Full Length Research Paper

Ethnobotanical value of medicinal plant diversity in Cheha district, Guraghe zone, Southern Nations, Nationalities and Peoples (SNNPR) of Ethiopia

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This study aimed to document information on the use, conservation and threats to medicinal plants in Cheha district, Guraghe Zone, Southern Ethiopia. Thirty informants were randomly selected from four kebeles. Of which, 10 key informants were selected purposively by criteria of age, gender and indigenous knowledge. Ethnobotanical data was collected through semi-structured interview, guided field observation and group discussion. Data was analyzed with descriptive statistics and expressed with frequency distribution, percentage and flow charts. A total of 58 medicinal plant species (17 wild, 38 home garden and 3 species from both) were recorded and a total of 37, 3 and 18 species were reported as being used to treat human, livestock and both ailments, respectively. The major habit of the medicinal plants were herbs (58.62%) followed by trees (24.13%), shrubs (10.34%), and climbers (6.89%). The most frequently harvested plant parts were leaves (36.20%) followed by seed (13.79%), fruit (12.06%) and others. Most of the remedies are prepared from single plant with various preparation methods and administered via oral, dermal, topical and nasal method. The major threats to medicinal plants in the study area are agricultural expansion, deforestation, firewood and charcoal production and over utilization, respectively. The data analysis result reveals that the community is better experiencing *ex-situ* conservation indigenously, but to ensure sustainability of medicinal plants; more emphasis should be given to the traditional medicine and indigenous knowledge and skill of herbalists must be encouraged, documented and supported with scientific approaches.

Key words: Ethnobotany, indigenous knowledge, medicinal plant, traditional medicine.

INTRODUCTION

Ethnobotany refers to the scientific study of how peoples interact with plant resources within their ethnic group. It plays a vital role in the discovery of novel products from plants (Katewa, 2009). Plants provide an endless use for

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every life form (Schippmann et al., 2002). They have been used in traditional medicine for thousands of years (Ghanthi and Manickam, 2008). The use of plants as a medicine by local peoples has been well documented as early as 1935 by Burkill (Mohan et al., 2008). Out of the total flowering plants in the world, more than 50,000 species are used for medicinal purposes for both human and livestock ailments (Govaerts, 2001).

In developing countries, particularly in Africa where modern health service is limited, folk remedies enjoy a respectable position (Schippmann et al., 2002). WHO estimates that at least 80% of the population relies on traditional medicine for primary healthcare (WHO, 1993). Accordingly, the promotion in healthcare service should be intensified by the application of appropriate traditional technology to healthcare improvement based on simplicity, safety, efficiency and availability at low cost, selection of essential traditional remedies, evaluation of traditional claims through scientific research, policy support for integration and inclusions in training programs at various levels (WHO, 1978).

Ethiopia is an agrarian country characterized by a wide range of ecological, climatic and edaphic conditions. In Ethiopia, traditional medicine is used by majority of rural population. This is attributed to cultural acceptability, efficiency against certain disease, physical accessibility, economic affordability and low cost (Slikkerveer, 1990; Vicchiato, 1991). Knowledge from herbalists is transformed secretively from one generation to the next through verbal communication (Pankhurst, 1990; Vicchiato, 1993). In this view, documentation of traditional use of medicinal plant is important to preserve indigenous knowledge and the role of medicinal plant in traditional medicine (Abebe and Ayehu, 1993) (Pankhurst, 2001). Therefore, proper insight should be given to indigenous knowledge and traditional medicine because it is the basis of modern scientific knowledge (Abbink, 1995; Quanah, 1998).

MATERIALS AND METHODS

Description of the study area

The study was conducted in Cheha district, Guraghe zone, SNNPR, Ethiopia (Figure 1). It is about 170 km far from Addis Ababa in South West direction along the Jimma road. Four kebeles were selected randomly from the district for a data source. The study site and informants were selected with the help of district administration and elderly people.

The district is inhabited mostly by local people and most of them rely on agricultural practices for their livelihood and income source. Their agricultural system mainly concentrates on '*Enset*' cultivation and other common cereal crops such as teff, as well as other homegarden vegetables and fruits such as: *Carica papaya*, *Mangifera indica* L., *Persea americana*, *Citrus sinensis* (L.) Osbeck,

Citrus aurantifolia (Christm) Swingle, etc. The reason why they dominantly cultivate '*Enset;* is that; they are highly resistant to drought and the population highly depends on enset cultivation because the population is known by prepared cultural food called '*Kocho*' in different ways from '*Enset'* (Agricultural office of Gubre sub city, 2013).

