

Ethnomedicinal study of Plants in Wonchi District, South Western Shewa, Oromia Regional State, Ethiopia

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Abstract

This study documents indigenous medicinal plant utilization, management and the threats affecting them. The study carried out in Wonchi District from December to March 2017. Ethnomedicinal data were collected using semi-structural interview, Field observation, Preference and Direct matrix ranking with traditional healers. The Ethnomedicinal use of 68 plant species belonging to 62 genera and 34 families. was documented in the study area. The most commonly used plant families were Lamiaceae (9 species, 13.23%) followed by Asteraceae (8, 11.76%). Most of the plants (70.6%) were reportedly used to treat human diseases. The most frequently used plant parts were leaves (66%), followed by roots (17.64%). The dominant route of remedy administration was oral (38 preparations, 55.9%) followed by dermal (20, 29.4%), nasal (8, 11.8%) and optical (2, 3%). The study showed that Wonchi District is rich in medicinal plant and related indigenous knowledge. However, anthropogenic factors and very poor conservation efforts threaten medicinal plant survival in the study area. Promotion a complementary in-situ and ex-situ conservation strategy for medicinal plants of the District highly recommended.

1. Introduction

Ethnobotany is defined as the study of local people's interaction with the natural environment: how they classify, manage and use plants available around them [8]. Over centuries, indigenous people have developed their own locality specific knowledge on plant use, management and conservation [2]. The complex knowledge, beliefs and practices generally known as indigenous knowledge or traditional knowledge develops and changes within time and space, with change of resource and culture

Indigenous people around the world have unique knowledge of plant resources on which they depend for food, medicine and other uses [8]. Plants have been vital sources of both preventive and curative traditional medicine for human and livestock [17]. It was estimated that 25000–75000 species of higher plants have been used in traditional medicine worldwide [18]. Ethiopia is also an important regional center for biological diversity [10]. There are about 6500–7000 vascular plants in Ethiopia nearly 10% of which are endemic [21].

Plants have traditionally been used as source of medicine in Ethiopia since long time ago to control various ailments affecting human and livestock. This is evidenced by records of several foreigners who visited the country at the different times [10]. The plant based knowledge, largely oral, has been transferred from one generation to next through herbalists and knowledgeable elders. A study [7] indicated that about 80% of Ethiopians are still dependent on traditional medicine. This to large extent involves the use of plants. Despite the significance role played by medicinal plants in supporting the national primary health care in Ethiopia [4] the major reasons why medicinal plant are demanded in the country are culturally linked traditions, the trust of communities on traditional medicine, efficacy and relatively low cost [19]

This rich medicinal plant knowledge is seriously threatened due to the age related loss of knowledgeable people, deforestation and environmental degradation taking place in the country. Ethnobotanical studies and subsequent conservation measures are required to prevent medicinal plants and the associated knowledge in Ethiopia from further loss. The purpose of this Ethnobotanical study was to record and analyse medicinal plants knowledge of indigenous people of the Wonchi District South West Shewa, Oromia Regional State, Ethiopia. The majority 90% of the + local people in the study area belongs to the Oromo ethnic group. The Oromo people constitute at least 40% of the Ethiopian population [13]. They speak Afan Oromo language. They have a long tradition of age based social organization called the Gada System by which they manage their social, political and belief systems.

2. Materials And Methods

2.1 Study area and ethnographic background of the local people

The study was conducted in Wonchi District located in South West Shewa Zone of Oromia Regional State, Ethiopia (Fig. 1). Wonchi District is located about 37 km West of Woliso, the administrative capital of the South West Shewa Zone and 27 km South East of Ambo. Wonchi District is found 150 km West of Addis Ababa, Ethiopia. The geographic location of the district lies between 08°41'N and 037°53'E. The altitudinal variation of the district extends from 1700 to 3387 m a.s.l from the Crater rim in the North on Mt. Wonchi to the lowest altitude along the south slope of Mt Wonchi toward the undulating foot slopes to the Woliso plain. The total area of the Woreda is 475.6 km² according to [3] and the total human population of the district is about 119,736. Seven Woredas are bordering the Wonchi District: Toke Kutaye (North West), Ambo and Dendi (North), Dawo (North East), Woliso (East), Amaya (south West) and Goro (south).

