ETHNOBOTANICAL STUDY OF TRADITIONAL MEDICINAL PLANTS IN JARDEGA JARTE DISTRICT, HORO GUDURU WOLLEGA ZONE, OROMIA REGIONAL STATE, WESTERN ETHIOPIA.

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Abstract

An ethnobotanical study was conducted to document and record the use of medicinal plants, as well as the associated knowledge of their usage by the local population of Jardaga Jarte District in the Horo Guduru Wollega Zone of Oromia Regional State, Western Ethiopia. The study took place from October 12, 2019, to February 07, 2022. A total of 88 informants (75 males and 13 females) ranging in age from 20 to 90 were selected to provide information on the use of medicinal plants from eight sampled kebeles. Among these, 16 key informants (12 males and 4 females) were purposively selected based on recommendations from the District Administrator, kebeles' leaders, elders, and local authorities. The remaining informants were chosen randomly. Ethnobotanical data was collected through semi-structured interviews, guided field walks, group discussions, and participant observations. Data analysis was conducted using descriptive statistics and recommended ethnobotanical tools, such as Informant Consensus, Preference Ranking, Paired Comparison, Direct Matrix Ranking, and the Informant Consensus Factor (ICF). A total of 87 medicinal plant species, belonging to 83 genera and 52 families, were identified and collected. Among these, 52 (59.77%) species were sourced from wild vegetation, while 35 (40.23%) were obtained from home gardens. These 87 medicinal plant species were utilized to treat 54 different ailments. Out of these, 70 (80.1%) species were documented for the treatment of human health issues, 6 (6.9%) species for livestock, and 11 (12.6%) species for the treatment of both human and livestock ailments. Trees constituted the highest proportion of medicinal plants (30 species, 34.48%), followed by shrubs (27 species, 31.03%), herbs (17 species, 19.54%), and lianas (13 species, 14.94%). The most commonly used plant parts were leaves (39, 44.8%), followed by roots (21, 24.1%). The predominant method of preparation was crushing (48, 55.2%) of various plant parts, followed by squeezing (7, 8%), chewing (6, 6.9%), and boiling (6, 6.9%). The primary route of administration recorded was oral (47, 54%), followed by dermal (26, 29.9%) and inhalation (6, 6.9%).

Major conservation threats included agricultural land expansion, overgrazing, firewood collection, charcoal production, timber production, and the felling of trees for construction, building, and furniture. The involvement of local communities, along with initiatives for awareness-raising through training and education on the sustainable utilization and management of medicinal plants and plant resources, as well as the establishment of forest protected areas, should be encouraged to ensure the sustainable utilization and protection of medicinal plants from local extinction.

Key word: Ethnobotany, Horo Guduru, Medicinal plants, Indigenous knowledge, Informant consensus factor

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1. INTRODUCTION

1.1. Background of the Study

Ethnobotany encompasses a wide range of disciplines, focusing on the intricate relationship between people, plants, and the environment (Martin, 1995; Cotton, 1996). It delves into how local communities interact with their natural surroundings, including how they categorize, manage, and utilize the plants in their vicinity (Martin, 1995). Beyond the documentation and dissemination of indigenous knowledge, ethnobotanical studies shed light on the dynamic interplay between biodiversity and human society, revealing how human activities influence and are influenced by the diversity in nature (Martin, 1995).

The ethnobotanical approach is particularly vital in involving local communities in biodiversity conservation. It operates on the premise that some of the world's healthiest ecosystems are overseen by local communities, who often manage numerous species that remain poorly understood by science. Indigenous communities have accumulated region-specific expertise over centuries regarding the use, stewardship, and preservation of plants (Cotton, 1996). Ethnobotany focuses on understanding the historical and contemporary utilization, management, and cultural significance of plants in human societies, encompassing their roles in sustenance, medicine, rituals, social customs, and more (Khan et al., 2007).

Plants hold a significant role in treating both human and livestock ailments, drawing on a wealth of complex knowledge, beliefs, and practices. Throughout history, people have directly and indirectly utilized plants for medicinal purposes. Traditional use of plants as medicine dates back to as early as 5000 to 4000 B.C. in China. Much of this indigenous knowledge system has been intertwined with the practice of traditional medicine across various countries (Zeleke Asefa, 2019). Many local communities derive traditional remedies from different parts of plants. According to numerous indigenous groups, they have developed diverse traditional systems utilizing locally available resources to address health issues. Traditional healers employ various techniques in preparing these remedies. The value of medicinal plants to human livelihoods is immeasurable.

Ethiopian medicinal plants have demonstrated significant effectiveness in treating various ailments in both humans and domestic animals. This underscores the crucial role that medicinal plants and the knowledge of their usage play in meeting healthcare needs across the country. Extensive literature attests to the pivotal role of medicinal plants in primary healthcare delivery in Ethiopia, where 70% of the human and 90% of the livestock population rely on traditional medicine, a trend common in many developing countries, especially those in Sub-Saharan Africa (Mulugeta Kebede and Erchafo Mohamed, 2017).

Indigenous knowledge, also known as traditional knowledge, evolves over time and space, shaped by shifts in resources and culture. Ethnobotanical studies are invaluable for documenting, analyzing, and disseminating this knowledge, as well as understanding the dynamic interaction between biodiversity and human society, revealing how diversity in nature is harnessed and influenced by human activities (Martin, 1995). Local communities employ their perceptions and experiences to categorize plants, leading to the development of various criteria for classification, such as plant use, habitat, life form, color, abundance, and morphological characteristics, among others (Martin, 1995; Cotton, 1996).

Across Africa, Asia, and Latin America, traditional medicine serves as a critical component of primary healthcare, with up to 80% of the population in Africa relying on traditional medicine for their healthcare needs (WHO, 2001, 2003). Given Ethiopia's rich biodiversity, diverse landscapes, and numerous ethnic cultures, ethnobotanical studies are essential in areas abundant with biological resources, facilitating the description, identification, documentation, ranking, protection, and sustainable utilization of medicinal plants (Bulcha Abera, 2014). Ethiopian plants have demonstrated remarkable effectiveness in treating various diseases affecting both people and livestock. Approximately 80% of the Ethiopian population is believed to rely on traditional medicine derived from plants for their healthcare needs. However, indigenous knowledge of medicinal plants is dwindling due to the influence of Western lifestyles, a decline in the number of traditional healers, and a lack of interest among younger generations in preserving this tradition and associated knowledge (Buwa, 2012). The majority of the population in rural areas, as well as the economically disadvantaged in urban areas, primarily rely on traditional medicines to meet their primary healthcare needs. However, the traditional knowledge of medicinal plants in Ethiopia has not been adequately compiled (Miruste Gide et al., 2003; Teshale Sori et al., 2004). Traditional medicinal knowledge of plants and their use by indigenous cultures is not only crucial for preserving cultural traditions and biodiversity but also holds potential for healthcare and drug development in the present and future (Tamiru et al., 2013).

Despite Ethiopia's multiethnic cultural diversity and rich flora, studies on traditional medicinal plants are limited (Mirutse Giday et al., 2009). In Jardega Jarte district, Horo Guduru Wollega Zone, Oromia Regional State of western Ethiopia, no scientific study has been conducted to investigate traditional medicinal plants and their use. Consequently, this study aims to identify, collect, and document both the medicinal plant species and the traditional medicinal knowledge of practitioners in the study area.

