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An Ethnobotanical Study of Plants in the Adjoining Area of Kafta Sheraro National Park Ethnic Groups, Ethiopia

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Abstract: A field trip was carried out in Kafta Humera wereda Adigoshu Tabia (administrative unit below wereda), adjacent to Kafta-Sheraro National Park, to assess the presence of plant and their derivative use of different use values practiced by the local community. The study employed ethnobotanical methods including structured and semi-structured interviews, field observations, preference ranking, relative frequency and fidelity level. A total of 50 informants from both ethnic groups (*Habesha* and *kunama*) Tabia were selected purposively and 28 key informants also selected with the help of local administrators, recommendations from elders, and members of the local community. A total of 36 plants with their ethnobotanical use were collected and identified. These species represent 34 genera and 27 families. About 29 of the medicinal plants were used to treat for human disease only, 2 medicinal plant only for animal and 5 medicinal plants for both animal and human diseases. The main source of those plant species was obtained from wild (83%) while 17% of the species were cultivated. Of the total 36 medicinal plants collected from the study area, the habit of a plant where about 69% trees followed by shrubs (22%), climbers (6%) and herbs (3%) in their decreasing order. The most commonly used plant parts were leaves and followed by root and fruit part in equal ranks. There was no uniform measurement used by the local healers in the study area. Female were more involved in selling the edible and medicinal plants than males.

Keywords: Adigoshu, Kunama, Medicinal, Local Community

1. Background

A study trip was held out at Kafta-Sheraro National Park, an Adigoshu Priority area for enhancement and enforcement intervention, from May 21–June 20, 2018 to evaluate the presence of plant and their derivatives for different use values practiced by the local community.

Local community throughout the world have their own sole gene of plant assets on which they depend for food, medicine and general service including marvelous botanical expertise [1]. This indicates that human beings are reliant on other living organisms for their life. Although various animal and mineral products contribute to human welfare, the plant kingdom is the most essential to human wellbeing especially in supplying its basic needs. This close interaction and dependency of human beings on plants is studied in the field of ethnobotany and or anthropology.

There are about 170 food plant species that are consumed in different parts of the country; representing different growth forms. However, most of the wild edible species are threatened due to genetic erosion [2]. These phenomena are more protuberant in countries like Ethiopia, where high speed of human population growth joins up with inadequate documentation and protection of biota, in particular preservation promising plant taxa [3]. With the routine underestimation of wild foods comes the risk of neglecting the provisioning ecosystems and supportive local knowledge systems that keep these food chains [4, 5]. Moreover, [6] also stated that in spite of the role of edible wild plants in bridging periods of food shortages and providing dietary variety, very little consideration has been given to the inventory and conservation of species. Comparatively well documented, compared with the research concerning the socioeconomic,

cultural, traditional, and nutritional aspects of wild-food plants still lacks adequate attention [7]. Furthermore, in view of the significant area, and immense social, cultural, and geographical diversity of the country, documentation and preservation of local knowledge and assessments of the nutritional composition of wild plants as well as health problems caused by their consumption are very scanty. Similarly, the useful plants are currently lacking of ethnobotanical coverage. Therefore, to conserve useful plants and local knowledge, human activities on plant species should be properly recognized and valued. In particular, in Ethiopia there is a circumstance where millions of countryside people are yet incapable to nourish themselves and are in need of food aid, the need to promote utilization of climatically adapted and nutritious edible wild plants is of overriding importance. To address such problem, compiling, documenting and preserving local knowledge is an important and urgent issue. This can be achieved through studying the relationship and interaction with local people with useful plants as well as the significance of plant species towards the wellbeing of local peoples [1]. Ethnobotanical investigation on the rest of the useful plants, including forage/fodder, food, fuel, material culture and miscellaneous uses need further and extensive research, this enables in order to document plant resources and their associated local community knowledge and practices, and hence for their sustainable utilization, proper conservation measure and manage.

Besides, the method of protected areas has been one of Ethiopia's major policies to preserve its biodiversity. In spite of these efforts, protected areas are declining alarmingly and biological resources, particularly the plant resources are locally and globally imperiled. High international demand for plant products, poverty of local communities (entire enslavement on natural resources), and habitat degradation are fundamental root causes of the problem in Ethiopia. There was not such a comparative study done between the two ethnic groups for ethnobotanical conservation and documentation in Adi Goshu. Therefore, this research was mostly meant to conduct ethnobotanical use of plants in Kafta Sheraro National Park Adigoshu project priority area and specifically to;

a) Identify the type of plants used for different purposes in KSNP priority area by both ethnic groups.
b) Compare the role of women in ethnobotanical exploration and conservation by the ethnic groups.
c) Pinpoint the dependency status of the people in plants and their derivatives used for various methods.