2.2 Climate Of The Study Area

The rainfall and temperature data collected from Woliso Giyon meteorological station indicated that the study area receives annual rainfall reaching up to 1142 mm in some peak years. The monthly mean maximum and mean minimum temperature of the area are 22.7 °C and 11.9 °C respectively. The mean annual temperature is 16.9 °C with slight variation from year to year (Fig. 2). The rainfall pattern shows low rainfall in December and February, gradually increasing to the peak period in July and then decreasing in November and December.

2.3 Methods of data collection

For ethnobotanical data collection, the following thirteen Kebeles were selected. Haro Wonchi, Hodo Fura, Weldo Telfam, Sonkole Kake, Belbela Bulbulu, Meti Welga, Chitu, Dimtu Godeti, Fite Wato, Haro Beseka, Chebo Senselati, Meraga Abayi and Werabu Masi were purposively selected among the 25 kebeles. The kebeles were selected based on vegetation cover, the presence of traditional healers and accessibility of road for transportation after discussing with the Woreda administration office.

2.3.1 Informants' Selection

Respondents were contacted through kebele Administration and local elders (Jaarsa Biyyaa) and interviewed in Afan Oromo. A total of 260 (104 Male and 156 Female) informants were selected from 13 kebeles (20 respondents = 8 Male and 12 Female respondents per kebele). The age of informants was between 25 and 90 years old. Respondents (Out of these, 39 key informants were purposively selected following [18] based on recommendation from elders and local authorities (Development Agent and kebele administration leader). The other 221 Respondents were randomly selected from the representative kebeles. Key informants were first interviewed individually using Afan Oromo language to mention about the local names of the plants they use to treat diseases, diseases treated, part (s) of plants used, methods of gathering, methods of preparation, route of application, dosage, uses of the plants other than medicine and major threats to medicinal plants. Three Group discussions were made per group six male and two female with general respondents on the title conservation status of medicinal plants and four selected respondents asked for field walk for onsite observation of the medicinal plants.

The methods used for ethnobotanical data collection were semi structured interviews described by [3] and [8] ; field observation, preference ranking and direct matrix ranking according to [2], [8] and [13]. The respondents' background, health problems treated, diagnosis and treatment method, local name of medicinal plants used, source of collection (wild/ cultivated), growth form, plant part used, method of preparation and application and threats to medicinal plants were carefully recorded. Observations were made on the morphological features, habit and habitats of each medicinal plant species in the field.

3. Results And Discussion

3.1 Medicinal plants in Wonchi District

In this study 68 plant species distributed into 62 genera and 34 families were recorded for their medicinal values. Of these, about (48 species, 70.6%), (14, 20.62%) and (6, 8.8%) were reported to treat only human, livestock ailments and both human and livestock ailments respectively. The family Lamiaceae was represented by the highest number of medicinal plants 9 species (13.23%), followed by Asteraceae 8 species (11.76%) (Table 1).

Endemic Plant Species

Four endemic plant species were recorded from the Ethnomedicinal plant study of the Wonchi District. The endemic species were found to represent the families Lamiaceae, Verbenaceae, and Urticaceae (Table 2).

Habitats Of Medicinal Plants In The Study Area

Most of the plants were collected from the wild (22Species, 32.4%), followed by collections from home gardens (20, 29.4), Wetland area (12, 17.64%), crop field (9, 13.2%) and surrounding house (5, 7.3%) (Fig. 3).

Plant habit (growth forms)

Herbs were the + most frequently reported (37, 53.7%) species followed by shrubs (17, 25.4%), trees (12, 17.9%) and (2, 2.9%) climbers (Figure .4).

Parts Of Medicinal Plants Used

During the study different parts of medicinal plants were reported by respondents to be used for medicines. The most frequently utilized plant part was leaf 45 (66.2%) followed by root that accounts for 12 (18%) as indicated in (Fig. 5).

