducive environment for traditional medicine practitioners and train them to share their secretive knowledge to the next generation
- Provide basic training to traditional practitioners with the objective of adding value to their traditional skill
- The community and Government officers (like health and agriculture sector) should participate in both in-situ and ex-situ conservation of medicinal plants found in the study area.
- Create awareness to local people of the study area to conserve medicinal plants in their garden.
- Planting of multipurpose plants is beneficial to the individual, to local people as well as to the country (decline climate change)
- Scientific investigations should be conducted to ascertain the effectiveness of identified medicinal plant species in the treatment and control of both human and livestock diseases
- phytochemical studies should also be conducted on the reported medicinal plant species of the study area so as to utilize them in drug development.
- People need to be encouraged to cultivate medicinal plants in their home garden through training or education. Furthermore, the documented medicinal plants can be used as a basis for further studies on the regions medicinal plants knowledge and for future phytochemical and pharmacological studies.

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APPENDICES

appendix 1.list of traditional medicinal plants used to treat human and livestock health problem

List of traditional medicinal plants used to treat human and livestock health problems with parts used, ailment type, route of administration, preparation and application and dosage (Key to abbreviations: H- habits, Sb – shrub, T- tree, Hb- herb, C – climber, P-parasitic PPU-plant parts used, R – root, L- leaf, St – stem, F – flower, S –seed, B-bark, Uf- used for, Hu – Human, an – animal, RA – route of application, O – oral, D – dermal, N – nasal, An – anal, V- vaginal, OU-other uses, fc-fence, af-animal food, hf-human food, cw- cloth wash, hm-house making, he -house equipment(furniture), hd-house decoration, pf-perfume making, tb-for tooth brush).

NO.	Scientific name	Family	Local name	H	Ha	Ailment type(Uf)	PPU	Method of preparation and application	RA	OU
1	*Achyranthes aspera*	Amaranthaceae	Telenji	Hb	W/HG	Evil eye(hu)	R	The root of *Capparis tomentosa, Carissa spinarum, Argemone mexicana* L.,and *Achyranthes aspera* become crushed and bind with pieces of cloth then tied with hand or neck and sniffed it	D,N	-
2	*Acokanthera schimperi* (A.DC.) Schweinf.	Apocynaceae	Merz/Mirez	T	W/HG	Liver Problem(hu)	L	The leaves crushed and mixed with the honey	O	fc
3	*Allium sativum*	Alliaceae	Nechi shin kurti	Hb	HG	Common cold(hu)	L	Dry and crush the leaves then take it by mixing with honey until recovery	O	hf
						Malaria(hu)	L	The flesh of the *Allium sativum* is chewed and swallowed	O	

						Lever problem(hu)	L	The flesh(bulb) of the *Allium sativum* is crushed and grinded then mix with honey	O	
						Evil eye(hu)	L	Similar to Artemisia *afra* Jack. ex Willd.		
4	*Aloe macrocarpa*	Aloaceae	Eret	Hb	W	Evil eye(hu)	R	The same as Artemisia *afra* Jack. ex Willd.		af and fc
						Emaciation(an)	L	The leaf is cut into pieces, mixed with sugar and with leaf of caster is given to the cattle.	O	
5	*Argemone mexicana* L.	Papaveraceae	Yahya eshoh	Hb	W	Evil eye(hu)	R	Similar to *Achyranthes aspera*	D,N	-
						Rabies(an)	R	Root is crushed and given with water to domestic animals	O	
6	*Artemisia afra* Jack. ex Willd.	Asteraceae	chikugn	Hb	HG	Evil eye(hu)	L	The root of *Aloe Macrocarpa, Capparis tomentosa ,Otostegia integrifolia* ,the leaf of *Artemisia afra* Jack. exWilld., *Ruta chalepensis* and the bulb of *Allium sativum* dried ,grinded and mixed then sniffed	N	-
7	*Asparagus scaberulus*	Asparagaceae	Yesiet kest	C	CL	Toothache(hu)	R	The root chewed from 30 minutes to 1hr for consecutive 3 days	O	-
						Placenta retention(hu)	R	Root is pounded, boiled in water then mixed with honey and is drunk.		
8	*Barleria ventricosa*	Acanthaceae	Tikur telenj	Hb	W	Ear infection(hu)	L	The flesh leaves squeezed and the juice placed on the infected ear	D	-

9	*Bersama abyssinica*	Melianthaceae	Azamir	Sb	W	Ascariasis(hu)	B	Fresh bark of *Bersama Abyssinica* is pounded and mixed with Honey then with cup of water dissolved and drink	O	-
10	*Brassica nigra*	Brassicaceae	Sinafech	Hb	CL	Stomach-ache(hu)	S	Seed is crushed with tooth and swallowed	O	hf
11	*Brucea antidysenterica*	Simaroubaceae	Abalo	T	W	Wound (hu)	R	Crushed root tied on the wound for two days interval until the wound become dry	D	-
						Chefie (hu)	S	The seed of *Brucea anti dysenterica* grinded and creamed the infected part with butter	D	
12	*Buddleja polystachya*	Loganiaceae	Amfar	Sb	W	Scabies/itching(skin problem)(hu)		The leaf of *Buddleja Polystachya* is pounded, powdered and applied on wound	D	fc fw
13	*Calpurnia aurea*	Fabaceae	Digita	Sb	W	Rabies (hu)	L	Drying and pounding then taken with water or honey	O	fc fw
						Malaria(hu)	L	The leaf is mixed with bulbs of *Allium sativum* then soaked ,mixed with water and the decanted taken	O	
						Wound (hu)	St	The stem dry and crushed then the powder mixed with water and creamed the wound	D	
14	*Capparis tomentosa*	Fabaceae	Gemero	Sb	W/HG	Evil eye(hu)	R	Similar to *Achyranthes aspera*	D,N	fc
15	*Carissa spinarum*	Apocynaceae	Agam	Sb	W	Evil eye(hu)	R	Similar to *Achyranthes aspera*	D,N	fc
16	*Cassia singueana*	Caesalpiniaceae	Gufa	Sb	W	Snake bite(hu)	B	The bark of *Cassia singueana* chewed and swallowed	O	fc