2. Study Area Description and Methodology

Kafta Sheraro National park (KSNP) is the project area for enforcing and enhancement of the protected areas enrichment. The Adigoshu adjoining site is the selected priority site for intervention from the park. Geographically, KSNP is located at 14°03'17"and 14°27'52"N latitude and 36°41'43" and 37°40'31"E longitude in the northern Ethiopia. The park is located 600 kilometer west of the Mekelle city [8, 9]. It holds an area coverage of nearly 2176.43km^2 with an average height of around 700 m.a.s.l. It is bordered by three weredas namely, Kafta-Humera, Tahtay–Adeyabo and Welkayit. But, the largest geographic coverage of the park is found in Kafta-Humera wereda. The northern part of the park is bordered by Tekeze River and Eritrea. Topographically the national park is dominated by hills and plain topographic features (figure 1). There are two ethnic groups, namely *Kunama* and *Habesha* ethnic group residing in the administration Tabiya.

Figure 1. *Map of the study wereda.*

The KaftaSheraro National Park is one of the African Elephant destination sites situated in the northern tip of the country bordered by Eritrea and the Tekeze River.

The traditional agro-ecological classification of the study area is *kola* (lowland). The topographic feature of the area are characterized by the flat to undulating, hilly, swampy, spring & some gully area's landscape. Residence area, cropland, grazing land, school, and churches& mosque are among the major land use types within the village.

2.1. Selection of Informants

The choice of informants was done following [1] who signposted that when recording indigenous knowledge apprehended by knowledgable traditional healers or by certain social groups the selection of key informant is crucial. The age of informants was between 22 and 80. From each ethnicity, 14 individual key informants were purposely selected from each kebele by applying information and recommendations from, local kebele administrators and kebele agricultural officials, park scouts, knowledgeable elders and spritual leaders as well as the local community. Accordingly, Twenty eight key informants (25 males and three females) with an age of 22 to 80 were selected.

2.2. Ethnobotanical Data Collection

Ethnobotanical data were collected by the method of structured and semi-structured interview following Martin [1, 10], and group discussion. Most of the interviews and discussions were conducted in the local language of the Wereda (Tigrigna), which is a common language in the study area (used by most informants) and the Tigray region as well. Likewise, the information from the *kunamugna* language speaker was translated to Tigrigna by using interpreter from the local community. The necessary information about the plants such as habit, habitat, parts used and method of preparation were recorded. Besides the type of diseases treated for both human being and livestock aliments were collected to compile and document the local knowledge of the community about the use values of plants for different purposes. During the discussion time a different ethnobotanical information collecting approach was applied to obtain the required genuine knowledge of the local community. Since the collection of ethobotanical Knowledge is not as such simple, respondents inform the main purpose of this discussion is a preliminary survey for the sake of enhancing the national parks enrichment.

2.3. Ranking of Threats to Medicinal Plants

Ranking of threats to medicinal plants reported by most of the informants in the study area was conducted using 10 selected key informants as described by these studies [1, 11]. Informants were asked to give five for the most threatening factor and one for the least threatening factor in the study area. Consequently, the aggregate of all factors given by all informants were summed and used to rank for each treats. This data is utilized to define the most eminent threats to traditional medicinal plants in the area and helps to advocate the necessary appropriate conservation actions.

2.4. Relative Frequency

Relative frequency of citation (RFC) index shows the most local importance of the mentioned plant species. The RFC value was calculated using the formula,

$$\mathrm{RFC} = \frac{\mathrm{FC}}{\mathrm{N}}$$

Where FC is the number of informants mentioning about the use of the species and N is the number of informants participating in the survey [12]. This RFC index varies from 0 to 1. When RFC index is 0, it means that no one refers to the plant as useful and when RFC index is 1, it indicates that all informants in the survey refer to the plant as useful [13].

2.5. Fidelity Level

Fidelity level (FL) was calculated to determine the most commonly used plant species in the treatment of a particular disease category by the informants of the study area. Fidelity level is useful for identifying the resident's most preferred species in use for treating certain ailments. The FL was calculated [14] by using the formula as follows:

$$\mathrm{Fl} = \frac{\mathrm{NP}}{\mathrm{N}} 100$$

Where Np is the number of informants that claim the use of a specific plant species to treat a particular ailment and N is the total number of the informants who utilized the plants as a medicine to treat any given disease.

2.6. Data Analysis

Ethnobotanical data collected using different ethnobotanical methods such as questionnaire survey and interviews, along with the data in the form of scores were organized, entered and analyzed in Microsoft Excel. Data were subjected to descriptive statistics analysis and percentages were generated. The data from ranking methods were presented in the form of ranks. Ranks were determined based on the total scores under each attribute. Pearson's correlation test was also run using SPSS 20.0 software [15] to find out the relationship between knowledge distribution by age, educational level, marital status, Kebelle and gender of respondents.