Method Of Preparation

People of the study area used various methods of preparation of traditional medicines for human and livestock ailments. The method of preparation depends on the types of disease treated. The major methods of preparation of medicinal plants were crushing (44.1%), pounding (36.7%), squeezing (8.9%), boiling (5.9), cooking (2.9%) and burning (1.5%) (Fig. 6).

Indigenous people have knowledge on the preparation of medicinal plants. Some of the traditional medicines had strong taste and bitter in order to reduce these they dilute them with honey, butter coffee, milk and salt.

Route of administration of medicinal plants in the study area

The route of administration includes oral, dermal, nasal and optical. From the reported route of administration, the highest use was through oral (38, 55.9%) and dermal (20, 29.4%) (Fig. 7).

Preference ranking

Ocimum lamiifolium scored 44 and ranked first indicating that it is most effective in treating febrile illness followed by Leonotis ocyimifolia, Ruta chalepensis, Croton macrostachyus and the least effective was Eucalyptus globulus (Table 3).

Paired Comparisons

A pair wise comparison was made among five medicinal plants. Nine key Respondents did the paired comparison of the five medicinal plants and the value was summarized. Ruta chalepensis comes first for treating stomach-ache followed by Ajuga integrifolia, Solanum incanum, Cymbopogon caesius respectively. Rumex nepalensis was the least preferred species to treat the stomach-ache disease in the study area. (Table 4).

Direct Matrix Ranking

In the study area medicinal plants were used for various purposes such as medicinal, charcoal, construction, firewood, Bee forage, furniture making. To assess the relative importance and to check the major impact on such plants direct matrix ranking was performed. In the area a number of medicinal plants were found to be multipurpose species being utilized for a variety of uses. Five commonly reported multipurpose species and six use-categories were involved in direct matrix ranking with five Respondents. Respondents evaluate their relative importance to the local people and use reports across the selected species were summed up and ranked. Results of the direct matrix ranking showed that Eucalyptus globulus ranked first and hence it is the most preferred plant by local people for various uses. Hagenia abyssinica ranked second, Croton macrostachyus ranked third, Cordia africana took fourth place and Olea europaea subsp cuspidata got the last place (Table 5).

Informant Consensus

Results showed that some medicinal plants were popular than others. In this study the highest informant consensus value was found for Ocimum lamiifolium which was cited by 56 respondents. Ruta chalepensis was cited by 54 respondents for treating stomach-ache, Acemella caulirhiza was cited by 42 respondents for the treatment of tonsil, and Rumex nepalensis cited by 39 respondents for treating stomach-ache (Table 6).

Informant Consensus Factor For The Given Disease Categories

Diseases in the study area were grouped in to different categories based on the conditions of the disease and treatment resemblance. The medicinal plants that were supposed to be effective in treating a certain disease had higher ICF values, which indicated that these diseases were more common than those with low ICF (Table 7).

The headache and acute febrile, tooth ache, tonsil, evil eye and cough scored the highest value (0.95) followed by stomachache, internal disease problems; placenta and urine retention and Gonorrhoea that scored the second highest value (0.92). In this study the lowest ICF value (0.87) scored for the category of diseases like wound, tumor, stabbing and swelling (Table 7).

Major Threats To Medicinal Plants

Results from nine respondents (R1-R9) on priority ranking of six factors that are described as threats to medicinal plants based on their degree of destructiveness (1 = least destructive, 6 = most destructive) were summarized. This study identified six major threats to medicinal plants of the study area based on the intensity of destructiveness in the area.. The result of the present study showed that agricultural expansion and deforestation were ranked 1st and 2nd factors respectively posing threats to medicinal plants of the area (Table 8).

4. Discussion

4.1 Medicinal plants of the study area

A total of 68 medicinal plants belonging to 62 genera and 34 families were identified and documented during the study period. The families that have the highest number of medicinal plants were Lamiaceae followed by Asteraceae. This finding agrees with the research done in Fiche District, Central Ethiopia [1]. Why Asteraceae dominant in Ethiopia this could be related to the fact that Asteraceae due to the adaptation potential of plant species in the family. They are very large and wide spread family of flowering plant that have advanced reproductive organs used for attracting pollinators this factors made the Asteraceae dominant in Ethiopia. The evidence given for similar result from by [6].