It has mostly vertisol and other subsidiary soil types such as clay, silt and others. The study area is covered by trees, shrubs, herbs and grasses. The district has measured a minimum and maximum temperature range of between 25-32°C, respectively with an annual average temperature of 32°C having a woinadega agro ecology. It has also an annual average rainfall of between 200-1400 mm/annum and the summer season starts from early June and ends in August up to mid-September. It also has an altitudinal range of 1937 masl (Agricultural office of Gubre sub city, 2013).

Data collection techniques

The data collection was carried out by semi-structured interviews, guided field observations, and group discussion with herbalists (Martin 1995; Cotton, 1996) Ethnobotanical data was collected from primary and secondary sources through active participation of traditional herbalists. The primary data sources were informants using semi-structured interview, guided field observation and group discussion, while secondary data source was agricultural office of the district.

Semi-structured interview

Informants were selected randomly in this study. A total of 30 informants (5 female and 25 male) were selected from four kebeles. The selected *kebeles* for informant selection were "Ewan Chequara, Other and Sisse, Karacha and Gasore, and Buchach and Deneb" from which a total of 6, 7, 12 and 5 informants were selected respectively based on the number of traditional herbalists. The interview questions were applied to collect the required data regarding the mentioned plant species, parts used, habit and habitat, source, method of preparation, routes of administration, disease treated, threat as well as the conservation and management practices. Also, 10 key informants (7 male and 3 female) were selected purposively for preference ranking and direct matrix ranking. Age, gender and indigenous knowledge were used as criteria for selection of key informants.

Guided field observation

By the help of informants, guided field observation was done, the habit and source of the medicinal plants were observed practically, and photographic image of some representatives was captured.

Group discussion

Group discussions were conducted on threats and conservation of the medicinal plants and transfer ability of indigenous knowledge in the community. 10 group discussions' participants were randomly selected from the total informants selected for ethnobotanical data collection to gain further information on medicinal plants at community level. The information collected by group discussion was
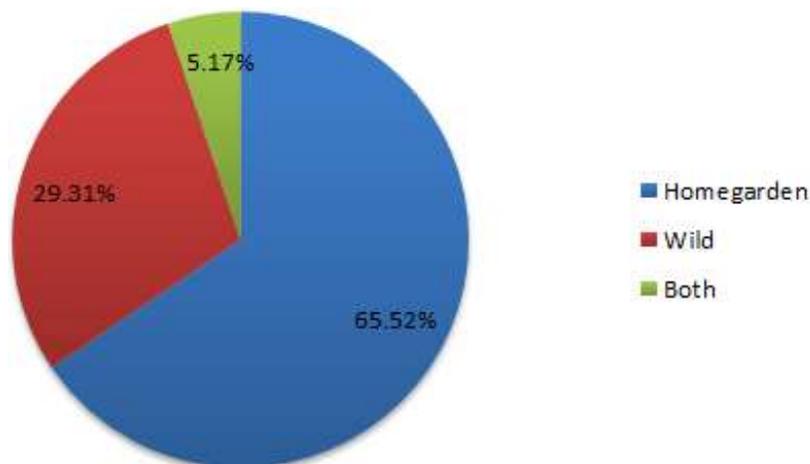
Figure 1. Map of the study area.

Figure 2. Percentage distribution of source of medicinal plants in Cheha district.

important to triangulate information collected through semi-structured interviews (Martin, 1995).

Data analysis

The obtained ethnobotanical data were analyzed through statistical analysis. Quantitative data were compiled and analyzed by using descriptive statistics such as frequency distribution and percentage. The analyzed data were expressed in tables, graphs and pie-chart. Informant preference and direct matrix ranking were accomplished to identify the effective medicinal plants against malaria and compare the economic value of selected multipurpose plants.

RESULTS AND DISCUSSION

Medicinal plant diversity and distribution

The medicinal plants collected belong to 50 genera and 33 families. The families Asteraceae, Poaceae and Rutaceae were represented by 4 species each, while the families Brassicaceae and Fabaceae were represented by 3 species each. They were followed by Alliaceae, Anacardiaceae and Apiaceae represented by two species each, whereas the remaining 24 families were represented by a single species. A total of 58 medicinal plants used to treat human and livestock ailments were recorded. From these, 37 of them were used to treat human, 3 for livestock and 18 for both ailments. The presence of such medicinal plant diversity in the study

area within 4 *kebeles* as compared to the work (Lulekal et al., 2008) including 230 medicinal plants from 18 kebeles, indicates that the study site is hot spot area for medicinal plant diversity.