17	*Cavratica gracilis* (Guill.&Perr.) Suesseng	Vitaceae	Aserkush	C	W	Hemorrhoids(hu)	R	Crushed root is mixed with the latexs of *Euphorbia abyssinica & Calotropis procera* are creamed*;* Latexs of *Euphorbia abyssinica, Calotropis procera* are mixed with the crushed roots of *Cavratica gracillis* then creamed	D	-
18	*Clausena anisata*	Rutaceae	Limich	Sb	W	Devil sickness(hu)	St	The stem of *Clausena anisata* cut and dried then tied to the hand or neck	D	tb
						Ascariasis (hu)	L	The same as *Leonotis Velutina var.rugosa*	O	
						Coccoides(kuriba animal) (an)	L	The flesh leaves of *Clausena Anisata, Leonotis Velutina var.rugosa, and Phytolacca dodecandra* L'Herit.squeezed drink	O	
19	*Clematis simensis*	Ranunculaceae	Yeazoareg	C	W	Hemorrhoid(hu)	L	The leaf dried and pound then creamed the infected part	D	af
20	*Clerodendrum myricoides*	Lamiaceae	Misrich	Sb	W/HG	Malaria(hu)	L	The leaf of *Clerodendrum myricoides and Allium sativum* are crushed, powdered and soaked in honey with water then drink	O	-
						boils (buginj) (hu)	L	The leaf puts on the skin where there is spoils then fired with fire wood	D	
21	*Clutia lanceolata* subsp.*lanceolata*	Euphorbiaceae	Fiyelefeg	Sb	W	Diarrhea (hu)	R	The root of *Clutia lanceolata* subsp.*lanceolata* crushed and tied on neck region of children until recovery	D	-

						Malaria(hu)	St	The stem of *Coccinia adoensis* dried crushed,then the powder is mixed with egg and honey and dissolved by water finally drink	O	
						Leprosy(hu)	St	The stem of *Coccinia adoensis* dried ,crushed,then the powder is mixed with egg and honey and dissolved by water finally drink	O	
22	*Coccinia adoensis*	Cucurbitaceae	workbemeda	Hb	W	Asthma(hu)	St	The stem of *Coccinia adoensis dried* , crushed,then the powder is mixed with egg and honey and dissolved by water finally drink	O	
23	*Convolvulus steudneri*	Convolvulaceae	Flatsut	C	W	Stomach problem(hu)	L	The leaf is crushed, powdered, mixed with honey then take it with water	O	-
						"Megagna" (hu)	B	During the pain the bark is grind and chewed with the tooth	O	
24	*Croton macrostachyus*	Euphorbiaceae	Bisana	T	W	Malaria(hu)	B	The bark is crushed, powdered,soaked in honey or butter and mixed with water	O	fc fw
						Evel eye (hu)	R	The root of *Cucumis Ficifolius,*the leaves of *Allium sativum, Ruta chalepensis,*and the root bark of *Carissa Spinarum* dryied and pound then sniffed	N	
25	*Cucumis ficifolius*	Cucurbitaceae	Yemdir embouy	Hb	W	Removal of retained placenta(hu)	R	The root is boiled with water and drink	O	-

						Rabies (hu)	L	The leaves of *Cucumis Ficifolius* dryied and crushed then taken with the honey	O	
						Chefie (hu)	R	The root crushed and creamed the infected body	D	
						Malaria (hu)	L	The leaves of *Cucumis Ficifolius* dryied and crushed then taken with the honey	O	
						Lung tuberculosis(hu)	R	The leaves of *Cucumis Ficifolius* dryied and crushed then taken with the honey	O	
26	*Cymbopogon citratus*	poaceae	Tejesar	Hb	HG	"Megagna" (hu)	R	During the pain the root of *Cymbopogon citrates* is sucked with the mouth	O	hd
						Snake bite(hu)	R	The pounding root is taken with water	O	
						Kuriba (an)	R	The flesh root crushed and mixed with water	O	
27	*Cyphostemma molle*	Vitaceae	Ese zewie	Hb	W	Bloating (an)	R	The root of *Cyphostemma Molle and Cavratica gracilis* (Guill.&Perr.) Suesseng crushed and dissolved with water	A	-
						Dandruff(hu)	L	The leaves squeezed and creamed the bolded head	D	
28	*Datura stramonium*	Solanaceae	Astenager	Hb	W/HG	Ear lesion(hu)	L	The leaves squeezed and placed droplets of juice in the ear	D	-
29	*Dipsacus pinnatifidus*	Dipsacaceae	Kelem	Hb	W	Eye infection (hu)	L	The leaf of *Dipsacus pinnatifidus* crushed and squeezed juices dropped on the	D	-