Four endemic plants were identified from the study area and these were Lippia adoensis, Pycnostachys abyssinica, Thymus schimperii and Urtica simensis. These species were also reported by [15] ethnobotanical study of Jeldu Woreda.

In this study medicinal plants were reported to have been collected from the wild (32.4%), home gardens (29.4%), crop field (13.2%), surrounding house (7.3%) and wetland (18%). Other reports also indicate [16] that more medicinal plants are obtained from the wild vegetation. From the total collected medicinal plants 12 (18%) were recorded from the wetland area. These medicinal plants include Acemella caulirhiza, Ageratum conyzoides, Colocasia esculenta, Cyanotis barbata, Cynodon dactylon, Datura stramonium, Guizotia scabra, Hygrophila auriculata, Pennisetum sphacelatum, Plectranthus punctatus, Ranunculus

multifidus and *Thunbergia ruspolii*. The output is very good indicates that wetlands serve as sources of medicinal plants for local communities, thus need proper conservation attention.

Of the total 68 medicinal plants collected from the study area, 54% were herb species followed by 25.4% shrub species, 18% tree species, and 3% climbers. Herbs were the dominant growth form of medicinal plant. This could be related to the fact that herbs are easily accessible in the nearby areas than trees and shrubs often harvested from patches of forests distantly located from residential area. The finding agrees with the general pattern of dominance herbaceous species seen in most medicinal plants inventories in Ethiopia [6, 5, 25, 26, 27].

During the study, different parts of medicinal plants were reported by informants to be used for medicine. The most frequently utilized plant part was leaf with 66.2% species followed by root which account for 17.6%. The finding agrees with previous reports in Ethiopia which showed that leaves were the most commonly used parts followed by roots to treat various health problems [14]. Roots were the most reported next to the leaf parts in the preparations of remedies. Such wide harvesting roots, which are important for the survival of plants has a negative influence on the survival and continuity of useful medicinal plants and hence affects sustainable utilization of the plants [4].

There are various methods of traditional medicinal plants preparation in the area. The most popular mode of preparation was in the form of crushing the plants materials which accounts 44.1% followed by pounding 36.7%, pounding and squeezing (8.9%). This finding was in line with earlier results in which crushing was the common type of preparation [11]. In the study area highest proportion of medicinal plants were prepared from fresh (85%) followed by dry (15%). The report from the local people shows that people in the study area prefer fresh plant materials to dried ones for their high efficacy of curing the disease.

The identified routes of administration include oral, dermal, nasal and optical routes. From the reported routes of administration, the highest report was found for oral (55.9%) and dermal, (29.4%) applications. This result agrees with similar studies in northern part of Ethiopia and Mena Angetu forest in Bale, [4], [12] and [6]. The dosage determination was the big problem in the study because there was no standardized known unit of measurements of the plant remedies. However, the dosage was determined by glass, cup, finger line, Small glass were the identified means to treat human and livestock ailments in the study area.

The preference ranking exercise helped to identify the most preferred medicinal plant species to treat febrile illness. Accordingly *Ocimum lamiifolium*, *Leonotis ocyimifolium*, *Ruta chalepensis* and *Croton macrostachyus* were found to treat the disease. Ethnobotanical investigation done elsewhere in Ethiopia [28] also reported the *Ocimum lamiifolium* for treating febrile illness. In this study, a number of medicinal plants were found to be multipurpose species being utilized for different purposes. Five respondents' ranked five commonly reported multipurpose species and six use-categories were involved in direct matrix ranking exercise in order to evaluate their relative importance to the local people related to their use values *Eucalyptus globulus* ranked 1st followed by *Hagenia abyssinica*, *Olea europaea* subsp *cuspidata*, *Cordia africana* and *Croton macrostachyus* ranked respectively similar result with research done in Ejere District [28].