3. Result

3.1. General Information of Informants

A total of 50 informants from both Kunama and Tigray ethnicity were participated in the interview. The age intervals, 30-40 and greater than 50 years were accounted 26% each. Besides, 38% of the respondents were from the kunama ethnicity and the remaining 62% of the participants were from the Tigray (locally called as *habesha*) ethnicity.

80% of the informants were married, but 14% and 6% of the informants were divorced and single in relationship respectively. The majority (76%) of the respondents in the study area were able to mention1-4 plants used for various purposes whereas 18% and 6% of the respondents were mentioned 5-8 and 9-12 medicinal plants used to treat different health problems in the study area respectively as shown in figure 2 below.

About 34% of the respondents were female, whereas 66% of the informants were male in their gender. In terms of educational level, 44% of the respondents were illiterate though 42% and 14% were primary and secondary school level complete respectively.

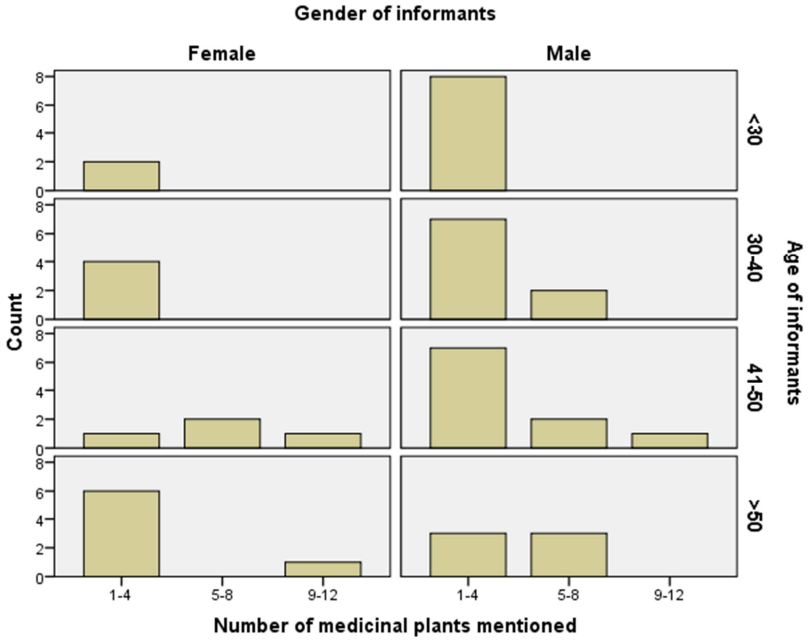

Figure 2. *Number of medicinal plants mentioned by gender and age groups.*

3.2. Correlation of Age and Medicinal Plants Knowledge, Conservation Practices

Knowledge distribution of medicinal plants was compared between age, kebele, gender, marital status and educational level of informants (Table 1). Established on the data obtained from the informants in the study site higher number of medicinal plants was cited by higher age group informants than lower age group informants. Moreover, there was a positive significant (r=+0.04) correlation between the medicinal plant knowledge and age differences.

Table 1. *Correlation of age and medicinal plants knowledge.*

		Age of informants	Gender of informants	Educational level of the informants	Ethnicity of the informants	Marital status
Number of medicinal plants mentioned by informants	Pearson Correlation	.291*	-.066	-.075	.165	-.056
	Sig. (2-tailed)	.040	.648	.607	.252	.699
	N	50	50	50	50	50

*Correlation is significant at the 0.01 level (2-tailed).
**Correlation is significant at the 0.05 level (2-tailed).

3.3. Threats to Medicinal Plant

Informants ranked illegal logging as the most serious threat to the plants of different use values followed by encroachment, firewood collection, Grazing and resettlements (Table 2).

Table 2. *Threats to medicinal plants.*

Threats	Informants Score											
	I1	I2	I3	I4	I5	I6	I7	I8	I9	I10	Total	Rank
Resettlements	4	2	4	1	5	1	1	3	1	4	26	5
Encroachment	5	4	5	4	4	2	3	1	2	3	33	2
Fire woodc ollection	3	1	3	5	1	5	5	2	4	1	30	3
Grazing	2	5	1	3	2	3	2	4	3	2	27	4
Logging	1	3	2	2	3	4	4	5	5	5	34	1

Key I=Informant.