1.2. Statement of the Problem

Traditional medicinal practices continue to be prevalent in Ethiopia, with traditional healers serving as primary healthcare providers for both urban and rural populations (Fisseha Mesfin, 2007). However, this valuable ethnomedicinal knowledge is transmitted orally from one generation to the next, risking loss whenever a traditional medical practitioner passes away without passing on their knowledge of medicinal plants (Pankhurst et al., 2001).

In developing countries like Ethiopia, indigenous knowledge regarding traditional medicinal plants is often transmitted confidentially from one generation to the next through oral tradition. However, there is a significant gap in documenting and recording this knowledge in the country. Additionally, the traditional knowledge of medicinal plant use is eroding due to factors such as migration from rural to urban areas, industrialization, the expansion of modern education, and the reluctance of specialized healers to pass on their knowledge. Furthermore, in many parts of the country, wild plants and forests are facing near-total depletion due to human activities like deforestation, agricultural expansion, overexploitation, and population growth. The study area is particularly affected by habitat and species loss resulting from ongoing deforestation and overuse of medicinal plants, along with the concurrent loss of associated knowledge. Despite this, little has been done to document and preserve this valuable ethnobotanical knowledge, which is fundamental for conservation and community development efforts. To date, no scientific research has been conducted to identify, document, and record the plant species used in the treatment of both human and livestock ailments using indigenous knowledge in Jardega Jarte district, Horo Guduru Wollega Zone, Oromia Regional State in western Ethiopia. Therefore, this study seeks to contribute to the existing ethnobotanical database of the country and to document the local knowledge of the people in this area.

2 Objectives of the Study

The general objective of this study was to investigate, collect and document medicinal plant species and the associated medicinal knowledge of the traditional health practitioners in Jardega Jarte district.

3. MATERIALS AND METHODS

3.1. Description of the study area

The study was carried out in Oromia regional State, Horo Guduru Wollega Zone at Jardaga Jarte district western Ethiopia. It is located 370 km away from Addis Ababa and 56 km North of Shambu, the capital city of Horo Guduru Wollega Zone.

3.2. Geographical location

This study was conducted in Jardega Jarte district. This is one from district of Horo Guduru Wollega Zone. The district is bordered by Abay choma and Horo Buluk district in the east, Abe Dongoro, Amuru district in the west Horo Buluk district in the south and Amuru district and Amhara regional State in the north. The geographical location (GPS location) of this distirict is: 9^0 52' 57, 84 '' N latitude and 37^0 04' 32, 81'' E longitude. The district has three Agro ecological zones, out of the total area of the district 6% (6228.24 hectare) is "Dega", locally called "Baddaa; and **74**% (76,814 hectare) is "Weyna dega" locally called as' baddadaree' and about **20**% (20,760.6 hectare) is"Kola", locally called as 'gammojjii. Jardega Jarte Agricultural Rural Development Office (JJARD Office, 2019)

3.3. Climate

Temperature is a measure of the intensity of heat of a substance. The temperature and Rainfall data for this study were obtained from Ethiopian National Metrological service Agency, from 2004-2019 (EMSA, 2019).

Based on 2004 – 2019 (EMSA, 2019) climate data, the average maximum temperature in the study area was recorded in April (19.4^0c) and Febreury (19.1^0c) On the other hand; average minimum temperature recorded was during August (15.45^0c) and July (15.8^0c). But throughout the 16 years, the mean monthly average temperature was 17.31^0 C while the mean annual temperature of the study area was 13 ^{0}C.

3.4. Rainfall

According to the sixteen (16 years rainfall summarized data, the study area has a high rainfall Distribution between July (325) mm and August (282.1) mm .On the other hand low rainfall January (6.6) mm and December (12.1) mm. The mean monthly and annual rainfall of the study area was 129.29 and 896 mm, respectively.

3.5. The Vegetation of the study area

Generally the vegetation of the study district broodily classified as ever green forests and woodland vegetation type (Sebsebe Demissew and Friis, 2009) the forest incorporate the lower plan, shrubs and higher plants and also it consists of ever green and some deciduous plants that cover about 7049.757 hectares of the total area of the district and also it consist of land and arboreal wild animals (AGP, 2011). The vegetation of the area includes Acacia, Olea, Juniperus, gallery forest, and shrubs. There is also very small community forest in the district. The livelihood zone or the necessities of life vegetation is characterized by sparsely vegetated with remnants of some old big trees on the hills and bushy vegetation further down slope.

3.6. Land use

Table1. Land allocation of the study area

No	Land use type	Unit	Amount
1	Cultivated land	hectare	350.48
2	Grazing land	>>	3.330
3	Forest and other purposes	>>	8.790
	Total	>>	103.804

*Source- Jardega Jarte district ARD office (2019).

3.7. Major food crops grown in the study area

Jardega Jarte district has an ideal agro-ecology for agriculture such as crop production, livestock rearing and cultivating different annual and perennial plants. The major food crops grown in the area are given in (Table 1).

Table 2. Major food crops grown in the study area

Crop category	Scientific name	English name	Local name
Cereals	*Zea maize* *Eragrostis tef* *Hordeum vulare* *Triticum aestivum Sorghum*	Maize Teff Barely Wheat	Boqqolloo Boqqolloo Garbu Qamadii
Vegetables	*Capsicum frutescns* *Allium cepa* *Cucurbita pepo* *Allium sativium* *Brassica oleracea*	Chili Shallot Pumpkin Garlic Cabbage	Barbaree Qulluubbii Buqqee nyaataa Qulluubbiiadii Raafuu
Fruits	*Citrus sinensis* *Citrus limon* *Musca x paradisiaca* *Manifera indica* *Carica papaya*	Orange Lemon Banana Mango Papaya	Burtukaana Loomii Muuzii Maangoo Papaya
Vegetables	*Capsicum annum* *Lycopersicon esculentum* *Allium sativum* *Brassica oleracea*	Pepper Tomato Garlic Cabbage	Mixmixa Timaatimaa Qullubbii adii Goomana habashaa
Pulses	*Pisum sativum* *Visa faba*	Peas Beans	Atara Baaqela
Cash crops	*Coffee Arabica* *Catha edulis*	Coffee Khat	Buna Caatii
Oil crops	*Guizotia abysinica* *Linum usitatissimum* *Brassica napus*	Niger seed Lin seed Kale seed	Nuugii Talbaa Sanyii raafuu

Source: Jardega Jarte District Agriculture and Rural Development Office (JJDARDO, 2019)

3.8. Human population

According to Jardega Jarte district Finance and Economic Development Office projection (2019), the total number of the population in the district is 69,454 (37,559 males and 31,895 females) which lives in 21 rural Kebele and 3 urban Kebele. About 50 % of the populations are Orthodox Christian religion, 15% of the populations are Muslim, and 35 % of the populations are protestant religion followers.