The results showed that some medicinal plants were popular than others, in this study the highest informant consensus went to *Ocimum lamiifolium* which was cited by 56 respondents. The popularity of this medicinal plant was due to the preference of the species for treating febrile illness in the community and its easy access at the home gardens. *Ruta chalepensis* was cited by 54 respondents for treating stomach-ache, *Acmella caulirhiza* was cited by 42 respondents for the treatment of tonsil, and *Rumex nepalensis* cited by 39 respondents for treating stomach-ache. The medicinal plants that were supposed to be effective in treating a certain disease had higher ICF values, which indicated that these diseases were more common than those with lower ICF. Headache and acute febrile illness, toothache, tonsil, evil eye and cough scored the highest value (0.95) followed by stomachache, internal disease problem while the lower ICF value scored was recorded to the category of diseases like wound, tumor and stabbing (0.87). According to [12] medicinal plants that are presumed to be effective in treating a certain disease have higher ICF values. A high ICF value (values close to 1) indicates that the respondents rely most on the same taxa to manage specific disease condition, while low values of ICF indicate that the informants disagree on the taxa to be used in the treatment of a given ailment.

As population growth is increasing medicinal plants went threatened due to destruction of their habitats. The result of the present study showed that agricultural expansion, deforestation over grazing ranked as the most serious threats not only to medicinal plants but also to the plants of the Wonchi District as a whole respectively. The finding was in line with other findings too [9], in Dale district [24], the Benna Tsehay district [23], the Mana Angetu district [6], Wando Genet [22]. Similar to other places in Ethiopia, people living in Wonchi District have traditional practices which they have accumulated for generations to treat both human and livestock ailments. However there are no written documents on traditional uses of medicinal plants

The study showed that Wonchi District is rich in medicinal plant and related indigenous knowledge. However, anthropogenic factors and very poor conservation strategy for medicinal plants of the District highly recommended.

Additional File

Additional file 1: Appendix 1. Lists of medicinal plants used for human ailments, scientific name, growth form, disease treated, condition of plant parts used, methods of preparation and application and voucher number

Declarations

Ethics approval and consent to participate

Not applicable

Consent for publication

Not applicable

Availability of data and materials

Data not required or applicable

Competing interests

The authors declare that they have no competing interests

Authors' contributions

All authors have equal contribution for this work and have read and approved the final manuscript

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Tables

Table 1 Number of medicinal plant family, genera and species

No	Families	No. of genera	Genera in %	No. of plants	Species	Species in %
1	Acanthaceae	3	4.83	3		4.41
2	Alliaceae	1	1.61	1		1.47
3	Araceae	1	1.61	1		1.47
4	Asteraceae	8	12.9	8		11.7
5	Apiaceae	1	1.61	1		1.47
6	Boraginaceae	1	1.61	1		1.47
7	Crassulaceae	1	1.61	1		1.47
8	Commelinaceae	1	1.61	1		1.47
9	Cucurbitaceae	2	3.22	2		2.94
10	Cupressaceae	2	3.22	2		2.94
11	Euphorbiaceae	2	3.22	2		2.94
12	Fabaceae	3	4.83	4		5.55
13	Flacourtiaceae	1	1.61	1		1.47
14	Lauraceae	1	1.61	1		1.47
15	Lamiaceae	8	12.90	9		13.23
16	Myrtaceae	1	1.61	2		2.94
17	Oleaceae	1	1.61	1		1.47
18	Oliniaceae	1	1.61	1		1.47
19	Poaceae	4	6.45	4		5.55
20	Plantaginaceae	1	1.61	1		1.47
21	Polygonaceae	1	1.61	2		2.94
22	Phytolaccaceae	1	1.61	1		1.47
23	Rhamnaceae	1	1.61	1		1.47
24	Rubiaceae	1	1.61	1		1.47
25	Rutaceae	3	4.83	4		5.55
26	Rosaceae	1	1.61	1		1.47
27	Scrophulariaceae	1	1.61	1		1.47
28	Simaroubaceae	1	1.61	1		1.47
29	Solanaceae	3	4.83	4		5.55
30	Urticaceae	1	1.61	1		1.47
31	Verbenaceae	1	1.61	1		1.47
32	Zingiberaceae	1	1.61	1		1.47
33	Chenopodiaceae	1	1.61	1		1.47
34	Ranunculaceae	1	1.61	1		1.47
	Total families 34	62	4.83	68		