Among the 58, about 65.52% were collected from homegarden (cultivated), 29.31% from wild and 5.17% from both homegarden and wild (Figure 2). It fits with (Yirga, 2010) implies that *ex-situ* conservation is better practiced contributing to sustainable use of medicinal plants. This was due to the better understanding of the society about the value of *ex situ* conservation for the long lasting sustainability of medicinal plants.

The results of the growth form analysis show that herbs occupy the highest proportion (58.62%) followed by trees (24.13 %), shrubs (10.34%) and climbers (6.89%) (Figure 3). This finding is similar to the work of (Giday et al., 2009), where herbaceous species also represent the major proportion of medicinal plants. Such similarity may be due to similar agro-ecology, climatic factors as well as edaphic condition are suitable to herbs.

The plant parts most commonly used to treat human and livestock ailments include leaves, seeds, fruits and others. The most commonly used plant parts for herbal preparations were leaves (36.20%) followed by seeds (13.79%), fruits (12.06%), corm (10.34%), and others with respective order (Figure 4). This study is consistent with the findings of (Yirga and Zeraburk, 2011). This indicates that most of the consumable medicinal plant parts were leaves and the chance of risk of medicinal plant diversity declination is reduced. The reason is that when herbalists harvest leaf, plants have low level of wilting unlike that of root and stem harvest. Thus, the plants whose roots are used as a medicinal value have
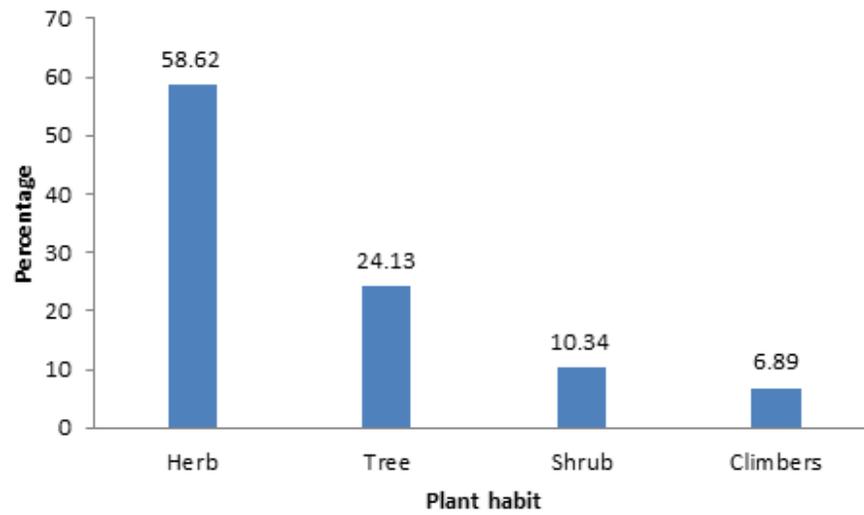
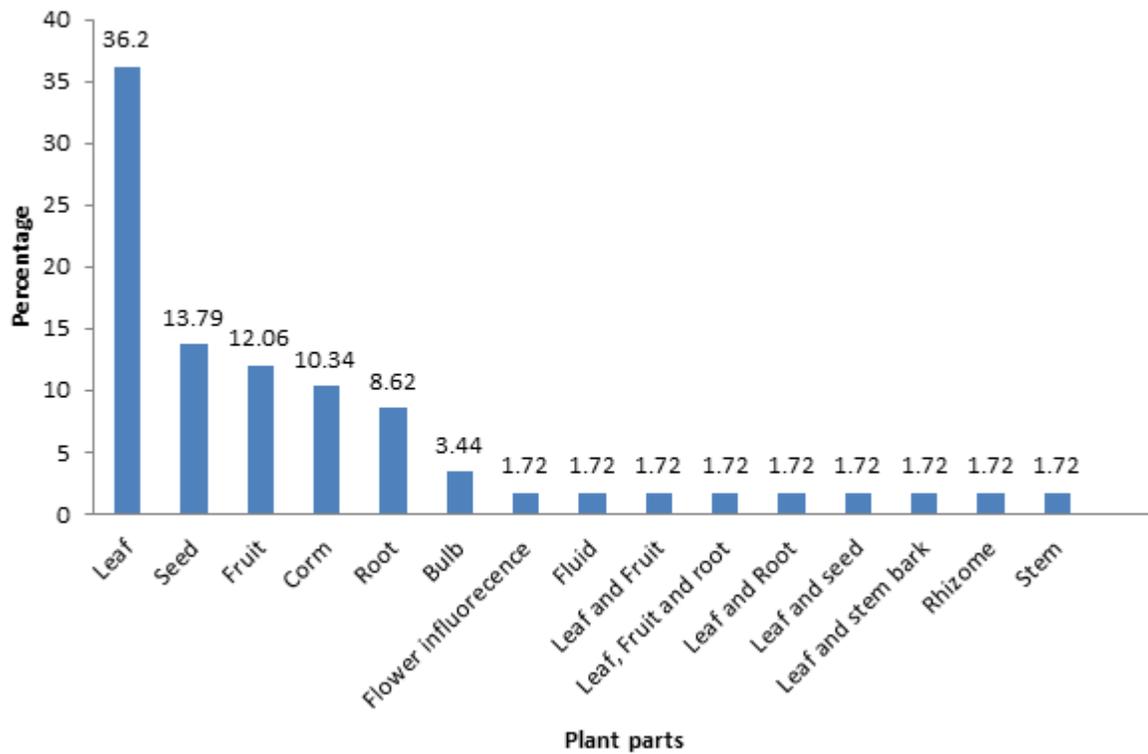**Figure 3.** Habit (growth form) of medicinal plants in the study area.

