



---

## **Ethnobotanical Survey of Common Medicinal Plants Used by Alfacho Kebele, Amaro Wereda Area, Southern Ethiopia**

**Alemayehu Letebo Albejo**

Department of Biology, College of Natural Sciences, Arba Minch University, P.O. Box-21, Arba Minch, Ethiopia

**Abstract** A comprehensive assessment study with the objectives of identifying and recording traditional medicinal plants and practices were carried out in Amaro Woreda, Alfachokebele, Southern Ethiopia in February – June, 2017. Purposive sampling method was used to select traditional medicinal practitioners of the study area. Information was gathered from traditional healers using integrated approach of plant collection, semi-structured and scheduled interview. A total of 25 local elder informants were participated. Data was analyzed with the help of descriptive statistics. A sum of 15 medicinal plant species belonging to different genus and families were reported. The habits of the plants were 20 % shrubs, 33.3% trees and 40% herbs and 6.7% climbers. Most frequently used plant part was leaves (60%) followed by roots (20%), stem (13%) and the remaining were barks (7%). Most common mode of plant remedial preparation, was in the form of decoction (61%) followed by crushing and grinding (22%) and others like concoction (6%) and chewing plant part (11%). Most of the plant remedies were prepared from fresh material of the plants and the most widely used route of administration was oral which accounted (73%) followed by topical (13.3%) and inhalation (13.3%) While, remedial preparation and knowledge of elder healer transfer vertically in family. The investigation also revealed the existence of traditional healing knowledge and secrecy of medicinal plant by the elder healer, had conserved a varieties of medicinal plants. Traditional Healers still play a great role in the primary health care systems in region where the modern health facility is limited. Therefore, large number of valuable resources, practices and indigenous knowledge of medicinal plants can solve problems of shortage of drugs at rural areas as well as drug resistance in different diseases.

**Keywords** Traditional Knowledge, Medicinal Plants, Ethnobotanical, plant remedial

---

### **1. Introduction**

Medicinal plants represent an important health and economic component of biodiversity and also conservation and sustainable use [1]. Information on the traditional knowledge or ethnic groups of medicinal plants and their uses would represent a vital role in the discovery of novel products from plants as chemotherapeutic agents [2]. Nowadays, folk medicine is recognized throughout the world as a credible healthcare resource and about 80% of the world's population depends on traditional medicine for the treatment of different ailments [3, 4]. The use traditional medicine is especial in the developing countries where the modern health service is limited in marginal areas and in accessible for treatment [5]. Along with this marginality, the study of traditional uses of plants and their products has been progressively increasing during the last few years and has enabled the collection of a significant body of knowledge.



The vast majority of Ethiopia's population lives in rural areas where the health care coverage is low and where existing public sector are in ranges of accessibility denying the marginal society; which is one of the greatest challenges facing the country in the health sector. In this regard, over one-third of the population in developing countries lacks access to essential medicines. The provision of safe and effective therapies could, thus, become a critical tool to increase access to health care [6]. Thus, in Ethiopia, most of the local people use traditional medicinal plant. In Ethiopia up to 80% of the population uses traditional medicine due to the cultural acceptability of healers and local pharmacopeia's, the relatively low cost of traditional medicine and difficult access to modern health facilities. In 1970, the first European James Bruce of Scotland, documents only 18 plants in his Natural history of Ethiopia. Today, nearly 7000 plant species[7], of which about 500 are endemic to Ethiopia [8]. The biodiversity richness of Ethiopia contributed as a source different types of medicinal plant preparation [9].

Traditional medicines are more liked in developing countries due to inadequate modern health services. In Ethiopia, the use of traditional plant medicines had been practiced since the ancient time [10]. Traditional medical knowledge of medicinal plants and their use by indigenous culture are not only useful for conservation of cultural traditions and biodiversity but also for community healthcare and drug development now and in the future [4, 11].

The rising demand for medicinal plants has led to increased pressure on medicinal plant populations and shrinking habitats. Despite contributing much healthcare to a significant world population, medicinal plants, except exploring them for use, have been neglected for years in the past and a little attention is given in present days too. It is obvious that the bulk of the plants traded in the local markets are sourced from the wild which could result in local extinction of medicinal plants in particular and plant species diversity in general. The knowledge on traditional medicine is limited to traditional healers and otherwise to some extent to those customers of the traditional therapeutics. Therefore, the survey of medicinal plants is not only important to the conservation of such plants but also to the in-depth knowledge of medicinal plants for the pharmaceutical industry in extraction of drugs.