								eye.		
30	*Dodonaea angustifolia*	Sapindaceae	Kitkita	Sb	W	Wound(hu)	L	The leaf of *Dodonaea angustifolia* is pounded, powdered and applied on wounded part	D	fc
						Malaria(hu)	L	The leaf and fruits mixed with ¼ of bulb of garlic, fruits and leaf of rue are crushed, powdered, soaked in honey and one glass is taken continuously.		
31	*Echinops kebericho*	Asteraceae	Kebericho	Hb	W	Epidemic(hu)	R	The root of *Echinops Kebericho* burnt and fumigate the smoke	D	-
32	*Embelia schimperi*	Myrsinaceae	Enkoko	Sb	W	Tapeworm(hu)	S	The seed of *Embelia schimperi* is pounded with "nug" and juice is eaten	O	fc
33	*Eucalyptus globulus*	Myrtaceae	Nech bahir zaf	T	HG	Common cold(hu)	L	The leaves boiled then fumigate until the patient becomes sweaty	D	fc hm
34	*Euclea racemosa.Hiern*	Ebenaceae	Dedho	Sb	W	Head wound(hu)	B	The bark of *Millettia Ferruginea and Euclea racemosa.Hiern* crushed and mixed then tied the powder to the injured head	D	fc
35	*Euphorbia platyphyllos*	Euphorbiaceae	Anitrfa	Hb	W	Wound (an)	L	The leaf dried and crushed then mix with water and creamed the wound body	D	-
						Mutilation (hu)	St	The milky fluid from the stem of *Euphorbia platyphyllos* creamed the genital organ of boy/man	D	

36	*Euphorbia abyssinica*	Euphorbiaceae	Kulkual	T	W/HG	"Amenimin" (hu)	S	The milky part is sucked and creamed the body of the patient	D	fc
						Kidney Stone problem(hu)	L	The flesh leaves became squeezed then drink	O	
						Liver problem(hu)	L	The crushed dry leaves mixed with honey	O	
37	*Feoniculum vulgare*	Apiaceae	Ensillal	Hb	W/HG	hypertension(hu)	S	The stem is either crushed or squeezed and make solution with water	O	-
38	*Gladiolus abyssinicus*	Iridaceae	Inzerezey	Hb	HG	Malaria(hu)	L	The dry leaf of *Gladiolus abyssinicus* crushed and mixed with honey by water then it becomes drink	O	-
39	*Gnidia glauca*	Thymelaceae	Awura	Sb	W	"Chefie" (hu)	L	The leaves crushed and creamed the infected body	D	fc
						Megagna (hu)	R	The root is crushed and mixed with water then drink it	O	
						Rheutematim pain(hu)	R	The root of *Gnidia Involucrate* placed in the yogurt at least for a day then drink the solute	O	
40	*Gnidia involucrata*	Thymelaceae	Boto	Hb	W	Malaria(hu)	L	The leaf is crushed and mixed with honey then dissolved with water and drink	O	-
41	*Hagenia abyssinica*	Rosaceae	Kosso	T	W	Tapeworm(hu)	S	The seed of *Hagenia abyssinica* is mixed with niger seed and pounded	O	-
42	*Jasminum Grandiflorum*	Oleaceae	Tembelel	Sb	W	Snake bite (hu)	L	The leaf is given to the person and chewed who bite by the snake	O	fc af

						Tosilitis		Crushed leaf mixed with butter and the paste is applied on the head.		
43	*Justicia schimperiana*	Acanthaceae	Simiza	Sb	W/HG	Malaria(hu)	L	The leaf is crushed, boiled in the water with sugar or salt and butter	O	fc af
						Antrax (an)	L	The leaf is crushed and mixed with water then watering	O	
						"Kuriba" (hu)	L	The leaves squeezed and drink with the help of water	O	
						Coccoides(an)	L	The leaf is crushed and squeezed with water and given with injera.	O	
44	*Kalanchoe* sp.	Crassulaceae	Endahula	Hb	W/HG	Ear infection(hu)	R	The root *Kalanchoe petitiana* is squeezed and added few drops through infected ear	D	-
45	*Kanahia laniflora*	Asclepiadaceae	yewuha tifrena	Sb	W	Evil eye (hu)	R	The root dried and crushed then sniffed	N	-
46	*Lagenaria siceraria*	Cucurbitaceae	Kil	C	HG	Ear lesion(hu)	L	The leave squeezed and the juice droped in the infected ear	D	he
						Snake bite(hu)	S	The seed and bitter portion of the plant dissolved with water then drink the solution	O	
47	*Laggera crispata*	Asteraceae	Kes bedeji	Hb	W	"Mich" (hu)	L	The leave squeezed then drink and creamed	O,D	-
48	*Leonotis Velutina var.rugosa*	Lamiaceae	yeFeres zeng	Sb	HG	Ascariasis(hu)	L	The bud(leaf) of *Leonotis Velutina var.rugosa, Rubus apetalus* and *Clausena anisata* sqeezed ,mixed with butter then drink	O	-
						"Kuriba" (an)	L	The same as *Clausena anisata*		