Figure 4. Medicinal plant parts used by traditional healers for remedy preparation.

narrow range of sustainability unless sustainable conservation measures have been taken.

Medicinal plants (Figure 5) have various methods of preparation and administration for different ailments.

Figure 5. Some medicinal plants of the study site. A. *Nicotina tabacum*, B. *Carica papaya* L., C. *Clerodendrum myricoides* (Hochst) Vatke, D. *Ocimum lamiifolium*, E. *Enset ventricosum*, F. *Allium sativum*, G. *Ruta chalepensis.*

Table 1. Common human ailments in the study area.

Disease type (local name)	Frequency
Malaria (*weba*)	30
Common cold (*gunfan*)	21
Bloating (*Shimetere*)	16
Headache	15
Gonorrhea (*chebto*)	12
Coldness (*kurtmat*)	7

They are prepared in the form of concoction, decoction, powder, crushed and homogenized in water. The methods vary among the ethnic groups. The preparations are applied through different routes of administration like oral, dermal and nasal. Many human diseases are administered orally followed by dermal and nasal, while livestock ailments are administrated dermal.

Human health problems, treatments and herbal preparations

Over centuries, indigenous people of different localities have developed their own specific knowledge on plant resource use, management and conservation practices (Cotton, 1996). Since ancient times, human beings used plants for the purpose of disease control and prevention. It was believed to be the result of many generations long year experience, careful observations and trial and error experiments and early humans acquired the knowledge on the utilization of plants for disease prevention and curative purposes (Martin, 1995). This indicates that humans are dependent on other organisms and plants for their survival. This close interaction of human beings and plants is studied under the field of ethnobotany, which involves traditional diagnosis, collection of raw materials, preparation of remedies and prescription to patients via inspection (Pankhurst, 2001).

In the study area, there were about 37 types of human diseases which can be treated traditionally. According to the data obtained from informants, the most widely distributed ailments include malaria, common cold, bloating (*Shimetere)*, headache, gonorrhea, coldness and others respectively (Table 1). Herbalists reported that malaria is serious and frequently occurring due to the presence of suitable places for mosquitoes breeding. This was different from the work by (Yalew et al., 2012) at which diarrhoea was recorded to be a dominant human ailment. Herbalists use different diagnosis and treatment methods depending on the type of the ailment. They commonly diagnose each type of health problem by an interview and visual inspection of the patient.

Patients or their attendants are commonly interviewed for symptoms observed and the duration of the health problem. Changes in overall look and body temperature are visually inspected by the practitioner and the remedy is prescribed. Internal ailments are commonly treated by drinking herbal preparations, while headaches and fever is by steam bath and vapor inhalation.

The accidental health problems such as bone fracture (for both human and livestock) can be treated by washing, joining, covering with clean white cloth and by the stem of *Arundo donax* and then tying with smooth rope for three successive days (repeated until recovery). The practitioners ordered the patient to feed on supportive foods such as Enset local clones (*Astara, Guarye, Kemnar, Senyera* and *Dere), Eragrostis tef.* (zurocc) frottes, *Hordum vulgare* L., and others for the bone to recover.