The study addressed the different types of medicinal plants, which traditionally served the local community for long time. However, traditional healers practiced the administration of medicinal plants through traditional way, but without dosage. Therefore, this study would be an input to harmonize the indigenous knowledge of the local community with the scientific world so as to benefit the users and the healers as well. Moreover, the findings of the research are expected to be an input data for the growing pharmaceutical industry of Ethiopia. Though we have these facts, literature survey on the ethnobotanical investigation reveals that there is no or very few previously conducted documentation work in any place in the District. Hence, there is a clear need to conduct ethnobotanical study of medicinal plants in the area, to look into and compile relevant information and to document them before the plants become too scarce to capture the knowledge of the indigenous people; and hence this study was initiated. The aims of this study were to survey the currently used medicinal plants, its habit, mode of preparation. Moreover, the study aimed at assessing practice and trends in using medicinal plants.

## **2. Materials and Methods**

### **2.1. Description of the people and study area**

Amaro is one of newly established special woredas in the Southern Nations, Nationalities, and Peoples' Region (SNNPR) of Ethiopia. The woreda located 5°50'N 37°50'E . It is situated in the Great Rift Valley, bordered , on the south by Burji special woreda, on the southwest by Konso special woreda, on the west by Dirashe special woreda, on the northwest by GamoGofa and Lake Chamo, and on the north and east by the Oromia Region. Amaro woreda is nearby to Delo, Hailu and Derba. Amaro Special Woreda has an elevation of 2,815 meters. It is divided into 34 kebeles. The administrative centre of the woreda is Kele. Alfacho kebele one of well-established kebele in the amaro woreda. The highest peak in the woreda is Mount Delo (3240 meters), which is part of the Amaro mountains. Much of the western part of this woreda lies inside the Nechsar National Park. The major crops grown in Amaro are teff, corn, wheat, barley, navy beans, and coffee. Based on the 2007 Census conducted by the Central Statistical Agency of Ethiopia (CSA), this woreda has a total population of 149,231, of whom 75,202 are men and 74,029 women. With an area of 1,422.16 square kilometers, Amaro has a population density of 104.93; 8,633 or 5.78% are urban inhabitants. A total of 28,969 households were counted in this woreda, which results in an



average of 5.15 persons to a household, and 27,941 housing units. The largest ethnic group reported in Amaro was the Koorete (97.8%); all other ethnic groups made up 2.2% of the population. Koorete was spoken as a first language by 97.36% of the inhabitants, and 1.28% spoke Amharic; the remaining 1.36% spoke all other primary languages reported. 87.76% of the population said they were Protestants, 6.12% practiced Ethiopian Orthodox Christianity, 2.78% practiced traditional beliefs, 1.84% were Catholics, and 1.14% were Muslim[12].