3.9. Livestock

Table3. Livestock population of the study area

No.	Livestock type	Unit	Total
1.	Cattle	Number	132,624;
2.	Hens	>>	63,429
3.	Goats	>>	22,540
4.	Sheep	>>	10, 337
5.	Donkey	>>	11,140
6.	Mule	>>	2,114
7.	Horse	>>	983
	Total	>>	

*Source: Jardega Jarte District ARD office 2012/2019

3.2. Design of the Research

Quantitative and qualitative study design was employed from October 2020 – Feburary, 2022 to conduct the study entitled on Ethinobotanical study of Traditional medicinal plants at Jardega Jarte District, Horo Guduru Wollega Zone Oromia Regional State Western Ethiopia.

3.2.1. Study Site (Kebele) Selection

In this study Eight Kebeles were selected out of twenty four Kebeles of the district or the study area using purposive sampling techniques for ethnobotanical data collection. The selection was based on the availability of traditional medical practitioners, accessibility and agro-ecological zone with the assistance of the Kebele administration leaders, elders, religious leader's developmental agency and others who have information about traditional healers (Martin, 1995 and Cotton, 1996). Those Kebeles which were having almost the same climatic conditions with other neighboring Kebeles were not included in the study and this is also additional factor for site selection. The study Kebeles were eight namely, Alibo 02, Kunaco, Dima Joke, Kiltu ceka, Sombo kumi. Tullu Nonno.Harbu Nagaso and Sombo wato.

3.2.2. Selection of Informants

A total of 88 informants (75 men and 13 females) individuals from each of the study sites were selected. Accordingly, the selection of key informants was carried out through purposive sampling method (Martin, 1995) to drain necessary information and to include at least two to three traditional medicinal practitioners in each study site. Out of these, Male 12 and Female 4 Total 16 key informants were selected by purposive sampling based on the recommendations of local authorities, knowledgeable elders and DA (developmental agents). The other Male 63 Female 9 Total 72 informants are selected preferentially from the local people of the study area. When recording knowledge held by traditional healers or by certain social groups such as women and elders, the choice of key informants is dictated (Martin, 1995)

3.2.3. Ethnobotanical Data Collection

An ethnobotanical survey was conducted to gather information on the traditional usage of plants in health care system using a semi-structured interview, group discussion, participant observations and guided field walks (Martin, 1995) from traditional healers who were willingness to share their indigenous knowledge. A total of 88 individuals were selected and interviewed based on their knowledge on traditional medicine. Interviews and discussions were undertaken based on checklist of questions prepared in English and translated to 'Afan Oromo'. Information was carefully recorded during an interview with an informant as well the knowledge of vegetation categorization was asked and recorded.

Field observations were performed with the help of local guides on the morphological features and habitats of each medicinal plant species in the field. Discussions were conducted on threats to medicinal plants, conservation of the medicinal plants and transferability of knowledge in the community. Before collecting the data, written permission was secured from the office of the District and permission was obtained from the administrator of each selected Kebele. Following this, the purpose of the study was explained to each informant and verbal prior consent was obtained. During the study period, each informant was visited at least two times in order to confirm the reliability of the ethnobotanical information (i.e. information that disagree with the first record were rejected) and the entire interview and discussion with informants were carried through direct face to face contact between the researcher and informants.

Semi-structured interviews

A brief discussion was made with informants at each kebele prior to ethnobotanical data collection. During the discussions, an attempt was made to let them understand that their

knowledge and the continued practice of their art of traditional medicine will be not interferred.

Semi-structured interviews were conducted with 88 informants in “Afan oromo” language with the help of an interpreter following Martin (1995) and Cotton (1996) to collect ethnobotanical data. The data collected include informants’name and address, in general personal data, common human and livestock ailments/ diseases in the area, part of the medicinal plants used for treating different aliments, status of the medicinal plants in the study area, method of preparation and application, use of dosage, route of administration, other uses of the medicinal plants and threat and conservation status of the plants (Appendix 1 and 5).

Field Observation

Field observations were performed with the help of local guides and interpreter, as well as interviewed informants in the study area and the status, habit, and habitat characteristics of the plants were recorded on site.

Group discussion

Group discussion made in Sombo kumi and Tullu nonno study kebeles with an estimated number of six community members which composed different groups that included one or more traditional healers in each kebeles where the discussion took place prior to Ethinobotanical data collection.at the time of discussion ethinomedicinal knowledge was gathered from the residence and knowledgeable members of the community recorded carefully.

3.2.4. Specimen Collection

At the end of the interview, sample specimens of the plants cited for their medicinal use were Collected, numbered, pressed and dried for identification.

3.2.5. Specimen Identification

Medicinal plants were collected from wild and cultivated areas. The local names, habits and associated information about the plants were collected. The voucher specimens of medicinal plants with scientific names, vernacular names, families and collection number for all medicinal plants recorded from the study area was taken to the Department of Biology Debre Berhan University. The identification was carried out from July to August by using taxonomic keys and various volumes of the flora of Ethiopia and Eritrea. Finally, the identification of the voucher specimens was confirmed by my advisor and stored at the Department of Biology (Debre Berhan University)

3.2.6. Data Analysis

3.2.6.1. Descriptive statistics.

The most useful information was gathered on medicinal plants reported by local people: method of preparation, route of application, disease treated, dosage, part used, habit, threat and conservation was analyzed through descriptive statistical analysis such as percentage and frequency. The most useful information gathered on medicinal plants reported by local people include medicinal value, application, methods of preparation, route of application, disease treated, dosage, part and habit used was analyzed through descriptive statistical analysis according to Martin (1995), Alexiades (1996) and Cotton (1996). Facilities in MS Excel spread sheet were utilized to make simple Calculations determine proportions Pie charts and draw bar graphs

3.2.6.2. Informant consensus Factors

In order to evaluate the reliability of information during the interview, informants were contacted at least 2 times for the same ideas and the validity of the information was proved and recorded. ICF was calculated for each category to identify the agreement of the informants on reported cures for the group of ailments or disease.

$$\text{ICF} = \frac{nur - nt}{nur - 1}$$

Where, ICF = informants consensus factor

Nur = number of use citation in each category

nt= number of species use

3.2.6.3. Preference ranking

.Preference ranking was made following Martin (1995) for seven most important medicinal pl ants used to treat Rabies. Preference ranking was used to compare the most effective medicinal plants used by the local people or community to treat the particular disease. This plants were presented to nine (9)

of the key informants to identify the best preferred medicinal plants based on their personal p reference for the treatment of rabies. In doing this, the informants were requested to mark seven to the most prefferred medicinal plant and one to the least preferred medicinal plant. The value given to each medicinal plant were added and the plants were ranked. This is important to show the effective medicinal plant used by the study area community to treat rabies.

3.2.6.4. Direct matrix ranking

Direct matrix ranking was used to compere multipurpose use of a given medicinal plant species. Direct matrix ranking was done following Martin (1995) and Cotton, (1996) to compare plant species for their multipurpose useseveplants which were used highly for many purposes by the community members were selected based onthe information obtain d from the informants and six attributes which included medicine, firewood, charcoal, constru ction, furniture and food were listed and the species were provided to 10 key informants to gi ve value according to the use of the species for the particular attribute listed above and then t he scores which were given to each attribute were summed,andranked so as to compare useva lues of the reported plant species.