3.4. Florstic Diversity of Medicinal Plants

A total of 36 plant species with their medicinal and other use value were re-corded. The Species were represented, 34 genera and 27 families and two plants were not identified their scientific name. In terms of species composition, the family Fabaceae consists of 6 species (22.22%) followed by Solanaceae 3 species (11.11%) followed by Moraceae and Combretaceae consists of 2 species each were the dominant family in the study area (table 3).

Table 3. *Plants use part, disease treated, condition use and relative frequency.*

Plant Scientific Name	Use part	Disease treat	Condition 1. dry 2. Fresh 3. both	N. I. C	FL	RFC
Securidacalongepedunculata	Root/stem	Evil eye	3	7	14	0.14
	Root	Fibril illness	3	2	4	0.04
Withania somnifera	Root	Anthrax	2	1	2	0.02
	Leaf	evil sprit	3	1	2	0.02
	Root	Evil eye	1	2	4	0.04
Plumbago zeylanica	Root	abdominal pain	2	1	2	0.02
	Stem	milking problem in cows	2	2	4	0.04
	Leaf	milk curdle	2	3	6	0.06
Pennisetum glaucifolium	Stem	Bloating	3	1	2	0.02
Silene macrosolen	Whole	evil sprit	3	3	6	0.06
	Leaf	Dandruff	2	2	4	0.04
	Root	stomach ache	1	3	6	0.06
Ziziphus spina-christi	Root	abdominals pain	3	7	14	0.14
	branches	Forage	2	1	2	0.02
	Stem	Construction	2	1	2	0.02
	fruit	Food	2	4	8	0.08
Cordia africana	Leaf	Fibril illness	2	1	2	0.02
		Fireburn	2	2	4	0.04
	Fruit	Amoebae	2	1	2	0.02
	Leaf	Stomach ache	1	2	4	0.04
Adansonia digtata	fruit	Stomach ache	1	3	6	0.06
	Young leaf	Food	2	3	6	0.06
	fruit	Edible	2	5	10	0.1
	fruit	Stomach ache	1	6	12	0.12
Hypheane thebica	fruit	Stomach ache	2	4	8	0.08
	fruit	Food	1	3	6	0.06
Datura stramonium	Leaf	Fibril illness	2	1	2	0.02
	Leaf	Constipation	2	7	14	0.14
Balanites aegyptiacus	Fruit	Tapeworm	2	2	4	0.04
	Fruit	Amoeba/food	1	3	6	0.06
Diospyros mespiliformis	Fruit	Food	2	7	14	0.14
Ximenia americana	Fruit	Food/internal parasite	2	3	6	0.06
		Worms		1	2	0.02
Azadrachta indica	Leaf	Forage	2	2	4	0.04
	Leaf	Malaria	2	1	2	0.02
		Termite	2	1	2	0.02
Tamarindus indica	Fruit	Ameba	2	4	8	0.08
	Leaf	Anthrax	2	1	2	0.02
	Fruit	Internal parasite	2	1	2	0.02
	Fruit	Amoebae	2	1	2	0.02
Anogeissus leiocarpa	Stem/bark	Abdominalpain	2	13	26	0.26
	Stem	Construction	2	16	32	0.32
Calotropis procera	Root	Snake bite**	2	7	14	0.14
	Latex	Wart	2	3	6	0.06
	Leaf	Itching	2	3	6	0.06
Solanum incanum	Root	Abdominal pain	3	6	12	0.12
	Root	Scorpion bite	2	4	8	0.08
	Root	Eye infection*	2	4	8	0.08
Zehneria scabra	Root	abdominal pain		4	8	0.08
Stereospermumkunthianumolanumincanum	Bark	wound healing	1	1	2	0.02
Albiza anthelmintica	Leaf	wound healing**	1	1	2	0.02
	Bark	tape worm	1	2	4	0.04
Unknown 1	Tuber	Food	2	1	2	0.02
Unknown 2	Tuber	Food	2	1	2	0.02
Grewwa flavescena	Fruit	Edible	2	1	2	0.02
Terminallia browni	Stem/bark	Fever	2	2	4	0.04

Plant Scientific Name	Use part	Disease treat	Condition 1. dry 2. Fresh 3. both	N. I. C	FL	RFC
Bosciaalgustifolia	Leaf	Forage	2	1	2	0.02
	Stem	snake bite	1	1	2	0.02
Albizia malacophylla	Stem	evil eye**	2	2	4	0.04
	Root	eye infection**	2	2	4	0.04
Dalbergia melanoxylon	Bark	snake bite	2	1	2	0.02
	Leave	abdominal pain**	2	1	2	0.02
Grewiya ferruginea	Leaf	Forage	2	1	2	0.02
	Bark	delivery facilitate*	2	1	2	0.02
Dichrostachys cinerea	Bark	wound healing	2	1	2	0.02
Ruta chalepensis	Root	Sprain	2	1	2	0.02
Ormocar pumpubescens	Whole	Cough	2	1	2	0.02
Ficus sycomorus	Leaf	Bloating of shoulder	2	1	2	0.02
Ficus glumosa	Leaf/latex	Bloating	2	1	2	0.02
Strychnos spinosa	Leaf/latex	Bloating	2	1	2	0.02
Sterculia africana	Leaf	Skin strength	2	1	2	0.02
	Leaf	Head lice	2	1	2	0.02

Key *=Medicinal plants used to treat livestock aliment only, **=for both livestock and human aliment.