Preference ranking of medicinal plants used for the treatment of malaria

Preference ranking was conducted on six medicinal plants by the selected key informants (Table 2). The informants were asked to preferentially rank the medicinal plants based on their effectiveness against malaria and give number 6 for most effective and number

Table 2. Preference ranking of medicinal plants used to treat malaria.

Medicinal plants	Herbalists labelled with A to J										Total	Rank
	A	B	C	D	E	F	G	H	I	J		
Allium sativum	4	3	3	3	4	3	4	5	5	5	39	3
Carica papaya	6	4	6	5	6	4	6	6	3	6	52	1
Croton macrostachys	1	1	1	1	1	2	2	1	2	3	15	6
Hagenia abyssinica	3	2	4	2	3	1	1	2	1	1	20	5
Justica schimperiana	6	2	4	2	6	3	3	6	2	3	36	4
Ruta chalepensis	5	5	5	6	5	5	5	4	4	4	48	2

Foot note: (6 = excellent, 5 = very good, 4 = good, 3 = less good, 2 = less used, 1 = least used).

Table 3. Average score of direct matrix ranking of 6 medicinal plants with uses besides medicinal effect.

Use diversity	*Carica papaya*	*Enset ventricosum*	*Cordia africana*	*Ruta chalapensis*	*Hagenia abyssinica*	*Zingiber officinale*
Food	5	5	1	4	1	4
Medicine	4	3	3	5	3	3
Market	5	4	5	4	3	5
Construction	2	4	5	1	4	0
Firewood	2	1	5	1	5	0
Total	180	170	190	150	160	120
Rank	2nd	3rd	1st	5th	4th	6th

5 = Best, 4 = very good, 3 = good, 2 = less used, 1 = least used.

1 for the least effective. The informant consensus reveals that *Carica papaya* occupies the first rank followed by *Ruta chalepensis*, *Allium sativum, Hagenia abyssinica Croton macrostachys* and *Justica schimperiana*. This study is contrary to the work done by (Seifu, 2004) that *Aloe* sp., *Balanites rotundifolia, Moringa oleifera* and *Salvadora persica* occupy the dominant rank. This was due to the herbalists engagement where indigenous varies across culture and ethnic group.

Medicinal plants used to treat livestock health problems

The informants reported that there are about 27 different livestock indigenously treated diseases in the study area. The herbalists use different herbal preparations to treat such livestock health problems. Black leg, skin cancer and infection, diarrhoea, bloating (*Shimetere*), bone fracture and dry cough were reported as the most popular livestock ailments. The most widely known medicinal plants used to treat such ailments include *Nicotina tabacum, Citrus aurantiifolia, Eucalyptus globulus, Enset*

local clones, and others. This contradicts the work of (Seifu, 2004) including *Calotropis procera, Kanahia laniflora, Jatropha glauca* and other species which were effective in treating livestock ailments. Such variation was obtained because traditional indigenous practices vary among culture as well as ethnic group.

The percentage analysis of medicinal plants for the curative and preventive value of human, livestock and both ailments indicates that most medicinal plants (63.79%) are used for human health problem, 5.17% for livestock, and about 31.03% for both human and livestock ailments (Figure 6).

Medicinal plants used for purposes other than medicinal value

In Cheha district, majority of the inhabitants rely on homegarden plants for various purposes such as forage, medicine, firewood, charcoal, construction, shade, socio economic value and food. The medicinal plants that were investigated for other values than medicinal effect, includes *Carica papaya*, *Citrus aurantiifolia*, *Enset* local clones, *Zingiber officinale*, *Allium cepa, Allium sativum*,
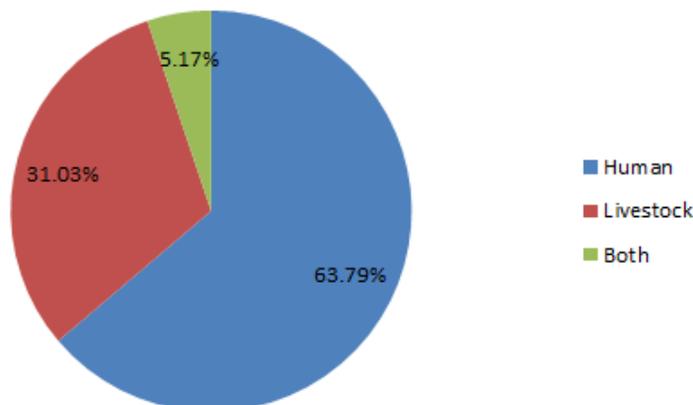
Figure 6. Percentage distribution of medicinal plants to treat human and livestock ailments.