3.2.6.5. Paired comparison

Among the 11 plant species already identified as traditional medicinal plants to treat wound, eight medicinal plants with highest informant concensus were selected. Paired comparisons to indicate the efficacy and popularity of eight medicinal plant species used to treat wound were employed as described by Martin (1995). Pairing and randomizing the pairs were done based on the method in Martin (1995) and delivered to ten key informants. Again informants were told to give the highest score and lowest score to the best pair that they consider best medicinal plants composition to treat wound. The score were added at the end and ranked.

3.2.6.6. Fidelity level index

The fidelity level (FL) is the percentage of informants claiming the uses of a certain plant species for the same ailment to treat. FL is calculated as FL (%) = (Np / N) x 100, where Np is the number of informants that claim a use of a plant species to treat a particular disease and N is the number of informants that use the plants as a medicine to treat any disease as stated by Alidades (1996).

In other way the fidelity level (FL), the percentage of informants claiming the use of a certain plant for the same major purpose, was calculated for the most frequently reported disease or ailments using the following equation.

$$FL\ (\%) = \frac{NP}{N} \times 100$$

Where NP is the number of informants that claim the use of a plants species to treat a particular disease, and N is the number of informants that use the plants as a medicine to treat any given disease.

4. RESULTS AND DISCUSSION

4.1. The Characteristics of Informants

Analysis of socio-demographic characteristics of informants with regard to sex, age, religion, marital status, educational level and occupation is assessed and presented as below in Table 4.

Table 4. The characteristics of informants (respondaants)

No	Items	Informant (Respondents)	
		No	Percent (%)
1	**Sex of Informants**		
	Male	75	85
	Female	13	15
	Total	88	100
2	**Ages of Informants**		
	21 _30	5	5.68
	31 _40	7	7.95
	41_50	16	18.18
	51 -60	26	29.55
	61-70	22	25
	71 -80	6	6.81
	Above 81	6	6. 81
	Total	88	100
3	**Religious status of Informants**		
	Orthodox	48	54.54
	Muselim	1	1.14
	Protestant	36	40.54
	Wakefata	3	3.4
	Total	88	100
4	**Marital status of Informants**		
	Married	83	94.32
	Single	3	3.4
	Divorce	2	2.27
	Total	88	100
5	**Educational Level of Informants**		
	Illiterate	25	28.41
	Elementary	38	43.18
	.High school	12	13.64
	College	13	14.77
	Total	88	100
6	**Occupation status of informants**		
	Farmer	73	83
	Gov. Worker	14	16
	Merchant	1	1
	Total	88	100

The characteristics of informants would give some basic information about the informants involved in this study. The characteristics of the respodents were examined in terms of sex, age, religion, marital status, educational background and occupation status of informants. The sex of the respondents indicated that, the data gathered was both from male and female respondents. While age also confirms the maturity level of the respondents to perform the given task.

The Informants' educational background or qualification showed that how far they become developed their academic performance for further knowledge that enhances them in performing their tasks. Moreover, the respondents work experience told that the development of the respondents theoretical knowledge in to practical skill to running and manage their responsibilities in different mechanisms. The analysis and interpretation in detail follows below.

4.2. Sex of informants

Concerning the sex of informants, the majority of the information was obtained from males than females. The distribution of informants with respect to sex shows that the males occupied the largest proportion 85% (75) than females 15% (13) suggesting that males had more practice and experience in plant cultivation and use (Table 4).

4.3. Age of informants

The distribution of informants with respect to age class shows that the majority of knowledgeable elders are in the age group or class of 51 to 60 (29.55 %) followed by age class of 61 to 70 (25%) and the least was between age class of 21 to 30 (5.68%) (Table 4).

4.4. Religious status of informants

Of the total informants, Orthodox and protestant were the dominant groups with a total informant number of 48 (54.54%) and 36 (40.90%), respectively but 3 (3.4 %) and 1 (1.14%) were Wakefata and muslem (Table 4).

4.5. Marital Status of Informants

Of the total informants, 83 (94.32%) were married, but 3 (3.4%) and 2 (2.27 %) were single and divorced respectively (Table 4).

4.6. Educational level of informants

The result shows that 38 (43.18%) informants attended elementary school followed by Illetrate 25 (28.41%) and the least attended high school 12 (13.64 %).

The result also shows that 73 (83 %) were Farmers followed by Government workers 13 (16 %) and the least was merchant 1 (1%). This result indicates that farmers were more inreacting with plants.

4.2.1. Indigenous knowledge of local people

4.2. 2.Indigenous knowledge on vegetation classification

People of the study area classify vegetation of their surrounding based on density of plant species that cover the land. The following are their classification:

Lafa qonnaa (Farmland): -This is agricultural land that serves for production or cultivation of different crops in the study area.

Lafa dhagaa: - rocky areas where stones are extracted and sold. This area is not comfortable for crops production.

Caffee (**Marshy vegetation):** This is marshland which is suitable for livestock grazing as well as some agricultural activities to take place during summer season. Unsuitable for crop plant growth but it is mostly suitable for grazing.

Bosona (Forest type): This is forest land where different plant species are found. It is a type of forest with densily populated plant species and various larger plants also occur. It is a home of larger wild animal's too for example, Aset forest, which is found in Dima joke Kebele.

Lafa kallo: - is an open grazing land left which is not plough by farmers or left aside by community for common livestock grazing.

4.2.3. Agro ecology and Land form classification by indigenous people

The local people classified the agro ecology of the area into 3 categories based on altitude and climate (Table 5) but land form into 6 categories based on altitude (Table 6).

Table 5. Agroecology of the study area

Agro ecology classification	Altitude	Corresponding etic category	Where in the study it found
Dega (baddaa)	Areas 2488m asl __ 2598m asl	Highland	Dima Joke and H/Nagasso
Woyinadega (badadare)	Areas 2368m asl ___ 2476m asl	Middle land	S/Kumi,T/Nono, Qunaco and Alibo 02
Kola (gammoojjii)	Area less than 1500m a.s.l.	Low land	Some part of S/Wato and K/Ceka

Table.6. Land form of the study area

Land form classification	Meaning of category	Corresponding etic category	Where in the study area it is found
Gaara	An area higher than hill	Mountain	Some part of sombo wato
Tulluu	Area less in height when compared to mountain	Hill	Harbu Nagaso (koram)
Tabba	Flat Area found at the top of the hills.	Plateau	Kunaco Kebele
Lafa diriiraa	More or less straight place	Plain	Sombo Kumi, Alibo 02 & Dima joke kebeles
Suluula	An area relatively lower than the surroundings and surrounded by steep slopes.	Valley	Valley of Chogo found in Kunaco and Tulu Nono kebeles.
Dhooqa	Very low depression with highest temperature	Very low area and depression	Large places in Tulu Nono and Sombo wato

4.2.4. Soil classification by indigenous people

Indigenous people classify (name) soil based on color, texture and suitability for cropping. Also the soil texture can be roughly estimated with the local moist soil sample Thus; the local people identify the following soil types:

Clay soil (Biyyoo diimillee): The soil can bent into a U and also the soil can be bent into a circle that shows cracks. Clay soils which have generally poor infiltration. They call it *biyyoo diimillee* because of its red color and poor fertility.On this soil, people cultivate crops like *Capsicum frutescens and Cucurbita pepo.*

Black soil (Biyyoo kootichaa):due to its color and with better fertility than other soil types .Crop like *Hordeum vulgare,Triticum aestivum, Sorghum, Pisum sativium,Visia fava,Allium cepa,Zea mays,Eragrostis tef,Phasioles vulgaris and Linum usitatisimum* are grown in this soil type.