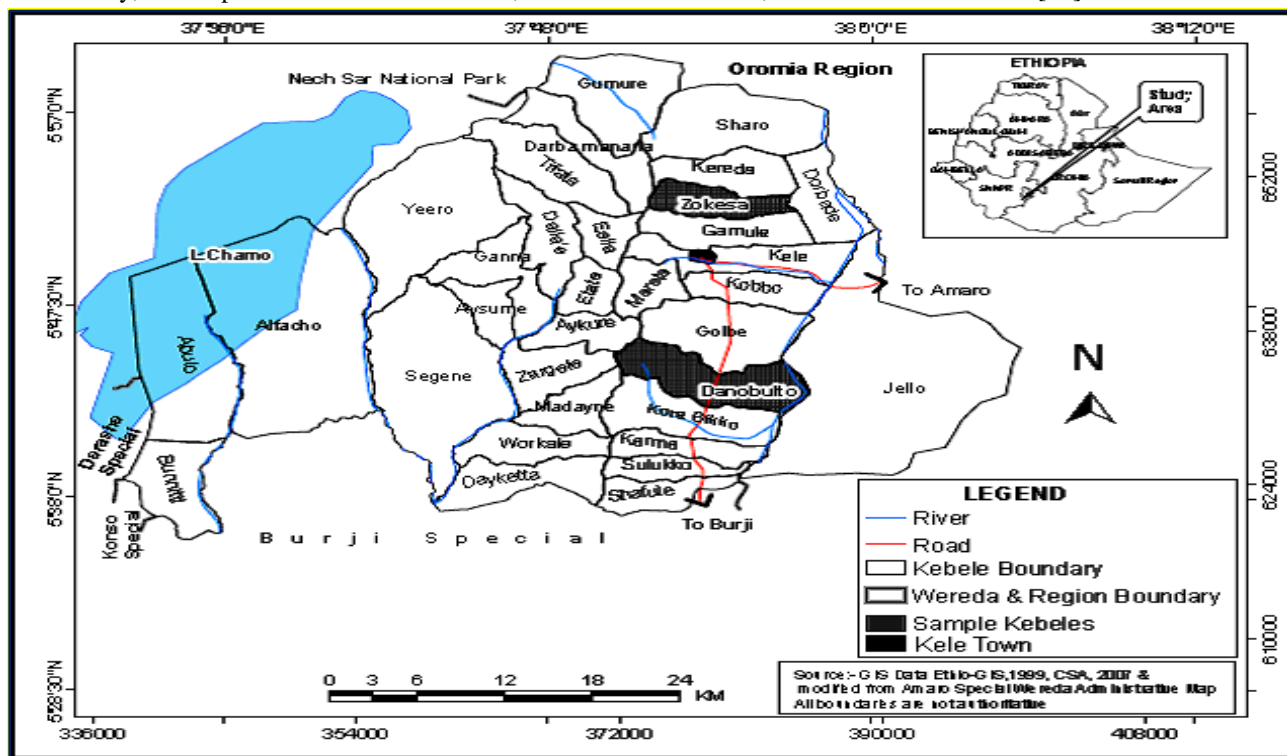


Figure 1: Amaro woreda administrative map [Taken from [13]]

## 2.2. Selection of study area and informants

Informants whose age ranged from 18 to 68 were chosen both purposively and randomly from among those born or have lived there for most of their lives. A total of 25 informants (18 males and 7 females) were used from 2 kebeles. The informants (7/8 per kebele) were key informants that selected purposively based on recommendations from the local people, at each study site, A1facho's kebeles.

## 2.3. Sample Size and Sampling Techniques

In this study one kebele was selected from the area using purposive sampling techniques. This is because the kebele is mostly covered by different plant species and these plants are used for traditional medicinal value to treat different diseases. The researcher selected 25 healers using purposive sampling technique to gather the relevant data.

## 2.4. Data collection methods

Ethnobotanical data was collected between February 2017 to June 2017 on twenty-five individual healers were interviewed using semi-structured interviews and observations. The information collected included local name of the traditional medicinal plant, type (cultivated or wild), diseases treated, parts used, condition of plant used, method of preparation, route of administration and frequency of appropriate dose per day.

## 2.5. Plant identification

Specimens for medicinal plants that were collected during informant visit with the exception of some very common cultivated plants which were identified in the field. These plant specimens were gathered and preliminary



identification of these specimens was made in the field; and they were pressed and taken to Arba Minch University where they were dried, deep frozen and identified by botanist with the aid of keys of published volumes of the relevant Flora of Ethiopia and Eritrea, and later supported with identification by comparisons with already authenticated specimen in the Herbarium.

## 2.6. Data analysis

Both qualitative and quantitative analytical data analysis were done using Microsoft excel 2010 package. Percentage frequency method of data analysis was employed to summarize some of the descriptive ethnobotanical data obtained from the interviews on reported medicinal plants and associated knowledge. Microsoft Excel spread sheet was employed for organizing some ethnobotanical data.

## 3. Results

### 3.1. Demography/Personal Information on Informant

The survey analysis in table 1 above showed a total of 25 informant, interviewed through the use of semi-structure questionnaire. The informants' age was in ranges of 18-25 (40%) and 26-68 which is 60% of the total. The sex ratio of the respondents indicates 72% of them were males. Forty eight percent of respondents were married and more than half of respondents were Orthodox followers (56%) and under nine grades (84%).

**Table 1:** Demographic information of respondents

Item	Respondent	Percent (%)
<b>Age</b>		
18-25	10	40
26-68	15	60
<b>Sex</b>		
Male	18	72
Female	7	28
<b>Marital Status</b>		
Married	12	48
single	11	44
Divorced	2	8
<b>Religion</b>		
Orthodox	14	56
Protestant	11	44
Muslim	0	0
<b>Academic Status</b>		
Grade 0-4	13	52
Grade 5-8	8	32
Grade 9-12	4	16

### 3.2. Medicinal plant species and their medicinal uses in the study area

According to respondents, there were many numbers of medicinal plants in the study area. But, they don't tell the most important medicinal plants as they are only known and secret by traditional healers.