Citrus medica, *H. abyssinica, Vernonia amygdalina*, *Ruta chalepensis* and *Cordia africana*. The informant consensus indicates that *Cordia africana, C. papaya* and *Enset ventricosum* occupy the first third rank, respectively followed by others. These medicinal plants have other values such as food and fodder, spice, fire wood, charcoal, house hold construction, fiber, timber production, socio economic use and others. Direct matrix ranking was done to compare these values of the selected multipurpose medicinal plants (Table 3).

Threats to medicinal plants and conservation practices

Threats to medicinal plants

Threat is the status or the position of a species which determines whether it will survive or be extinct in the future. In the study area, different threat factors were mentioned by the informants. The major factors arise mostly from anthropogenic causes via agricultural expansion which accounts for about 66.66%, deforestation 50%, firewood and charcoal production 50% and over utilization 33.33%. Most multipurpose medicinal plants have higher risk of threat. This study somehow differ from the work described in (Lulekal et al., 2008) in which deforestation accounts for the highest rank of the threat factor followed by agricultural expansion and fire wood requirement. The medicinal plants that were recorded in the study area to be threatened includes: *Echinops kebericho, Croton macrostachys*, *Cordia Africana* and *Dodonaea angustifolia* L.f*.* Medicinal plants such as *H. abyssinica* and *Withania somnifera* were recorded to be extinct from the sub city.

Conservation practices of medicinal plants

Conservation is the wise and proper utilization of resources without retarding their future existence (Cunninghum, 1996). The conservation practice of medicinal plants was observed to be good in the study area as compared to other studies. This was because about 65.51% of them were recorded to be obtained from homegarden which implies that the societies developed a habit of *ex situ* conservation. In addition, it assures that medicinal plants to be transferred to the future generation without being endangered. Some medicinal plants have to be conserved *in situ* due to difficulty in domestication and management (Zemede, 2001; Kelbessa et al., 1992). Furthermore, the presence of 29.31% of medicinal plants in the wild shows that the herbalists also harvest considerable amount of plants which introduces a risk of reduction in the wild population. Some plants (5.17%) are also found in both wild and homegarden (cultivated species e.g. *C. papaya, Coffea arabica, Persea americana, Enset* local clones*, Ruta Chalapensis, Allium sativum* and others)*.*

Conclusion

Ethiopia is an agrarian country characterized by a wide range of ecological, climatic and edaphic factors. This variation allows it to have a diversified fauna and flora distribution. The result of this study shows that there is high diversity of medicinal plant providing both curative and preventive value for human and livestock ailments. Most of the medicinal plants were collected from homegarden, which implies better achievement of *ex situ* conservation and the societies developed the habit of cultivating plant resources which ensure their continuity

for future generations. Even if most of them have no educational background, herbalists inspect patients and prescribe the traditional medicine having no guide book. Young herbalists are rare and this will lead to the loss of indigenous knowledge through time. Therefore, the government and concerned institutions should give greater emphasis and create awareness on the role of indigenous knowledge and traditional medicine, also researchers should forward a new look towards traditional medicine and medicinal plants.

RECOMMENDATIONS

According to the result of the study, the following recommendations are forwarded.

1. Greater emphasis should be given to the traditional medicine and traditional medicinal plants in the study area.
2. The indigenous knowledge and skill of traditional medicine practitioners must be encouraged, protected, documented and supported with scientific approaches which could be the way through which they could exercise their knowledge broadly and make it sustainable for future generations.
3. The traditional medicine practitioners shall be supported by the government by providing funds, land for cultivating medicinal plants and assisting their activities with professional guidance helps and benefit from the task they perform by their indigenous knowledge.
4. The traditional healers association should be established even at the zone level because it will create suitable and hostile environment to the traditional healers.
5. Broad conservation measures should be established to ensure the sustainability of multipurpose and widely used medicinal plants as well as the whole natural resources in the study area.
The district Agricultural and Natural Resource Management Office should raise awareness to the societies to develop the habit of cultivating plants in home-gardens which helps to conserve medicinal plants and their associated indigenous knowledge. The researchers should have introduced a positive insight towards the study area.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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