Sandy soil (Biyyoo cirrachaa): The soil contains loose and single grained and can only be heaped into a pyramid. The soil can be rolled into a short thick cylinder. They are poor in plant nutrients. Sandy soils and silt soils resulting from deposition by erosion. This soil type is easily distinguished by its content of fine sand soil with silt and is suitable for growing specific crop types like *Pisum sativum, Visa faba, and Hordeum vulgare ground nuts.*

Mixed soil (Biyyoo waliinii): mixed soil type characterized by containing all the above soil type.**Loam soil (Biyyoo kosii)**: It contains plenty of humus and they are fertile**.**The soil contains sufficient silt and clay to become somewhat cohesive and can be shaped into a ball that easily falls apart. Loams are soils with mixed particles of Sand, Silt and Clay**.** This soil type contains high amount of organic materials drawn from house hold left wastes and animal excreta. It is suitable for vegetable like *Musca paradisiaca Allium cepa, Brassica oleracea Nicotina tabacum, cucurbita pepo, Solanum tuberosum, Brassica carinata, Allium sativium* are usually cultivated on it.

4.2.5. Classification of plant habit (forms) by indigenous people

Based on the growth forms or habit, the indigenous people of the district categorized plants into three groups: Trees, shrubs and herbs.

Trees (Mukkeen): are big and tall plants.

Shrubs (Miciree): are medium sized, woody plants taller than Herbs and shorter than a Tree.

Herbs (Dagala): are starting from the smallest, herb is a short sized plant with soft, green, delicate stem without the woody tissues (Table 7).

Table.7. Classification of plant habit

Plant habit	Meaning of category	Corresponding Etic category	Where in the study area it is found
Mukkeen	They have very thick ,woody and hard stem	Trees	Found in all study kebeles
Micciree n	Their features include bushy, hard and woody stems with many branchs.	Shrubs	Found in all study kebeles
Dagala	A short sized plant with soft green, delicate stem without the woody tissues.	Herbs	The same with the above.

4.2.6. Seasonal classification

Indigenous people classify seasons in to Four (4) main categories based on climatic condition or amount of rain (Table 8).

Table.8. Seasonal classification of the study area

Emic category	Etic category
Birraa	Spring (September,October andNovember)
Bona	Summer (December,January and Feburary)
Arfaasaa	Autumn (March,April and May)
Gannaa	Winter (June,July and August)

4.3 Distribution of the medicinal plants among the plant Families

Eighty seven plant species were used by the community or local people of the district to treat various human and livestock ailments. These medicinal plants were distributed across 83

generea and 52 families (Appendix 3).The most popular family was Solonace which contributed for 7 (13.46 %) species followed by Euphorbiaceae with 5 (9.62 %) species (Appndex 3).

The families reported the presence of high utilization of various medicinal plants for health care system in the study area. Solanaceae and Euphorbiaceae are widely used families by practitioners. In contrast, ethnobotanical studies carried out in other parts of the country such as Endalew Amenu (2007), Ermias Lulekal et al. (2013, 2014) and Getaneh Gebeyehu et al. (2014) reported that Asteraceae had the largest proportion of medicinal plants used. In this study Asteraceae was the third family.

4.4. Medicinal plants obtained and their sources

The results of this study showed that most of the medicinal plants 52 (59.77 %) were collected from the wild while some plants 35 (40.23 %) were collected from the Homegardens. Plants collected from the wild include *Accacia abysinica, Prunus africana, Podocarpus falcutus, Olinia usambare, Erythrina abssinica, Croton macrostachyus* whereas *Capsicum annum, Ruta chalepensis, Coriandrum sativum, Ocimum lamiifolium, Musa paradisiaca, and Flacourtia indica* were collected from homegardens. *Allium sativum, Cucurbita pepo, Hordeum vulgare* were collected from both homegardens and natural habitats. Various studies conducted in Ethiopia as well as other countries in the world reported that the majority of medicinal plants were harvested from the wild (Ermias Lulekal, *et al,* 2008). This finding agrees with the general pattern seen in many investigations in Ethiopia in which more medicinal plants are collected from the wild than homegardens (Endalew Amenu, 2007; Etana Tolasa, 2007). The works of Etana Tolassa (2007) and Fisseha Mesfin (2007) also showed that majority of the medicinal plants were collected from the wild which accounted for 72.94% and 61.1% respectively.

4.4.1. Growth forms (habit) of medicinal plants

This study showed that trees constituted the highest species representation by 30 species (34.48 %), followed by the shrub 27 species (31.03 %) , herbs 17 (19.54%) and the least were lianas with 13 species (14.94 %). The results of this study agrees with similar studies elsewhere in Ethiopia (Bayafer Tamene, 2000; Mirutse Giday and Gobena Amen 2003; Tesfaye Awas and Sebsebe Demissew, 2009). In addition, Etana Tolasa (2007) and Endalew Amenu (2007) also reported that trees were the most diminant growth forms in their studies. Ethiopians use traditional medicinal plants as remedies for a centures (Getachew Adis *et al*., 2001; Mirutse Giday *et al,* .2003). In the study area, all plant growth forms are differently used as remedies.

4.4.2. Plant parts used to treat human and Livestock ailments

Most of the medicinal plant species collected and identified in this study were also medicinally used in other parts of Ethiopia. For example, of the 87 medicinal plants collected from Jardega Jarte district, 47 of them were reported by Etana Tolasa (2007), 36 by Endalew Amenu (2007), 33 by Haile Yineger *et al*. (2008), 33 by Seyoum Getaneh (2009) and 29 by (Fisseha Mesfin, 2007), as medicinally important to treat human and livestock diseaseses.

People of the study area gather or harvest different plant parts for preparation of plant remedies (cure) and , for e.g., from leaves, roots, seeds, stems barks, fruit, latex and whole parts. In this study area the highest number of plant remedies were prepared from leaves 39 species,(44.8 %) followed by roots 21 species (24 %), seeds 12 species (13.8 %), barks 6 species (6.9 %), fruits 4 species (4.6 %), stem 2 species (2.3 %), whole parts 2 species 2 (2.3 %) and latex 1 species (1 %) (1). A similar finding was reported by Miruse Giday *et al*. (2003), and Fisseha Mesfin (2007).

4.4.3. Medicinal plants used to treat human, livestock and both human and livestock ailments

According to this study Eight seven (87) medicinal plants have been recorded and documented in the study area. The number of reported medicinal plants and their uses by the local people of the district indicates the depth of the local indigenous knowledge on medicinal plants and their applications. Among the collected 87 medicinal plants, 70 species (80%) were used to treat human diseases, 6 species (6.9 %) to treat livestock ailments and 11 species (12.6 %) help to treat both human and livestock ailments in the tudy area of (Table 10). The use of medicinal plants to treat human diseases stands first than livestock ailments by local people of the study area. As a result, they acquire low knowledge of medicinal plants to treat livestock ailments than knowledge of medicinal plants for treating human ailments. A similar finding was reported by Seyoum Getaneh (2009).