						Stomachache(hu)	S	The seed of *Lepidium sativumis* chewed and swallowed	O	
						Stomach disorder(an)	S	The seed of *Lepidium sativumis* mixed with "tella"then drunk	O	
						"mich" (hu)	S	The seed pounded and drink by mixing with water	O	
49	*Lepidium sativum*	Brassicaceae	Feto	Hb	HG	Blood dysentery(Diarrhea with blood)(hu)	S	The pounded seed mixed with yoghurt and drink it	O	hf
						Wound (hu)	S	The pounded seed mixed with honey then cream the wound	D	
50	*Linum usitatissimum* L	Linaceae	Telba	Hb	CL	Ulceration (hu)	S	The seed boiled with water then drink the decant	O	hf
						Urination problem(hu)	L	The leave of *Lycopersicum esculentum* and *Feoniculum Vulgare* mixed crushed and squeezed and drink it	O	
51	*Lycopersicum esculentum*	solanaceae	Timatim	Hb	HG	Leech infestation (an)	L	The leaves squeezed and mixed with "tella" then drunk	O	hf
52	*Millettia ferruginea*	Fabaceae	Birbira	T	W	Leech infestation (an)	L	The leaf is crushed and the powder given with mixed water	O	
						Hypertension(hu)	L	The leave crushed and the powder taken as tea	O	
53	*Moringa stenopetala* L.	Moringaceae	Shiferaw	T	W/HG	Diabetes (hu)	L	The leaves boiled and eat like cabbage	O	fc
						Common cold(hu)	B	Crushed and powdered and sniffed until recovery	N	
54	*Myrica salicifolia*	Myricaceae	Shinet	T	W	"chenkur" (hu)	L ,B	The leave and the bark of *Myrica salicifolia* crushed and	D	fc pf

								the powder mixed with the butter or Vaseline then cream the injured part		
						Evil eye (hu)	B	The bark crushed then sniffed	N	
55	*Ocimium lamiifolium*	Lamiaceae	Dama kessie	Sb	HG	Febrile illness(hu)	L	The leaves squeezed and drink the juice	O	-
56	*Olea europaea* subsp. *cuspidata*	Oleaceae	Woira	T	W/HG	Brain tumor(hu)	Fr	The fruit of *Olea europaea* subsp.*cuspidata* and *Embelia schimperi* are mixed, grounded, powdered, mixed in water then drop the solution through nose in before breakfast.	N	fc
57	*Opuntia vulgaris*	Cactaceae	Beles	H	W	Ear lesion(hu)	L	The juice is squeezed and placed in the injured ear	D	fc
58	*Otostegia integrifolia*	Lamiaceae	Tnjut	Sb	HG	Evil eye(hu)	R	The root of *Otostegia integrifolia,Capparis tomentosa* ,Leaf of *Artemisia afra* Jack. ex Willd. ,*Allium sativum* are mixed grinded and powdered then sniffed	N	-
						Malaria(hu)	L	The leaf is crushed with *Allium sativum* and soaked in honey for one day then drink	O	
59	*Periploca linearifolia*	Asclepiadaceae	Moider	C	W	Devil sickness(an)	L	The leaf is squeezed and mixed with local beer(tella) and drink the cattle	O	-
60	*Physalis peruviana*	Solanaceae	Nechi Awut	Hb	W	Ulceration (hu)	Fr	The ripen fruit is eaten	O	-
61	*Phytolaca dodecandra*	Phytolaccaceae	Mehan endod	C	W	Emergency(kuriba) (hu)	L	The leaf is squeezed and the juice is drunk	O	
						Rabies(an)	R	The root of *Phytolaca*	O	cw

								dodecandra Crushed, mixed with milk then given to the infected dog in order to avoid contamination		
						Bloating(an)	L	The leaf dried ,crushed and mixed with tella then watering	O	
62	*Phytolacca dodecandra* L'Herit.	Phytolaccaceae	Endod	S	W/HG	Ascariasis (hu)	L	The same as *Leonotis Velutina var.rugosa*	O	cw
						Body swelling (an)	L	The same as *Clausena anisata*		
63	*Plantago lanceolata*	Plantaginaceae	Gorteb	Hb	CL	Hemorrhoid(hu)	L	The leaf dried then grind and the powder mixed with water then cream the infected part	D	af
64	*Plectocephalus varians*	Asteraceae	Esteyohannaes (engochet)	Hb	W	Gastrointestinal parasite(hu)	L	The leaf is dried, pounded and mixed with water and honey	O	-
						Ulceration (hu)	L	The leaf is dried, pounded and mixed with water and honey	O	
65	*Plumbago zeylanica*	Plumbaginaceae	Amira	Hb	W	Tuberculosis (hu)	L	The leaf dried and the powder is mixed with honey	O	-
66	*Prunus persica*	Rosaceae	Kok	T	HG	Swelling(an)	L	The leaf is crushed, powdered mixed with tella or water then drink	O	hf
67	*Polygala abyssinica*	polygalaceae	Etse libona	Sb	W	Amenimin(AIDS) (hu)	L ,R	The root is chewed, the leaf is crushed and the powder is mixed with water then drink	O	af
68	*Rosa abyssinica*	Rosaceae	Keka	Sb	W	Tapeworm(hu)	Fr	Ripened fruits of *Rosa abyssinica* are eaten by excluding the seed.	O	hf af
69	*Rubus apetalus*	Rosaceae	Enjory	Sb	W/HG	Ascariasis (hu)	L	The leaf of *Clausena Anisata* and *Rubus apetalus* are mixed and squeezed then take it as food with butter	O	hf