### 3.3. Practices and trends of in using medicinal plants

The trend in medicinal plants showed that one (4%) of the male informant was traditional healer. However, they were not agreed to tell all of the medicinal plants even high negotiation was made. Majority (88%) of the respondents use traditional medicine and most (76%) of them preferred traditional medicine over the modern. Most of the time patients get traditional medicine from traditional healers in their locality (Table 3).



**Table 2:** List of medicinal plants and their uses in the study area

S.No	Scientific Name	Family Name	Local Name	Utilized Part	Mode of preparation /administration	Freq/ day	Amt/ use	Habit	Growth form	Ailment Cured
1	<i>Balanitesaegyptiaca</i>	Zygophyllaceae	Bedena	Stem	Decoction, Boiling & Steam bath	Once	2 spoon stem juice	Tree	Wild	Head ache
2	<i>Cordia africana</i>	Boraginaceae	Bola	Leaf	Decoction	Once	1 cup	Tree	Cultivated and wild	Hookworm
3	<i>Gardenia ternifolia</i>	Rubiaceae	Gambella	Stem	Decoction	Once	1 spoon	Shrub	Wild	Malaria
4	<i>Slanumincanum</i>	Solanaceae	Yemidirembuway	Root	Concoction	Once	1 spoon	Shrub	Wild	Snake bite
5	<i>Artemisia annua</i>	Asteraceae	Artemisia	Leaf	Decoction	3 times	1 tea cup	Herb	Cultivated	Snake bite, malaria and fever
6	<i>Rutachallenpensis</i>	Rutaceae	Tena adam	Leaf	Chewing & Decoction	Once	2-3 cups	Herb	Cultivated	Stomach ache, antihelminthes
7	<i>Aloe spp.</i>	Liliaceae	Yejibtila	Leaf	Decoction	Twice	1-2 spoon	Herb	Wild	Wound
8	<i>Lemon grass</i>	Gramineae	Tejsar	Leaf	Decoction, Boiling & Steam bath	once	1 hand	Herb/grass	cultivated	Killing lice and mosquito, washing and aromatizing milk bottles
9	<i>Allium sativum</i>	Amaryllidaceae	NechShinkurt	Root	Chewing and Decoction	once	1 hand	Grass/herb	Cultivated	Malaria treatment
10	<i>C. papaya</i>	Caricaceae	papaya	leaf	Boiling /Decoction	once	1 tea cup	Tree	Cultivated	Malaria and Diarrhea
11	<i>Arundinariaalpina</i>	Poaceae	Kerheha	Root	Root powder Direct Application to the bite	Once	-	Herb	Wild	Snake bite
12	<i>Acokantherabyssinica</i>	Apocynaceae	Qaraaruu	Leaf	Leaf Juice/paste application	Twice	Rub the area	Tree	Wild	Skin Itching /Skin disease and Jaundice
13	<i>Carissa spinarum L.</i>	Apocynaceae	Agam	Stem /bark/root	Fresh root Decoction	Once	1 spoon	Shrub	Wild	Gonorrhea
14	<i>Moringa stenopetala</i>	Moringaceae	Shiferaw	Leaf	Dried leaf Prepared as tea, Decoction	Once	1 spoon	Tree	Wild	Malaria diabetes, Hypertension, kidney infection.
15	<i>Nicandraphysalodes</i>	Solanaceae	Machara	Leaf	Leaf powder boiling, decoction	Once	1 spoon	Herb /tree climber	Wild	Leishmania

**Table 2:** Practices of medicinal plants by respondents

Preference		Sources of medicinal plants collection					
Use medicinal plants	Traditional medication	Modern medication	Market	Traditional Healer	Wild	Home garden(cultivated)	
<b>Yes</b>	No						
<b>22</b>	3	19 (76%)	6 (24%)	7 (28%)	11 (44%)	3 (12%) 4 (16%)	



### 3.3.1. Medicinal plants habits most commonly utilized part

A study survey revealed that most of the medicinal plants utilized by the elder practitioners were brought from other traditional healer (44%) followed by local market (28 %), home garden (16%) and wild (12%). (Table 3). In addition, the most indicated habit of the medicinal plants was herbs (40%) followed by tree (33.3%), shrub (20%) and least percentage practiced habit of plant is tree climber (6.7%) (Figure 2). The study showed that the widely used plant part for the preparation of the remedies in the study area was leaves(60%) and followed by roots (20%), then stem (13%) and barks (7%) (Figure 3).