3.5. Preference and Direct Matrix Ranking

Preference ranking of plants in the study area was made based on the number of informants cited for each type of plant parts used for different purposes (figure 3). Accordingly, the stem/bark of *Anogeissus leiocarpa* (7.5%) used to treat abdominal pain was ranked first and followed by root of *calotropis procera* used for snake bite, leave of *Balanites aegyptiacus* used to treat constipation, root/stem of *Securidaca longepedunculata* used to treat evil eye and root of *Ziziphus spina-christi* used to treat abdominal pain (4% each).

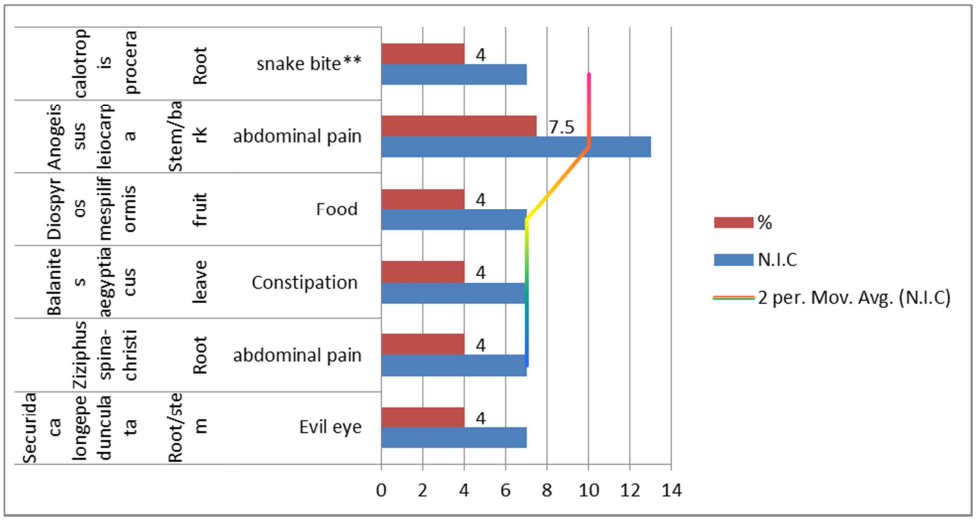

Figure 3. *Preference ranking N. I. C. =number of informants.*

The direct matrix ranking was performed to assess the relative importance and to check the major impacts on each of the plants. In order to ealuate their comparative importance of multi-use plants to the local people and the extent of the existing threats related to their use values, seven common multipurpose species were taken and direct matrix ranking was conducted (table 4). The seven multipurpose species were chosen because they were among the most commonly encountered species, and were described in equal frequency before the ranking exercise. The result of the direct matrix ranking showed that *Ziziphus spina-christi* (10.35%) stood first in being the most multipurpose medicinal plant followed by *Solanum incanum* (8.1%), *Hypheane thebica*, *Adansonia digtata, Anogeissus leiocarpan* and *calotropis procera* (7.5% each) table 4.

Table 4. *Matrix Ranking.*

Plant Scientific Name	Parts used	Disease treat	N. I. C	Total N. I. C	%	RFC	FL
Ziziphus spina-christi	leaf	Dandruff	2	18	10.35	0.36	36
	Root	Stomach ache	3				
		Abdominal pain	7				
	Branches	Forage	1				

Plant Scientific Name	Parts used	Disease treat	N. I. C	Total N. I. C	%	RFC	FL
	Stem	Construction	1				
	Fruit	Food	4				
Hypheane thebica	Fruit	Stomachache	10	13	7.5	0.26	26
		Food	3				
	Leaf	Stomach ache	2				
Adansonia digtata	Young leaf	Food	3	13	7.5	0.26	26
	Fruit	Edible	5				
		Stomach ache	3				
Balanites aegyptiacus	Leaf	Constipation	7				
	Fruit	Tape worm	2	12	6.9	0.24	24
		Amoeba/food	3				
Anogeissus leiocarpa	Stem/bark	Abdominal pain	13	29		0.54	54
	Stem	Construction	16				
	Root	Snake bite**	7				
Calotropis procera	Latex	Wart	3	13	7.5	0.26	26
	Leaf	Itching	3				
		Abdominal pain	6				
Solanum incanum	Root	Scorpion bite	4	14	8.1	0.28	28
		Eye infection*	4				

N. I. C.=number of informants cited.

3.6. Habitat and Habits Diversity of the Medicinal Plants

Regarding the distribution of medicinal plants, out of the 36 plant species, 30 (83%) species were obtained from wild while 6 (17) species were cultivated (figure 4).