						Hypertension(hu)	St	The stem dried ,crushed and mixed with honey stirred with water then drink	O	
70	*Rumex abyssinicus*	Polygonaceae	Mekemeko	Hb	W/HG	Tuberculosis (hu)	St	The stem dried ,crushed and mixed with honey stirred with water then drink	O	hf
						Tonsilities(hu)	R	The root is crushed, mixed with water and drunk and small amount of powder is tied on neck	O ,D	
						Kurtimat(hu)	R	The root of *Rumex nepalensis* Spreng. and *Solanum anguivi* soaked mixed with water then drink	O	
						Ascariasis(hu)	R	The root of *Rumex nepalensis* is tied in different parts of the waist	D	
71	*Rumex nepalensis*	Polygonaceae	Yewusha mlas	Hb	W	Abortion(hu)	R	The root of *Rumex nepalensis* is placed in the uterus	V	af
72	*Rumex nervosus*	Polygonaceae	Embacho	Sb	W/HG	Eye diseases(hu)	L	The leaf of *Rumex nervosus* is squeezed and added through eye	D	af
						Common cold(hu)	L	The leaf of *Ruta chalepensis* is sniffed with in nose	N	
						Malaria(hu)	L	The leaf of *Ruta Chalepensis and Allium sativum* pounded and drink my mixing with water	O	
73	*Ruta chalepensis*	Rutaceae	Tenadam	Hb	HG	Evil eye (hu)	L	The same as *Cucumis ficifolius*	N	-
74	*Schefflera abyssinica*	Araliaceae	Getem	T	W	Snake poison(hu)	B	Crushed and infusion is drunk	O	fc

	(Hochst.ex A. Rich.) Harms.									
75	*Schrebera alata*	Oleaceae	Estemesewor (kessie)	T	W/HG	Amenimin(hu)	L	The leaf is crushed, powdered and mixed with honey leave it from 2-3days then eat	O	-
76	*Sida schimperiana*	Malvaceae	Chifreg	Sb	W	Eye problem(hu)	L	The leaf of *Sida schimperi* is pounded, powdered and then applied juice on the infected eye	D	-
77	*Solanum anguivi*	Solanaceae	Zerch embouy	Sb	W	Kurtimat(hu)	R	The root of *Rumex nepalensis Spreng* and *Solanum anguivi* soaked mixed with water then drink	O	-
78	*Solanum dasyphyllum*	Solanaceae	Gebre embouy	Sb	W	Snake bite(hu)		The root of *Solanum Dasyphyllum* is chewed and swallowed immediately after snake bite	O	
79	*Solanum incanum*	Solanaceae	Embouy	Sb	W	Anthrax (an)	L	The fresh leaf of the plant is pounded then soaked in water. It is decanted and the solution is drink	O	-
80	*Solanum nigrum*	Solanaceae	Tikur awut	Hb	W	wound(hu)	L	The leaf of *Solanum nigrum* is squeezed and then creamed on the wound part	D	-
81	*Stephania abyssinica*	Menispermaceae	Ye ayt-jero (etse-eyesus)	C	W	Liver problem(hu)	L	The leaf dried and pounded and mixed with honey	O	af
						Kidney problem(hu)	Fr	The fruit dried and grinded and mixed with water	O	

						Malaria(hu)	L	The leaf is dried and grinded and the powder is mixed with water	O	
						Wound(hu)	L	The leaf is dried and pounded then cream the wounded part	D	
82	*Syzygium guineense*	Myrtaceae	Dokima	T	W	Ascaries, amoeba, Tania sagineta (kosso) (hu)	L S R	The leaves or stem or root crushed and powdered, then taken with the addition of either honey or "tazima"	O	fc
83	*Tragia brevipes* Pax.	Euphorbiaceae	Abelbalit	P	W	Coccidiosis(an)	L	The leaf is crushed and the powder is mixed with enjera the eat	O	-
						Kurtet (hu)	R	The root of *Tragia brevipes* Pax.chewed and swallowed	O	
84	*Trigonella foenum-graecum*	Fabaceae	Abish	Hb	CL	Body swelling(hu)	S	The powder of the *Trigonella foenum-graecum* seed stirred with water then drink	O	hf
85	*Verbascum sinaiticum*	Scrophulariaceae	Ketetina	Sb	W	Bleeding nose(hu)	St ,R	The root and stem of *Verbascum Sinaiticum* grind and powder is tied in the bleeding site	D	af
						Tuberculosis (hu)	L	The leaf is dried, grinded, the powder mixed with honey and drink by mixing with water	O	
86	*Verbena officinalis*	Verbenaceae	Atuch	Hb	W	Dysentery(hu)	R	The root is chewed with honey and swallowed	O	af
87	*Vernonia amygdalina*	Asteraceae	Grawa	Sb	W/HG	Ameba ,Giardia and Tapeworm(hu)	L	The leaf is squeezed and drink the juice	O	fc af
						Stomach Disorder(an)	L	The leaf is crushed, soaked in the water until the juice is produced then drink the cattle mixed with tella.	O	
88	*Vernonia*	Asteraceae	Est-musay	Sb	HG	'Likfit'(hu)	R	Crushed and powdered root is	O	-

	adoensis Sch.Bip ex Walp.							drunk with water; root is chewed and juice is swallowed.		
						Kidney problem(hu)	R	The root is crushed, boiled in water then drink	O	
						Wound (hu)	L	The leaf is pounded and cream the wound	D	
89	*Vicia faba* L.	Fabaceae	Bakela	Hb	CL	Anemia (hu)	S	The dry seed roasted and boiled then eat regularly	O	hf
90	*Withania somnifera*	Solanaceae	Githewa	Sb	HG	Malaria (hu)	L	The leaf of *Withania somnifera* is dried pounded mixed with honey and water then drink	O	-
91	*Ximenia caffra*	Olacaceae	Enkoy	Sb	W	Herpes zoster(skin problem)(hu)	B	The bark of *Ximenia caffra* is crushed and the powder mixed with fresh butter and creamed the infected part	D	fc
92	*Zehneria scabra* (Linn. f.) Sond.	Cucurbitaceae	Hareg resa	C	W/HG	Headache(hu)	L	The leaves squeezed and drink	O	-
						"Mich" (hu)	L	The leaves squeezed and cream the face	D	

appendix 2.List of human diseases which are treated by medicinal plants in the study area