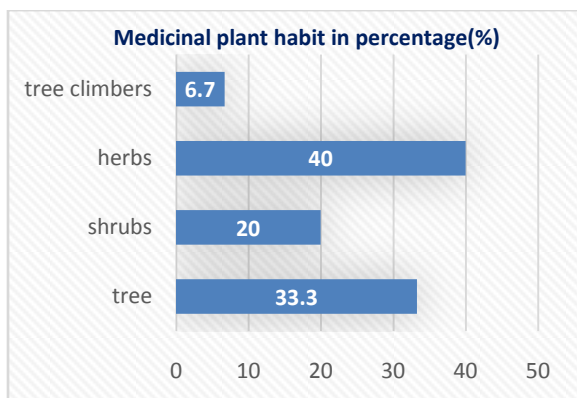


Figure 2: Habits of commonly utilized Medicinal Plants

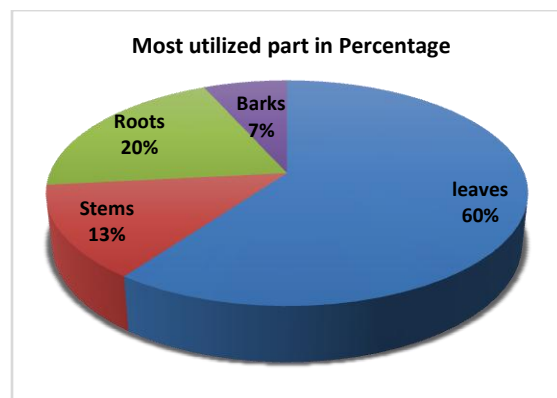


Figure 3: Percentage of utilized part of plants

### 3.3.2. Mode of preparation and Route

The study revealed that the highest mode of preparation was in the form of decoction (61%) followed by crushing and grinding (22%) and others like concoction (6%) and chewing plant part (11%), (Figure 4). The majority of the plant remedies were prepared from fresh material of the plants and the most widely used route of administration was oral which accounted (73%) followed by topical (13.3%) and inhalation (13.3%) (Table 4).

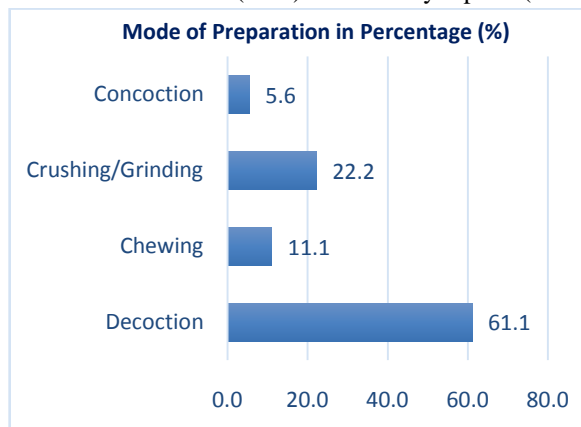


Figure 4: Mode of remedies preparation

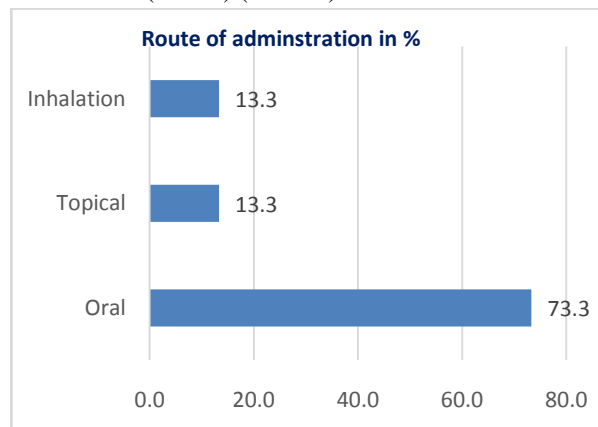


Figure 5: Route of medicinal plant administration

### 3.4. Assessment of conservation and threats of medicinal plant species

Assessment of conservation and threats (See table 4) has shown that traditional land management, knowledge of medicinal plants only by healers, traditional beliefs and growing in home gardens were good opportunities to save plants. On the other hand, increasing demand and overexploitation, the ongoing climate change, less transmission of medicinal plant species knowledge to younger generations and habitat destructions were reported as the major threats to medicinal plant species in particular and the whole biodiversity in general.