Among the families, Solanaceae was the higest represented by 7 species (13.46%) followed by Euphorbiaceae species (9.62%). The finding of the family Solanaceae as the contributor of higher number of plant species used for medicinal purposes than other families is similar with other studies elsewere in Ethiopia (Mirutse Giday and Gobena Ameni, 2003; Kebu Belami *et al.*, 2004; Amenu Amenu, 2007).

4.4.4. Mode of preparation

The local community use different forms of remedy preparations and practical use to treat human and livestock diseases. The preparations also vary based on the type of disease

treated and the actual site of the ailment. The study showed that the highest common form of preparation was crushing 48 (55.2 %), followed by squzeeing 7 (8 %), chewing 6 (6.9 %), boiling 6 (6.9 %) and smoking 5 (5.7 %) (Table 10). This result agrees with a similar studies elsewere in Ethiopia (Dawit Abebe and Ahadu Ayehu, 1993; Endalew Amenu, 2007; Mirutse Giday, 1999).

4.4.5. Route of administration and dosage of medicinal plants that used for ailments for human and livestock.

The study showed that oral administration 47 (54 %) was the highest route followed by dermal 26 (29. 9 %) and inhaling 6 (6.9 %) (4). Oral route of application is the most efficient for better physiological reaction to the disease. Similar results were obtained by Ermias Lulekal (2005), Endalew Amenu (2007), Etana Tolasa (2007), and others that indicated oral administration dominates over others routes of administration agrees with this finding.

Considering to the dosage given to patients, there is no standardized known unit of measurements of the plant remedies in the study area. This means that the same types of medicinal remedies for the same types of ailments were given with different measurements in different Kebeles of the study district. The result of this study is in line with study made by Sofowara (1982) and Dawit Abebe (1986) who indicated that lack of precision and standardization as one draw backs for the recognition of traditional health care system. Although the measurement types were different, there are some common measurements like Meleke, Bottle, coffee cup, tea cup, digits of a finger, spoon, glass that people use to drink water and palm of hand. Age, sex and stage of illness were also considered in the study area by some professional healers to determine the amount of the remedies to be given. This finding is also similar with the study conducted by Dawit Abebe (1986) and Assegid Aseffa and Tesfaye Abebe (2014). At the time of group discussion almost all the informants agreed on the variation in dosage given by different healers and the analysis of the data based on the information gathered from the key informants and even from the users, indicated that taking over dosage or under dosage have their own negative impact that is over dosage may lead to different health complication and even death and under dosage may not cure the diseases.

4.4.6. Conditions of preparation of remedies

Based on the information collected from the key informants in the study area for healing different health problems, the condition of remedy preparation was not one way. The study showed that the widely used condition of preparation was fresh accounted for 62 (74 %) followed by dry 20 (21 %) and both or dry/ Fresh 5 (5 %). This is in agreement with Kebu Belamie *et al, (*2004). Also other study conducted by Teshale Sori *et al*., (2004) in Borana,

Oromia Reginal State, south Western Ethiopia showed that using fresh materials for different health problems is more preferable than dry materials.

4.5. Ranking and Scoring of medicinal plants

4. 5.1. Preference ranking

In the study area different species selected or prescribed for the same health problem, people show preference of one over the other. Preference ranking of seven medicinal plants that were used for treating rabies was conducted after selecting 9 key informants. The informants were asked to compare the given medicinal plants based on their efficacy and to give the highest number (5) for the medicinal plant which they thought most effective in treating rabies and the lowest number (1) for the least effective plant in treating rabies. In the study area, rabies infection was showed to be the most common disease. Seven medicinal plants were reported as effective to treat rabies infection. Nine traditional healers (key informants) ranked these Seven plant taxa based on their perception of the degree of effctiveness. Accordingly, *Cucumis ficifolius* scored 33 ranked first indicating that the most effective in treating rabies, followed by *Ricinus communts* scored 29 ranked second *and Solanum gigantum* scored 25 ranked thrid respectively for treating rabies ailments (Table 9). As indicated in table 9 below, *Clucia lancolata* and *Erythrina absinica* were least prepferred for treating rabies. *Cucumis ficifolius* widely available in the agricultural fields of the study area. Then the local people in area have been using this plant for treating rabies.Where as the avilablity of *Clucia lancolata* were less or limited in the study area

Table 9. Preferance Ranking

List of Medicinal plants	Respondents (R1 ___ R9)									Total	Rank
	R1	R2	R3	R4	R5	R6	R7	R8	R9		
Bruceana ldysentrica	4	1	3	1	2	5	3	2	2	23	5
Clucia lancolata	2	2	1	4	3	1	2	1	3	19	7
Ricinus communts	5	3	1	2	4	5	3	4	2	29	2
Cucumis ficifolius	4	5	3	4	5	3	4	2	3	33	1
Solanum gigantum	3	4	2	1	3	4	3	3	2	25	3
Phytolacea dodecam	3	2	1	2	4	3	4	1	4	24	4
Erythrina absinica	1	3	3	4	2	1	2	3	2	20	6

4.5 2. Paired ranking

A paired comparision was made for medicinal plant species that were identified by the informants to be used in treating wound among nine medicinal plants. Ten informants participated in this ranking. Accordingly, *Plantogo lanceolata* scored 34 comes first followed

by *Coffee arabica* scored 31 and *Prumus africana* scored 29 and others (Table 10). *Olea curapaca* and *Msytemus senegalenis* were used for wound treatment purpose though least preferred. Similar study indicated in (Girum Misalie, 2018). *Plantago lanciolata* is mostly available in teff agricultural fields of the study area, so farmers in particular have been using this plant for treating any wound when sharp materials cut their body parts during harvesting agricultural crops.

Table 10 Paired comparision of medicinal plants used to treat wounds.

List of medicinal plant	Respondents (R1__ R10)											Rank
	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	Total	
Coffee Arabica	3	2	4	1	4	2	2	4	4	5	31	2
Crotna macreste	4	1	2	3	2	5	3	2	2	4	28	4
Plantogo lanceolata	2	4	3	2	5	3	4	3	5	3	34	1
Clematis simensis perr and Guillceae	3	2	2	1	3	5	3	2	3	1	25	6
Syyzgium guincense	2	3	4	2	3	2	1	3	1	2	23	7
Justica schimposium	4	2	1	3	2	4	3	2	1	4	26	5
Msystemus senegalenis	2	2	3	2	1	3	2	2	1	3	19	8
Prumus Africana	3	4	2	3	3	2	4	3	3	2	29	3
Olea curapaca	2	1	3	2	1	1	2	4	1	3	20	9

4.5.3. Direct matrix rankig

In the study area, many medicinal plants were used for different purpose other than their medi cinal value.Ten selected key informants were allowed to give status of use (5 = best, 4 = very good, 3 = good, 2 = less used and 1 = least used). The six major use catagories include medicine, firewood, charcoal, construction (fence), furniture and food. Accordingly, the ten key informants reported that all medicinal plants are not equally used for different purposes**.** Then the average values given by informants summed up and ranked. The result showed that *Podocarpus falcatus, Eucalyptus globulus, Crotona lanceolata L. Cordia africana, Prunus africana, Olea curapeaca, Syzygium guincense, and Eucalyptus canaldvens, Olinia usambare* and *Hyphacne thebaica. Podocarpus falcatus, Eucalyptus globulus and Crotona lanceolata L.*were ranked first, second, third and others respectively. *Podocarpus falcatus* plant was widely available in forest of the study area. The plant is highly used for

furniture making construction, fire wood and charcoal, strong for furniture making and fencing, so preferred and widely used in the study area. Deforestation in the study area was primarily for the purpose of different usese (Table 11).