No.	Local name	English name	No. of medicinal plants	
			Number	(%)
1	Abalazer besheta	STDs	1	1.08
2	Aganint	Devil sickness	2	2.17
3	Amenimin	Unspecified diseases	2	2.17
4	Amoeba	Amoeba	2	2.17
5	Asim	Asthma	1	1.08
6	Be ebab menedef	Snake bite	6	6.52
7	Bleeding nose	Nose bleed	1	1.08
8	Buda	Evil eye	12	13.04
9	Buginj	Boils	1	1.08
10	Chefie	Skin rash/ Eczema	1	1.08
11	Chenkur	Sight problem	1	1.08
12	Dem gifit	Hypertension	3	3.2
13	Dem manes	Anemia	1	1.08
14	Dem tekimat	Diarrhea with blood	1	1.08
15	Ebtet	Swelling	1	1.08
16	Engede lij mekert	Placenta retention	1	1.08
17	Entil mewered	Tonsil	1	1.08
18	Forefor	Dundrof	1	1.08
19	Giardia	Giardia	1	1.08
20	Gubet	Liver problem	4	4.34
21	Gunfan	Common cold	4	4.34
22	Hod kurtet	Stomach problem	3	3.2
23	Injury on the body	Mutilation	1	1.08
24	Jero himem	ear infection and Maturities	2	2.17
25	Jero megil	Ear lesion	3	3.2
26	Kintarot	Hemorrhoids	2	2.17
27	Kintarot (specially on the hand &feet)	Hemorrhoid (wart)	1	1.08
28	Koda beshta	Skin problem	2	2.17
29	koso	Tapeworm	3	3.2
30	Kulalit	Kidney problem	2	2.17
31	Kumitina/sega dewe	Leprosy	1	1.08
32	Kuriba	Body swelling	2	2.17
33	Kurtemat	Rheumatism	1	1.08
34	Kusil	Wound	7	7.6
35	Megagna	Megagna	3	3.2
36	Mich	Fibril illness	3	3.2
37	Samba nekeresa	Tuberculosis	2	2.17
38	Tekimat	Dysentery	1	1.08

39	Tsenis lemaswored	Abortion	1	1.08
40	Weba	Malaria	14	15.22
41	Worershign	Epidemic	1	1.08
42	Wosifat	Ascaries	5	5.43
43	Wusha likeft	Rabies	4	4.35
44	Yecheguara kusil	Ulceration	4	4.35
45	Yechenklat ety	Brain tumor	1	1.08
46	Yehod telatil	Intestinal Helminthiasis	1	1.08
47	Yeterse kurtmat	Toothache	1	1.08

appendix 3.List of livestock diseases which are treated by medicinal plants in the study area

No.	**Local name**	**English name**	**Medicinal plants(species)**	
			Number	**(%)**
1	Fengil	Coccoides	**3**	**3.2**
2	Hod menifat	Bloating	**1**	**1.08**
3	Wusha likeft	Rabbies	**2**	**2.17**
4	Yekebt kusil	Animal wound	**1**	**1.08**
5	Yekebt kuriba	Emergency	**2**	**2.17**
6	Kumegna	Emaciation	**1**	**1.08**
7	Aba senga	Anthrax	**2**	**2.17**
8	Hod himem	Stomach Disorder(an)	**2**	**2.17**
9	Ebtet	Swelling	**3**	**3.26**
10	Alekit	Leech infestation	**2**	**2.17**
11	Aganint	Devil sickness	**1**	**1.08**

appendix 4.Checklist items used as a basis of discussion and interview

1. Information on respondents

Name_____ Age_____ Sex_____

Religion_____ Marital status_____

Education status_____ Occupation_____ kebele / 'gote'_____

2. What are the common traditional medications practiced in your locality?
3. What are the most common diseases of human and livestock respectively?
4. List plants used to treat human, livestock or both diseases?

Name of plant	Disease	Habit	Habitat	Parts used	Preparation	Route of Application	Other uses	

5. How do you get the knowledge of traditional medication?
6. Are you willing to share your knowledge? If not, why?
7. From where do you collect medicinal plants?
8. What is the marketing value of TM in the study area?
9. How is the knowledge of traditional medicine passed to a family member or younger generations?
10. What are the current and potential threats of medicinal plants and the associated knowledge?

    Underline your option; (charcoal making, fire wood collection, collection of construction woods, overgrazing, new agricultural lands expansion)
11. How do you and people of the locality conserve medicinal plants from the locality?
12. Are medicinal plants important for farmers to treat their animal? Yes/no, if yes, why?
13. Are there members of the community who frequently use medicinal plants?