**Table 3:** Conservation and threat practices to medicinal plants

Conservation methods	Number and Percentage (n =25)	Threats for medicinal plants	Number and Percentage (n =25)
Traditional land resources management	13 (52%)	Increasing demand and overexploitation	21 (84%)
Only healers know and cut medicinal plants	11 (44%)	Global warming	14 (56%)
Traditional beliefs (sacred forests)	7 (28%)	Less or nil transmission of indigenous medicinal knowledge	19 (76%)
Growing in home gardens	9 (36%)	Habitat destruction	15 (60%)

#### 4. Discussion

In the present study, the study was indicated that the majority of the traditional healers were 26-68 age groups (60%). In comparison of educational status, less or non-educated informants handled much knowledge of traditional medicine whereas educated informants had low knowledge of traditional medicine, which is an indicative of impact of modern education. This was in line with report Yigezu *et al.* [14]. The findings was also agrees with reports of Tamiru *et al.*, [15] and Gebrezgabiher *et al.*[16]. Less medicinal knowledge in relation to young age might be attributed to the fact that traditional knowledge is built with years of experience Awas [17]. This might be as result of oral transfer of indigenous knowledge within the family with great secrete from generation to generation. Furthermore, shifting the knowledge of medicinal plants is frequently done at old age.

##### 4.1. Medicinal plant species and their uses in the study area

The total of 15 medicinal plants were assessed and documented in their scientific names, vernacular names, families, growth forms, habits, mode of administration, amount per day, frequency per day and the ailment treated. The findings from the study area have shown that the dominantly used parts of plant to treat human ailments are the leaves (60%), stem (13%), root (20%) and bark (7%). The predominate utilization of leaves part for remedy preparation also agreed with the previous report of Giday *et al.*, [18] and Mesfin [19]. The prescription of medicinal plants also revealed some plants are ordered/ purchased without dosage that amplified the side effects. The different types of medicinal plants encountered during the study time have different modes of administration for use for medication. These included steam bathing (11.1%), chewing (11.1%), decoction (61.1%) and concoction (5.6%). The way of their administration respectively was by smoking on face, chewing by teeth, drinking the liquid and painting on site of infection. Informants responses indicated that there were variations in quantity of remedies, unit of measurement of remedies, duration and time of use of preparations prescribed by healers. The study survey showed that habits of plants used in the medication were from all plant habits namely tree (33.3%), shrub (20%), tree climbers (6.7%) and herbs(40%).This indicated that herbaceous medicinal plants were the widely used medicinal plant habits. The finding agrees with investigations carried out in other regions of Ethiopia [20-22]. The finding also revealed that the majority of the traditional healers in the study area relies on traditional knowledge, practices. With limitations to list all medicinal plants in the study area due to involuntariness of the traditional healers, each recorded medicinal plant species treats different disease types. Accordingly, *Balanitesaegipitiaca* treats head ache, *Cordi Africana* treats hookworm, *Gardeniaternifolia* treats malaria, *Solanum incanum* treats snake bite, *Artemisia annua* treats snake bite, malaria and fever, *Rutachallepensis* treats stomach ache and antihelminthes, *Alloe spp.* treat wound and *Lemon grass* kills lice's and mosquitoes and used for washing domestic equipment's and give them good aroma.

##### 4.2. Practices and trends of respondents in using medicinal plants

According to focus group discussion and key informant most of the medicinal plants are herbs. As reported by Tesfaye Awas [8], most of medicinal plants in Ethiopia are herbaceous. According to information from the traditional healer and focus group discussion and key informant, traditional healers believe and witness if anyone



other than the healer knows those medicinal plants, the healing efficiency will reduce and in some of the cases the plant will not cure the diseases it cures before. This belief was also previously addressed by [23] that Medicinal plants are given high respect by local people. There is a strong belief among the people that herbal medicines lose their healing power or die if other people know them. As informants indicated most of the community members prefer traditional medicine than the modern. This is also supported by data from informants that 22 (88%) of them prefer traditional medicine. The reason behind it was low cost, easily accessible, they believe there is no side effect by using traditional medicine and traditional medicine cures diseases that are not easily diagnosed and cured by modern medical clinics and laboratories. Traditional medicine is accessible from market, traditional healer, cultivated at home gardens and open to access in wild. Although modern medicine is well developed in most of the world, large sections of the population in developing countries especially in rural areas where more than 80% of the population live still rely on traditional medicine for upper mentioned reasons [24-26].