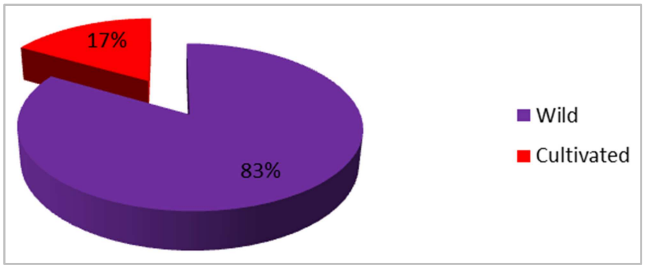

Figure 4. *Habitats of medicinal plants.*

Of the total 36 medicinal plants collected from the study area, trees (69%) followed by shrubs (22%), climbers (6%) and herbs (3%) were the habits of medicinal plants in their decreasing order (Figure 5).

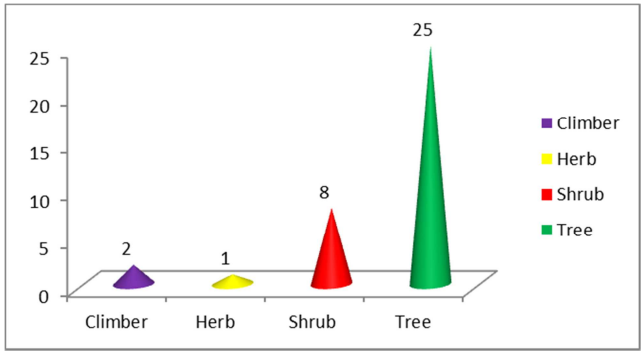

Figure 5. *Habits of medicinal plants.*

According to the interview result leaves were the most commonly used plant part in the study area. Fruit and root parts were the next most commonly used plant parts in the preparation of remedies in the study district next to leaves. The use of other plant parts that mentioned by informants during the discussion period was indicated in table 5 below.

Table 5. *Plant parts used for medicinal preparations.*

Plant part	Frequency	%	Rank
Tuber	2	3	5
Latex	3	5	4
Stem	6	9	3
Bark	7	11	4
Root	14	21.5	2
Fruit	14	21.5	2
Leave	19	29	1
Total	100	100	

3.7. Preparation, Modes of Application and Routes of Administration of Medicinal Plants

Traditional healers in the study area reported that they follow the various ways of remedy preparation and this depends, according to their explanations, on the type of ailment. Crushing, pounding and fumigation were the three main methods of preparation of herbal medicine in decreasing order. According to the informants indicated that drinking was the highest reported case followed by creaming, rubbing and smearing.

The greater proportion of application of medicinal plant preparation is external and internal application is slightly lower. There are several administration routes of traditional medicinal plants in the study area used by the local community.

3.8. Acquisition of Traditional Medicinal Plant Knowledge Practice

The highest number of traditional medicinal plant knowledge (66%) of informants in the study area was gained from family (parent member) followed by relatives (22%) (table 6).

Table 6. *Source of Ethnobotanical Knowledge.*

	Alternatives	Frequency	%	Rank
From whom do you get this Knowledge	Self-innovation	6	12	3
	Relatives	11	22	2
	Parent member	33	66	1
Total		30	100	

3.9. Transferring Knowledge of Traditional Medicinal Plants

According to the data from the study area, the major way of indigenous knowledge transfer on types of medicinal plants, traditional concepts of illness and methods of diagnosis among traditional healers was by word of mouth to a family member, especially of an eldest son and daughter (table 7).

Table 7. *Transferring knowledge of traditional medicinal plants.*

	Alternative	Frequency	%	Rank
To whom member of the society you want to transfer	Son	14	28	2
	Daughter	5	10	3
	wife/husband	2	4	5
	Son and daughter	24	48	1
	not voluntary	5	10	3
Total		50	100	

3.10. Women Role and Market Analysis

There were lots of plant parts sold at the market in Humera town and Adigoshu market for different use values. The most important plant part and their derivatives sold at the market by the people were edible fruit (*Cordia africana, Adansonia digtata, Ziziphus spina-christi, Hyphean ethebica, Tamarindus indica, Balanites aegyptiacus, Diospyros mespiliformis, Ximenia americana*), fragrance (*Securida calongepe dunculata, Pennisetum glaucifolium*), for medicinal purpose (*Terminallia brownie, Plumbago zeylanica, Securidaca longepedunculata* and *Withania somnifera*) and for different ornamental values (*Hypheane thebica*). The unit prices of these multi-purpose plants were varied from time to time and from place to place. There were no uniform measures for any of these marketable plants and their derivatives.