appendix 5.Pictures of the traditional medicinal plants

እንስላል / *Feoniculum vulgare*

ገበርእንዐይ/ *Solanum dasyphyllum*

እፊት/ *Aloe macrocarpa*

አንፋር */Buddlejapolystachya*

ልምጭ/*Clausena Anisata*

የፈረስዘንግ/*Leonotis Velutina var.rugosa*

ምስርች/ *Clerodendrum myricoides*

ጠለንጅ/ *Achyranthes aspera*

አስተናግር/*Datura stramonium*

አቱች/ *Verbena officinalis*

አባሎ/*Brucea antidysenterica*

በለስ/*Opuntia vulgaris*

የምድር እንቦይ/ *Cucumis ficifolius*

ዘርጭእንቦይ/ *Solanum anguivi*

ጡንጅት/ *Otostegia integrifolia*

ጠጅ ሳር /*Cymbopogon citrates*

ፍላጩት/ *Convolvulus steud*

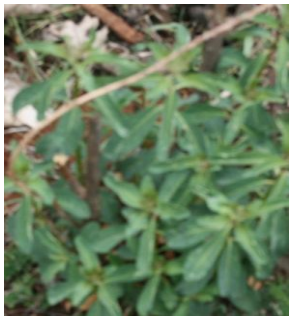
የአይጥጀሮ/ *Stephania abyssinica*

ድግጣ/*Calpurnia aurea*

አንተርፋ/ *Euphorbia Platyphyllos*

ኢጋም/ *Carissa spinarum*

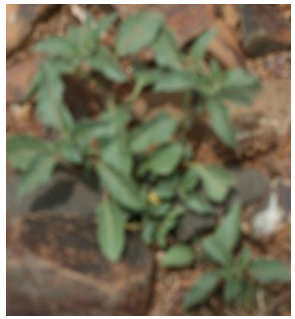
አዉራ / *Gnidia glauca*



እፀ-ሙሴ / *Vernonia adoensis*

አብላሊት/*Tragia brevipes* Pax.

ቁልቋል / *Euphorbia abyssinica*



አዉጥ/ *Physalis peruviana*

ለንጆር / *Rubus apetalus*

ቀጥና/ *Verbascumsinaiticum*

ሀረግሬሳ/ *Zehneria* ***scabra***

ሰሚዛ/*Justicia schimperiana*

ከሲ/ *Schrebera alata*

አሚራ / *Plumbago zeylanica*

እንቧጮ/ *Rumex nervosus*





ነጭ ሽንኩርት/ *Allium sativum* *ቁስ በደኛ /Laggera crispate* ጊዜዋ/*Withania somnifera* ክትክታ/ *Dodobaea angustifolia* *ቅል/ Lagenaria siceraria*






ጤናዳም /*Ruta chalepensis* *ቆጋ/ Rosa abyssinica* *ብርብራ/ Millettia ferruginea* ቀበርቾ/ *Echinops keber* *መቅመቆ/ Rumex abyssinicus* *ብሳና / Croton macrostachyus*





ግራዋ/ Vernonia amygdalina *ወይራ/Olea europaea*subsp.*cuspidata* ነጭባህርዛፍ/ *Eucalyptusglobulus* የዉኻምላስ/ *Rumex nepalensis* *ኮክ/ Prunus persica*

appendix 6. List of Informants in the Study Area

No.	Name	Sex	Age	Educational status	Marital status	Religion	Gote	Kebele
1	Molla Yegzaw	M	80	Primary education	Married	Orthodox	Chaba	Yetejan
2	Demel Gesse	M	82	Illiterate	Married	Orthodox	Densaw	Yetejan
3	Zewda Asmare	M	76	Illiterate	Married	Orthodox	Chaba	Yetejan
4	Waga Gela	M	75	Primary education	Married	Orthodox	Chaba	Yetejan
5	Tarekegne Tegegne	M	56	Basic education	Married	Orthodox	Selamawet	Yetejan
6	Alemeneh Weba	M	60	Illiterate	Married	Orthodox	Selamawet	Yetejan
7	Chane Desse	M	58	Primary education	Married	Orthodox	Densaw	Yetejan
8	Mola Yegzaw	M	40	Basic education	Married	Orthodox	Chaba	Yetejan
9	Habta Wagawe	M	42	Illiterate	Married	Orthodox	Chaba	Yetejan
10	Mentewabe Getaneh	F	38	Illiterate	Married	Orthodox	Chaba	Yetejan
11	Aba Bogale Chere	M	90	Illiterate	Married	Orthodox	Selamawet	Yetejan
12	Mose Yegzaw	M	40	Basic education	Married	Orthodox	Densaw	Yetejan
13	Yeshewas Gelaye	M	65	Illiterate	Married	Orthodox	Gereman	Wenka
14	Munuye Tefere	M	68	Illiterate	Married	Orthodox	Selmawet	Wenka
15	Mameta Terefe	F	52	Illiterate	Married	Orthodox	Chaba	Wenka
16	Derege Aweke	M	34	College & above	Married	Orthodox	Deber	Wenka
17	Aba Ewenetu Bayable	M	70	Secondary education	Married	Orthodox	Deber	Wenka
18	Lakesh Hunegaw	F	72	Illiterate	Married	Orthodox	Densaw	Wenka
19	Yetayal Gashu	M	50	Secondary education	Married	Orthodox	Kechenwenze	Wenka
20	Keleme Demeke	M	45	Basic education	Married	Orthodox	Atare	Wenka
21	Mekeru Terefe	M	55	Basic education	Married	Orthodox	Abugen	Wenka
22	Tena Terefe	F	45	Illiterate	Married	Orthodox	Deber	Wenka
23	Merygeta Araya Meseret	M	90	Religious education	Married	Orthodox	Deber	Wenka
24	Werku Bezabeh	M	55	Basic education	Married	Orthodox	Bekoshegne	Wenka
25	Kes Kasse	M	80	Religious education	Married	Orthodox	Kechen wenze	Wenka
26	Abere Tsegaye	M	65	Illiterate	Married	Orthodox	Gafat	Wenka
27	Kebet Tegbaru	M	65	Illiterate	Married	Orthodox	Gafat	Wenka
28	Merygeta Zelalem Fesha	M	48	Religious education	Married	Orthodox	yebokla	Yebokla
29	Aba Bayla	M	55	Basic education	Married	Orthodox	Yebokla	Yebokla
30	Merygeta Tade Tegegne	M	45	Religious education	Married	Orthodox	Yezabet	Yebokla
31	Merygeta Merhe Aweke	M	60	Religious education	Married	Orthodox	Yebokla	Yebokla
32	Debtera Admasu Balhe	M	63	Religious education	Married	Orthodox	Berra	Yebokla
33	Emebet Damta	F	46	Basic education	Divorced	Orthodox	Manekya	Yebokla
34	Moset Temeche	M	43	Basic education	Divorced	Orthodox	Gedam	Yebokla
35	Yaregal Tenaw	M	37	Primary education	Married	Orthodox	Fulket	Aba lebanos
36	Ayalew Wendmu	M	50	Basic education	Married	Orthodox	Yvavat	Aba lebanos
37	Endaweke Wale	M	41	Basic education	Married	Orthodox	Yevavat	Aba lebanos
38	Selemon Meseret	M	33	Primary education	Married	Orthodox	Fuleket	Aba lebanos
39	Negus Zewedu	M	35	Primary education	Married	Orthodox	Enderege	Aba lebanos