#### **4.3. Conservation and threats of medicinal plant species**

In this study, the data assembled from the key witnesses was demonstrated that the treats of restorative plants increment every once in a while, in the study area. Increasing demand and overexploitation (84%), global warming (56%), Less or nil transmission of indigenous medicinal knowledge (76%) and habitat destruction or deforestation (60%). The finding is somewhat in line with [19, 20]. This may be because of nonstop farming developments, deforestation and draft notwithstanding need consideration towards the therapeutic plants. The plants are vanished as a result of fast financial, ecological and mechanical changes and because of the loss of cultural heritage under the guise of civilization [27].

Indigenous conservation methods include traditional land management, low exposure of medicinal plants to people other than traditional plant practitioner, traditional customs and beliefs and growing some plants in home gardens. Local people use some forests out of their reach because they are believed to be sacred and use such forest for religious purposes only. Home gardens are most important home gardens to avoid overgrazing and overexploitation and replication of the species. The major threats of medicinal plants are increasing demand and overexploitation, global warming, less transmission of indigenous medicinal knowledge to younger generations and habitat destruction due to agricultural activity, over population and less attitudes towards medicinal plants. The traditional healer or elder transmit his/her knowledge on traditional medicine only to one of the family member who is too intimate to them when their age becomes very old or they are fear of death at times of sicknesses or any accident.

#### **5. Conclusion**

The present study revealed that most of informants know the uses of medicinal plants but with little knowledge of such plants. Traditional medicinal healers were not voluntary to survey all the medicinal plants there for their belief that the medication power of the plants does not work up on exposure to other community members. The study revealed the medicinal values of medicinal plants is significant and complement the modern medication. Medicinal plants of the area can be widely used for the benefit of wider communities if the indigenous knowledge of the society particularly that of the traditional healers is harmonized to the modern medical industry. This will help to formulate dosage, find more ailments treated by a given medicinal plant species and design appropriate modes of administration. Lastly, the study area is seen to have huge potential of medicinal plant that needs deep study of investigation at survey and extraction levels. There was extensive number of important assets, practices and information of pharmaceutical which can take care of issues of lack of medications at country zones and additionally tranquilize protection in various illnesses. Rural development and deforestation were observed to be the fundamental dangers for the therapeutic plants. Subsequently, consideration ought to be given towards the therapeutic plants and research ought to be expected to decide well-being, poisonous quality and measurements

#### **Acknowledgements**

The author wishes to thank, alfacho kebele, Amaro woreda for guiding and indentifying potential informant. The author also thanks Arba Minch University, Department of Biology staff for their constructive comments.