Table11. Direct matrix ranking in the study area.

Name of species	**Use catagories**						Total	Rank
	Medicine	Firewood	Charcoal	Construction (fence)	Furniture	Food		
Syzygium guincense	2	3	4	2	1	3	15	7
Prumus Africana	4	3	2	3	3	2	17	5
Olea curapeaca	2	4	3	4	2	1	16	6
Crotona lanceolata L	5	4	4	3	2	2	20	3
Eucalyptus globulus	4	5	3	5	3	1	21	2
Eucalyptus canaldvens	2	4	2	4	2	0	14	8
Cordia africana	2	4	3	4	5	1	19	4
Olinia usambare	4	3	2	2	2	1	13	9
Podocarpus falcatus	3	5	4	3	5	4	24	1
Hyphacne thebaica	1	2	1	1	2	3	11	10

As the above table showed that, the higest ranked species are highly threatened that is there is high rate of loss of *Podocarpus falcatus* in the area. Especially *podocarpus falcatus* species highly used for Construction, furniture, firewood and charcoal etc. Even though the rank is

given, all of the species particularly the top ranked ones are in the future their survival are under question, because as the life of some people in the society depends on these species for different purpose.

4.5.4 Informant consensus

Of 87 reported medicinal plants in the study area, not all were equally important. From the application of informant consenses analysis some medicinal plants were more popular than others. Accordingly *Allium sativium* was cited by 27 informants. This plant widely used for the treatment of Common cold by almost all ages of the society followed by *Croton macrostachyus scored* 25 and *Phytolacea dodecandra* also scored 24 informants. *Schima molle* and *Azadirachta indica* scored the least values, respectively (Table 12). However, the study conducted by Debela Hunde. *et al.*, (2006) showed that *Andrachne aspera* took the lead popularity. The findings of this study agree with similar studies reported by Girum Misaiel (2018) and Bahilu Etana (2010).

Table 12.Informant consenses of medicinal plants in the study area

Scientific name	No of informants cited	Rank
Allium sativum	27	1
Phytolacea dodecan	24	3
Bruceana dysentrica	23	4
Justica Schimposiana	19	8
Eucalyptus globulus	17	9
Prumus Africana	14	12
Coffee Arabica	21	6
Plantogo lanceolata L.	20	7
Crotana macreste	25	2
Ocimum lamifolium	8	18
Clematis simensis perr and Guillceae	12	15
Ricinus communts	13	14
Zingiber officials	22	5
Citrus aurantifolia	16	10
Colocasia esculeate	9	17
Lipidum sativum L.	10	16
Hagenia abyssinica	15	11
Olinia usambare	13	13
Schima molle L.	5	20
Azadirachta indica	7	19

4.5.5. Informant Consensus Factor (ICF)

The disease of the study area have been classified into different catagories..The ICF have been calculated for each category (Table 13). The result of the study indicated that, diseases that are frequent in the study area have higher informant consensus factor. Medicinal plants that are effective in treating certain ailments or disease and well known by community members also have high ICF. Accordingly, plant used against tooth ache had high ICF scoring (0. 71%) followed by plants used againist rabies (0.69%) abdominal ache (0. 68 %) and others (Table 13). The findings of this study agree with similar studies reported by (Fisseha Mesfin, 2007, Getu Dida, 2017 and Bahilu Etana , 2010).

Table13. Informant Consenses Factor of medicinal plants in the study area.

Disease categories	**No of species**	**No. of use citation**	**ICF**	**Rank**
Common cold and cough	11	20	0.47	6
Abdominal pain stomach ach,stomach cramp and constipation	8	23	0.68	3
Fibrill illness,evil eye,head ach	11	19	0.44	10
Tooth ache	10	32	0.71	1
Rabies	12	37	0.69	2
Snake bite,snake repllent,and ant repllents	10	21	0.45	7
Cattle ailments (leech,blouting,swelling)	10	14	0.31	12
Wound,burn body	14	31	0.57	4
Tonsil	9	15	0.43	11
Tape worm and ascaries	7	13	0.5	9
Skin rash,Ring worms Itching,skin disease and dandroof	9	18	0.53	5
Diarreahea and aysentry	5	11	0.6	8

Toothache had the highest ICF values (0.710) due to the high occurrence of disease in the study area. In other way Cattle ailments (leech, blouting, and swelling) had the lowest (0.310) value due to the rare occurance of the diseases.

4.5.6. Fidelity level Index of healing potential of medicinal plantsuse citations,

Fidelity level is a crucial means to determine which plant species has more healing power. Accordingly, those species with high FLI are supposed to be more curative for the respective ailments. Efficacy is not the only factor that influences the informant choice but abundance of a given plant and prevalence or widespread of disease in the area can affect informants choice. Fidelity level (FL) quantifies the importance of a species for a given purpose. Hence, fidelity level values were calculated for commonly used individual medicinal plants. In this study *Allium sativum* (55.1 %) and *Zingiber officials* (44.9%) were reported by informants. A total of 22 specific and 27 general use reports for *Zingiber officials* and 33 specific and *30* general use reports for *Allium sativum* were given by informants.

Table14. Fidelity level index for plant species used to treat abdominal pain in the study area

Disease treated	Medicinal plants	Percentage of informants	**N_p**	NI	**FL %**
Abdominal pain	*Zingiber officials*	44. 9 %	22	33	66%
	Allium sativum	*55.1 %*	*27*	*30*	*81%*

Fidelity level of *Allium sativum* (81%) was greater than Zingiber *officials* (66%) as it is shown in the (Table 14.) The growth form or habit of these plants was herb, smaller in size and different stage of growth to be eaten. Both plant species cultivated and easily conserved in the area of home garden. When we compare the avilablity of two plants in the study area *Allium sativum* is more cultivated in the majority of study area. But *Zingiber officials* rarely cultivated in the study area due to this cultivate and conserve the plants of *Zingiber officials'* medicinal plants. Similar studies reported by (Girum Misalie, 2018).

4.6. Threats to Medicinal Plants and Conservation Medicinal plants

4.6.1. Threats to Medicinal Plants

The cause of threats to medicinal plants can be generally classfed into natural and human induced factors. However, as reported in this study most of the causes for the threats to medicinal plants and the associated indigenous knowledge are the anthropogenic factors such as deforestation, agricultural land expansion, fire, construction, overgrazing, overpopulation, charcoal production, furniture production, urbanization and over harvesting of known medicinal plants. Kebu Belami *et a*l., (2004), reported overgrazing was principal threat to medicinal plants in Fentalle area. Mirutse Giday (2001), indicated that intense deforestation become the major threat on medicinal plants in Zay people. Similar study by Fisseha Mesfin (2007) in Wonago District showed that, there are different threats in medicinal plants such as

agricultural expansion, fire wood collection and others. Thus, the need for agricultural expansion for farm land and charcoal use threatened plant species in general and medicinal plants in study area.