40	Damta Yetayew	M	36	Secondary education	Married	Orthodox	Enderege	Aba lebanos
41	Debtra Meiakae Genet	M	65	Illiterate	Married	Orthodox	Yeyesha	Aba lebanos
42	Debtra Getai Fekad	M	52	Religious education	Married	Orthodox	Yeyesha	Aba lebanos
43	Alemu Mekonen	M	49	Basic education	Married	Orthodox	Yeyesha	Aba lebanos
44	Demeke Abebe	M	45	Basic education	Married	Orthodox	Yevavat	Aba lebanos
45	Endaaweke Abateneh	M	66	Illetrate	Married	Orthodox	Enderege	Aba lebanos
46	Debtera Terefe Hunegaw	M	70	Religious education	Divorced	Orthodox	Yetebata	Denba
47	Egegu Hunegaw	M	78	Illiterate	Married	Orthodox	Yetebata	Denba
48	Mose Getaneh	M	57	Basic education	Married	Orthodox	Yetebata	Denba
49	Alemu Temesgen	M	83	Secondary education	Married	Orthodox	Engorma	Denba
50	Anleye Mehare	M	46	Primary education	Married	Orthodox	Weyera	Denba
51	Mose Senshaw	M	53	Basic education	Married	Orthodox	Weyra	Denba
52	Andualem Zeleke	M	66	Illiterate	Married	Orthodox	Desa	Denba
53	Meregeta Takele	M	53	Illiterate	Married	Orthodox	Yekela	Denba
54	Lenger Egegu	M	46	Primary education	Married	Orthodox	Yetebata	Denba
55	Kelkay Fenta	M	40	Basic education	Married	Orthodox	Tewaw	Asabeabo
56	Zeretu Balehe	F	46	Secondary education	Married	Orthodox	Tewaw	Asabeabo
57	Webeshet Tenaw	M	45	Secondary education	Married	Orthodox	Abugen	Asabeabo
58	Lenger Kuma	M	39	Basic education	Married	Orthodox	Yegaba	Asabeabo
59	Mane Abera	M	54	Illiterate	Married	Orthodox	Tsomwha	Asabeabo
60	Gete Kebra	M	48	Basic education	Married	Orthodox	Abugen	Asabeabo
61	Gete Aynalem	M	52	Basic education	Married	Orthodox	Deber	Asabeabo
62	Mkuryaw Tarekegne	M	50	Primary education	Married	Orthodox	Deken	Asabeabo
63	Chekol Gebru	M	78	Illiterate	Married	Orthodox	Yegote	Chemet
64	Kes Ades Tesfa	M	64	Religious education	Married	Orthodox	Enemye	Chemet
65	Tadese Yehune	M	75	Illiterate	Married	Orthodox	Geteme	Chemet
66	Telahune Degu	M	70	Illiterate	Married	Orthodox	Ddedena	Chemet
67	Muluayehu Senshaw	M	63	Primary education	Married	Orthodox	Yegote	Chemet
68	Neguse Andualem	M	59	Illiterate	Married	Orthodox	Anbute	Chemet
69	Kes Kere Yetbarek	M	47	Religious education	Married	Orthodox	Anbute	Chemet
70	Ayalew Telahun	M	42	Primary education	Married	Orthodox	Anbute	Chemet
71	Mekurya Menlargeh	M	40	Primary education	Married	Orthodox	Enemaye	Chemet
72	Yene Alemayehu	M	48	Basic education	Married	Orthodox	Kenatew	Enerata
73	Desalegne Abebe	M	55	Illiterate	Married	Orthodox	Kenatew	Enerata
74	Betaw Mekonen	M	38	Basic education	Married	Orthodox	Gedame	Enerata
75	YalewSalelew	M	41	Secondary education	Married	Orthodox	Gedame	Enerata
76	DenkayehuDemeke	M	30	Basic education	Married	Orthodox	Gedam	Enerata
77	Gulbet Alemu	M	22	Primary education	Single	Orthodox	Tach amba	Enerata
78	Kebede Wale	M	46	Primary education	Divorced	Orthodox	Tach amba	Enerata
79	Enayehu Delle	M	64	Illiterate	Married	Orthodox	Dong	Enerata
80	Endalamaw Salelew	M	35	Secondary education	Married	Orthodox	Dong	Enerata