Besides, about 58% of the respondents affirmed that those edible plants were sold by children while 26% of the informants responded as women were involved in selling at the market as shown in the following figures 6 and 7.

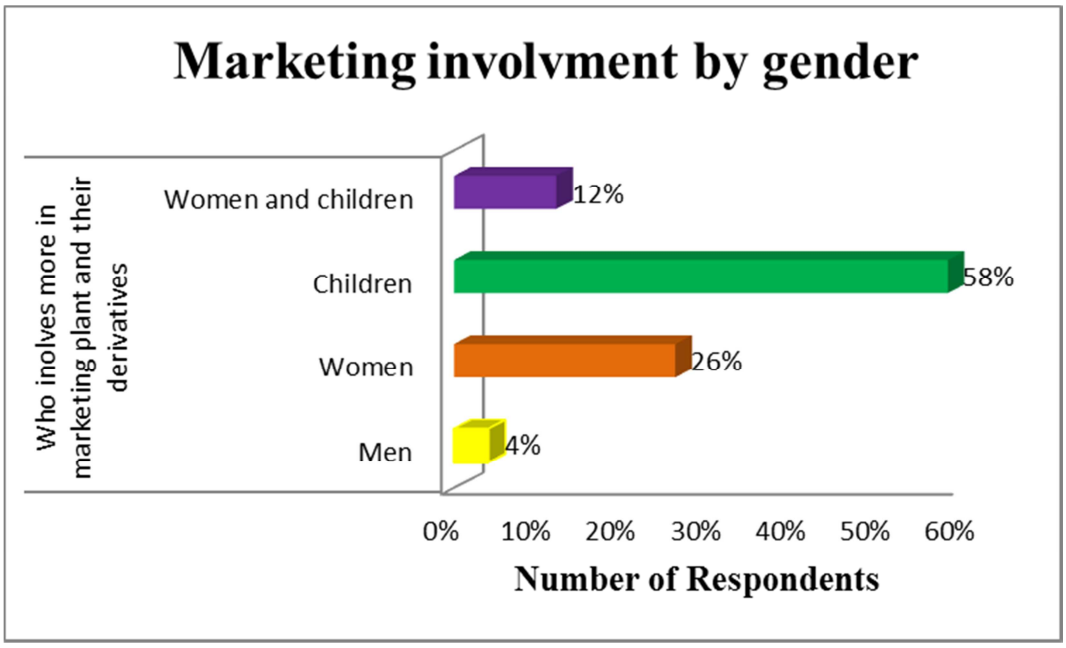

Figure 6. *Market involvement by gender.*

Figure 7. *Market survey of medicinal plants from Humera market.*

4. Discussion

The highest percentages of informants (28%) were from the age interval of 41-50 years while the lowest percentages (20%) were from the age interval of less than 30 years.

Similar ethnobotanical study in different places [16-19] indicated that, respondents above 40 years of age were found to be very knowledgeable on how to collect plants, process remedies and administer and had stronger belief in the curative effect of their medicinal plants as compared to the younger age group.

A Study conducted in Nigeria [20] reported that the highest percentage of younger generation had no any knowledge of traditional medicine practice due to more exposure to modern life style.

Besides, males were involved more than females in traditional healing practice. According to the informants' perception, there was no any traditional conservation mechanism to conserve a plant used for different use values.

People of both ethnic groups in the study area illegally cut plants, including those which have medicinal value, for different reasons. The most and principal reason were for constructing their home and fencing its surroundings, and for the expansion of agricultural lands. Medicinal plants growing in the wild are highly exposed to different anthropogenic factors such as agricultural expansion, deforestation for fulfilling ornamental and basic needs. This finding was similar with the finding of researches conducted elsewhere in Ethiopia [21-23].