According to Ensermu kalbessa *et al*. (1992*),* Ethiopia traditional medicine, as elsewhere in Africa, faced with problems of continuity and sustainability primarily due to loss of taxa, habitat of medicinal plants and other categories .The results of this study showed that the source of threats to medicinal plants especially human infulences was a great impact on them. Similar findings were reported elsewhere in the country (Tesfaye Awas, 2004 and Fisseha Mesfin, 2007; Eskedar Abebe, 2011). The study also revealed that the type and degree of threats varies from place to place and species to species in the study area. For example, the medicinal plants grown near in study area are highly threatened by firewood collectors, timber and other plant providers and charcoal sellers which use them as a means of additonal income generation by providing to the urban dwellers. In doing that medicinal plant species such as *Podocarpus falcutus, Cordia africana, Acacia abyssicica, Ekebergia capensis, and Olea europaea* subsp. *cuspidata* species. *Ekbergia capensis or* Konnoo in local name are the most vulnerable than other medicinal plants. In this study, informants indicated that it took a day to get very important medicinal plants like *Ekbergia capensis* and *Echinops kebericho* to travel away from home is expected. The medicinal plants which grow relatively in the densely populated rural kebeles such as Sombo kumi, Harbu nagaso, Sombo wato and Dima Joke are highly threatened by practice of agricultural expansion in the study area.

4.6.2 Conservation practices of medicinal plants

Conservation and use of medicinal plants has now grown to be a present or moment issue in Ethiopia because of plants diminishes in the rural and urban places. Traditional medicinal plants are widely going on in use to treat both human and livestock ailments. Moreover, these plants are serving for multiple use categories (Table 14). The information obtained from informants showed less conservation status of medicinal plants. Especially, low conservation of wild medicinal plants cause scarcity. According to Zemede Asfaw (2001), medicinal plants are considered to be at conservation high risk due to over use and destructive harvesting (roots and barks collection). Similar studies usually located close to the homestead; home gardens can accommodate women's food production and household responsibilities (FAO, 2005). The home garden agro ecosystem in Ethiopia maintains a wide range of taxa of perennial and annual crop plants.

Plantations or afforestation of medicinal plants can be made in deforested areas. There are many medicinal plants of Ethiopia that have good properties for land restored and erosion

control which could be planted in different agro ecological settings. In situ and ex situ conservation strategies work well when they complement one another since what is not achievable by one method is backed by the other method. Also in other way make sustainable use of medicinal plants and the associated indigenous knowledge should be developed with the best practice of trained and giving awerness for the surrounding community follow up with the district Agricultral worker experts continually.

5. COSNCLUSION AND RECOMMENDATIONS

5.1. Conclusion

Indigenous people of Jardega Jarte district owing personal difference have knowledge of how to use plant resources for wide and varied use values i.e. food, timber production, medicinal, charcoal, construction, fencing, fire wood, building and furniture making in general and medicinal purpose in particular around their locality. The District is rich in plant diversity. A total of eighty seven (87) medicinal plant species were recorded in the study area. The study revealed that the local community used traditional medicine widely to treat both human and livestock ailments. Among the families, Solanaceae was represented by 7 species (13.46%) followed by Euphorbiaceae species (9.62).

Of these 87 species, 70 species were used to treat human ailments while 6 species were used to treat livestock ailments and 11 species were used to treat both livestock and human ailments. This can indicate that the people of the study area partly depend on this resource for their day-to-day health care system. The different plant species used in different ways to treat ailments. The majority of plant species recorded in the district is found to be used in other parts of the country. The documented medicinal plants (with different growth forms) such as trees 30 species, shrubs 27 species, herbs 17 species and liana 13 species inhabited in different habitats of the district. The most medically used parts of plants are leaves and roots. Most of the medicinal plants are found in all seasons of the year.

The uses of different parts of medicinal plants lead various preparation methods to be employed. The mode of preparation for both human and livestock involve crushing, squeezing, boiling, chewing, smoking and cooking.. There are different route of administration of prepared medicinal plants in Jardega jarte district that used for ailments for human and livestock: oral, dermal, Inhalation, optical, nasal and fumigation are the most known.

The major treats or challenges to medicinal plants and associated knowledge in the study area includes agricultural expansion, firewood collection, charcoal production, fencing,

furniture, construction, overpopulation, and overgrazing have all been recognized as contributing factors to the loss of plant resources with indigenous knowledge

Thus, the need for agricultural land and population pressure severely threatened plant species in general and medicinal plants in particular. Though conservation approaches were not sufficient for the sake of getting different use categories including medicinal purpose. Local people have been practicing variety aspects of wise use and management activities. However, more struggle together for plant cultivation, wise use, management and preservation are needed from the society for better opportunities or access of medicinal plants in the future.

5.2. Recommendations

After analyzing the outcomes of the study, the following recommendations are forwarded:

- Local community of the study area should be involved in conservation and management of plant resources and their indigenous knowledge in their locality.
- Training and awareness creation should be given to traditional healers and the local people respecting the management of medicinal plants.
- The Indiginous knowledge of traditional healers must be encouraged and protected by community of the study area, and it should also be transferred to the future generation.
- Encourage the local community or people to cultivate on large scale and wisely use to medicinal plants in their homegardens and farmlands place.
- In order to improve the quality of the cultural medicines, it is better to give education for those cultural medicinal practitioners.
- To get medicinal plants in the required time, it is crucial to develop biological garden in all kebeles of the district, Governments and non governmental organizations should partener with the local community to enhance in situ conservation of wild plants.
- Training the local community, on resource use value, management and conservation at kebele or district level by agricultural experts or development agents, as it facilitates an integration of resource conservation with sustainable use.
- Administrators of Jardega Jarte district should give recognition to traditional healers; find means of supporting them; bring known healers together for cooperative work and create conducive environment to share their experience and practice to others especially to youngsters or the coming generation..
- Ex-situ and In-situ conservation activities should be practiced in the district through FTC (farmers training centre) and the surrounding community to ensure the continuity of threatened medicinal plants.

- Traditional healers or practionars should have to conserve the medicinal plants on their home garden especially the treatend medicinal plant species.
- Trainings should be given to the practitioners on the best way to collect, document, use and conserve the medicinal plant species.
- Planting or afforesting of multipurpose plants in the study area. Namely. *Podocarpus falcutus*, the district Agricultural Office need to distribute such medicinal plants to local people since the use of *Podocurpus falcutus* is very essential to people of the study area
- Agricultural expansion, cutting down plants for fire wood collection, for different construction, overgrazing, furniture, and charcoal trading were identified as the main threat of medicinal plants in the study area. Therefore, the district administration of Jardega jarte should protected from human impacts or anthropogenic factors.
- The overall analysis reported that major uses of medicinal plants for treatment of different ailments ranges from simple to fatal diseases. These traditional remedies indeed, need to be confirmed through scientific research investigations to identify for modern drugs.

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