## Reference

- [1]. Alves, R. R., & Rosa, I. M. (2007). Biodiversity, traditional medicine and public health: where do they meet?. *Journal of ethnobiology and ethnomedicine*, 3(1), 14.
- [2]. Balunas, M. J., & Kinghorn, A. D. (2005). Drug discovery from medicinal plants. *Life sciences*, 78(5), 431-441.
- [3]. Shinwari, Z. K., & Qaiser, M. (2011). Efforts on conservation and sustainable use of medicinal plants of Pakistan. *Pak. J. Bot*, 43(1), 5-10.
- [4]. Young, A. (1983). The relevance of traditional medical cultures to modern primary health care. *Social Science & Medicine*, 17(16), 1205-1211.
- [5]. Agra, M. D. F., Silva, K. N., Basílio, I. J. L. D., Freitas, P. F. D., & Barbosa-Filho, J. M. (2008). Survey of medicinal plants used in the region Northeast of Brazil. *Revista brasileira de farmacognosia*, 18(3), 472-508.
- [6]. Kassaye, K. D., Amberbir, A., Getachew, B., & Mussema, Y. (2006). A historical overview of traditional medicine practices and policy in Ethiopia. *Ethiopian Journal of Health Development*, 20(2), 127-134.
- [7]. Bekele-Tesemma, A. (2007).: Useful trees of Ethiopia: identification, propagation and management in 17 agroecological zones. World Agroforestry Centre, Nairobi, Kenya.
- [8]. Nebiyu, A., & Awas, T. (2006). Exploration and collection of root and tuber crops in Southwestern Ethiopia: its implication for conservation and research. In: The Conference of the Crop Science Society of Ethiopia, 11, Addis Abeba (Ethiopia), 26-28 Apr 2004. Crop Science Society of Ethiopia
- [9]. Bekele, E. (2007). Study on actual situation of medicinal plants in Ethiopia. *Addis Ababa: Prepared for Japan Association for International Collaboration of Agriculture and Forestry*.
- [10]. Abebe, D. (1986). Traditional medicine in Ethiopia: the attempts being made to promote it for effective and better utilization. *SINET*, 9(Suppl.), 61-69.
- [11]. Bodeker, G. (2003). Traditional Medical Knowledge, Intellectual Property Rights & (and) Benefit Sharing. *Cardozo J. Int'l & Comp. L.*, 11, 785.
- [12]. Ethiopia, C. S. A. (2008). Summary and statistical report of the 2007 population and housing census. *Addis Ababa, Ethiopia: Federal democratic republic of Ethiopia population census commission*, 1-10.
- [13]. Tazeze, A. (2011): The Livelihoods of Women Headed Households in Amaro Woreda in Southern Nations, Nationalities and Peoples Regional State (unpublished work). 2011.
- [14]. Yigezu, Y., Haile, D. B., & Ayen, W. Y. (2014). Ethnoveterinary medicines in four districts of Jimma zone, Ethiopia: cross sectional survey for plant species and mode of use. *BMC veterinary research*, 10(1), 76.
- [15]. Tamiru, F., Terfa, W., Kebede, E., Dabessa, G., Roy, R. K., & Sorsa, M. (2013). Ethnoknowledge of plants used in veterinary practices in Dabo Hana District, West Ethiopia. *Journal of Medicinal plants Research*, 7(40), 2960-2971.
- [16]. Gebrezgabihier, G., Kalayou, S., & Sahle, S. (2013). An ethno-veterinary survey of medicinal plants in woredas of Tigray region, Northern Ethiopia. *International Journal of Biodiversity and Conservation*, 5(2), 89-97.
- [17]. Awas, T. (2007). Plant diversity in Western Ethiopia: ecology, ethnobotany and conservation.
- [18]. Giday, M., Asfaw, Z., Elmqvist, T., & Woldu, Z. (2003). An ethnobotanical study of medicinal plants used by the Zay people in Ethiopia. *Journal of ethnopharmacology*, 85(1), 43-52.
- [19]. Mesfin, F., Demissew, S., & Teklehaymanot, T. (2009). An ethnobotanical study of medicinal plants in Wonago Woreda, SNNPR, Ethiopia. *Journal of Ethnobiology and Ethnomedicine*, 5(1), 28.
- [20]. Tessema, T., Giday, M., & Aklilu, N. (2001). Stacking and information on the medicinal plants of Ethiopia. *National Biodiversity strategy and action plan project Medicinal plant Team, Addis Ababa: IBDA*.
- [21]. Giday, M., & Ameni, G. (2003). An ethnobotanical survey of plants of veterinary importance in two woredas of southern Tigray, Northern Ethiopia. *SINET: Ethiopian Journal of Science*, 26(2), 123-136.
- [22]. Sori, T., Bekana, M., Adugna, G., & Kelbessa, E. (2004). Medicinal plants in the ethnoveterinary practices of Borana pastoralists, Southern Ethiopia. *Int J Appl Res Vet Med*, 2(3), 220-225.
- [23]. Agisho, H., Osie, M., & Lambore, T. (2014). Traditional medicinal plants utilization, management and threats in Hadiya Zone, Ethiopia. *J. Med. Plant*, 2(2), 94-108.
- [24]. Tabi, M. M., Powell, M., & Hodnicki, D. (2006). Use of traditional healers and modern medicine in Ghana. *International nursing review*, 53(1), 52-58.
- [25]. Ekor, M. (2014). The growing use of herbal medicines: issues relating to adverse reactions and challenges in monitoring safety. *Frontiers in pharmacology*, 4, 177.



- [26]. Birhan, W., Giday, M., & Teklehaymanot, T. (2011). The contribution of traditional healers' clinics to public health care system in Addis Ababa, Ethiopia: a cross-sectional study. *Journal of Ethnobiology and Ethnomedicine*, 7(1), 39.
- [27]. Lulekal, E., Kelbessa, E., Bekele, T., & Yineger, H. (2008). An ethnobotanical study of medicinal plants in Mana Angetu District, southeastern Ethiopia. *Journal of ethnobiology and Ethnomedicine*, 4(1), 10.