Furthermore, 29 of the collected medicinal plants were found to treat for human disease only, 2 medicinal plant only for animal and 5 medicinal plants for both animal and human diseases. A study conducted in [24-26] indicated that, the highest percentage of medicinal plant preparation were used to treat human diseases. With regard to the measurement of medicinal plants, there is no standardized measure of the dose of herbal remedies in the study area. This indicates that there were variations in the unit of measurement. This also indicated that lack of precision and standardization as one of the drawbacks for the recognition of traditional health care system. One of the major problems in traditional medicine is lack of standard dosages and précised measurements [27, 17]. According to informants in the study district, the amount of dosage prescribed for same/similar health problems vary as remedies are prescribed with different units of local measurement. Inconsistency of doses has also been reported in studies conducted elsewhere in Ethiopia [28-30]. The most Popularity of these medicinal plants according to the informants was due to their wide range of diseases they treat or due to the abundance of the plant in the area for easy access.

The utilization of medicinal plants for variety of added values may result in additional pressures to these resources. This calls for practical solutions like domestication, *in-situ* conservation, and introduction of other tree species for non-medicinal uses to reduce pressures on the medicinal plants and promotes sustainability.

Thus, the local people rely more on medicinal plants from wild habitats. Thus, traditional practitioners suffer to travel large distance in search of large these medicinal plants. It was also found out that above three fourth of ethnobotanical plants in the study District were harvested from the wild, which is in agreement with reports of many studies conducted in the study area country [18, 28, 31-33].

The study also showed that people in the study district use a relatively high number of shrubs, which is in agreement with studies conducted elsewhere in the country [34]. However, [35] showed that shrubs, followed by herbs and trees were the most frequently used growth forms.

Many studies conducted in different parts of Ethiopia also showed that leaves are used more frequently than any other parts [28, 36-40]. As compared to other parts, damage inflicted on medicinal plants due to harvest of leaves is very minimal [41]. However, the use of the root part of the plant didn't assure the sustainability of the plant for further use. This finding was similar with the result of the study done in [42].

Most of the medicinal plant species were reported to be processed through crushing followed by pounding and chewing. Ethnobotanical studies conducted in different parts of the country (Ethiopia) [36, 37, 43, 44] reported similar

results.

The major routs of administration by the peoples under study area were; oral, dermal, nasal, and oracular. Informants in the district reported that, they were taken internally/orally followed by smearing on the skin. Others are administered through making the patients inhale the smoke and vapor of the plants in cases. Several studies conducted in different parts of the county [46-50] also revealed that oral followed by dermal were the principal routes of remedy administration.

Most of the time, knowledgeable people keep their knowledge secret until their death. Their knowledge become disappears since it didn't transfer to their descendants. The highest source of knowledge from the parent member and relatives in the study area indicated that there was good practice of sharing knowledge about medicinal plant use for different purposes freely.

It was also found from the informants that there was maximum clandestineness in passing the knowledge within the family circle. The second highest transfer of medicinal plant knowledge only to eldest son (28%) limits the involvement of female in the study area.

5. Conclusion and Recommendation

5.1. Conclusion

The results of the study publicized that there is a high diversity of medicinal plant knowledge among local people of Kafta Humera wereda, Adigodhu Tabiya. The People of the study area, mostly prepare the remedy from the leaves and the habit of the local community using leaves than other plant parts do not put medicinal plants under pressure compared with using whole plants which is the most important way of practice for medicinal plant sustainability. Large numbers of medicinal plants were collected from wild. This show, as there is lack of cultivation of medicinal plants in home gardens or back yards by local people of the study area, even local healers runs to the wild to collect medicinal plants when the need arise. Knowledge of medicinal plants in the study area varies among age and sex. A great deal of knowledge of medicinal plants was handled by elders who were the age of 40 and above and males were able to mention more medicinal plants than females, especially for those which were went distant area for farming and other reasons, when they are far from the health facility. In the study area, 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 their or their livestock ailments. The results of the study also revealed that many wild species of medicinal plants are under pressures from various human induced factors. In addition, the disinterest of young generation on traditional medicine; put the continuity of traditional medicinal knowledge under question. Since heedlessness was observed from the young generation, the knowledge of traditional medicine might be wiped out in the near future unless proper documentation and conservation are made.

5.2. Recommendations

Grounding along the outcomes of the study, the following recommendations are forwarded: Traditional medicinal plants are central to the indigenous cultures and material needs. Hence, formal and non- formal education systems should be designed to create positive attitudes among the young about the traditional usage of plants. Credits should be devoted to traditional healers, either through certification or through organizing them at community or wereda level, which popularizes and scale up their indigenous knowledge and medicinal plants value. In-situ and ex-situ conservation activities should be practiced in the sub distric through training to ensure the continuity of threatened medicinal plants. forest areas should be recognized by all levels of administration with clear demarcation to stop further encroachment and grazing. Promote people to cultivate medicinal plants in home gardens, mixing with crops, in farmlands, and live fences. Boosting people to protect and enclose forest biodiversity rich areas with higher distribution of medicinal plants in the locality.

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