Table 2 Endemic species used for medicinal purpose in the study area

Species	Families	Habit	Distribution in Ethiopia
<i>Lippia adoensis</i> Hochst. ex Walp.	Verbenaceae	Herb	TU, GD, GJ, SU, AR, WG, AR, KF, GG
<i>Pycnostachys abyssinica</i> Fresen.	Lamiaceae	Shrub	IL, KF, GG, SD, WU, SU, AR, HA
<i>Thymus schimperi</i> Ronninger	Lamiaceae	Herb	TU, GD, WU, SU, AR, SD, BA, HA
<i>Urtica simensis</i> Steudel.	Urticaceae	Herb	TU, GD, GJ, SU, AR, BA, SD

Table 3 Preference ranking of plants treating febrile illness

Medicinal plant species	Respondents coded (R1-R10)										Total	Rank
	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10		
<i>Croton macrostachyus</i>	3	2	3	1	2	3	5	1	3	3	26	4
	4	5	2	2	4	1	1	4	5	2	30	2
<i>Leonotis ocyimifolia</i>	2	1	4	3	3	5	2	2	1	5	28	3
<i>Ruta chalepensis</i>												
<i>Ocimum lamiifolium</i>	5	4	5	4	5	4	4	5	4	4	44	1
<i>Eucalyptus globulus</i>	1	2	1	5	1	2	3	3	2	1	21	5

Table 4 Preference ranking

Medicinal plants	Respondents coded (R1-R9)									Total	Rank
	R1	R2	R3	R4	R5	R6	R7	R8	R9		
<i>Ajuga integrifolia</i>	4	5	5	3	5	1	4	5	4	36	2
<i>Ruta chalepensis</i>	5	4	4	5	4	5	5	4	5	41	1
<i>Solanum incanum</i>	2	3	3	4	2	4	5	2	1	26	3
<i>Rumex nepalensis</i>	3	1	2	1	1	3	1	1	2	15	5
<i>Cymbopogon caesius</i>	1	2	1	2	3	2	2	3	3	19	4

Table 5 direct matrix ranking

Use value	<i>Croton macrostachyus</i>					<i>Olea europaea</i> subsp <i>cuspidata</i>					<i>Hagenia abyssinica</i>					<i>Cordia africana</i>					<i>Eucalyptus globulus</i>			
	R					R					R					R					R			
R	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4
MP	5	4	5	2	5	4	3	2	3	4	5	5	4	4	5	4	3	2	1	4	5	4	4	3
Cons	4	4	3	3	4	5	5	4	2	3	4	5	5	3	4	5	5	4	3	5	4	5	5	3
FW	3	4	2	3	5	5	4	5	1	5	4	3	3	2	4	4	3	4	1	5	5	5	4	2
BF	5	4	3	3	3	3	2	1	2	2	5	4	4	1	5	5	4	2	1	4	4	5	5	3
CH	2	3	2	2	4	5	2	3	3	1	3	2	1	4	2	3	2	3	3	2	4	3	2	2
FR	4	5	4	1	3	5	4	4	2	5	4	4	5	3	3	4	5	4	2	3	5	4	5	3
RT	23	25	19	14	24	27	20	19	13	20	25	22	22	17	23	25	22	19	11	23	27	26	25	16
GT	104					99					109					100					121			
R	3					5					2					4					1			

Table 6: Informant consensus

No	Botanical name of Medicinal plants	Families	No. of Informants	Percent	Rank
1	<i>Ocimum lamiifolium</i> Hochst. ex Benth.	Lamiaceae	56	21.50	1st
2	<i>Ruta chalepensis</i> L.	Rutaceae	54	20.77	2nd
3	<i>Acmella caulirhiza</i> Del.	Asteraceae	42	16.20	3rd
4	<i>Rumex nepalensis</i> Spreng.	Polygonaceae	38	14.60	4th
5	<i>Allium sativum</i> L.	Aliaceae	36	13.80	5th
6	<i>Ajuga integrifolia</i> Buch,Ham	Lamiaceae	33	12.70	6th
7	<i>Premna schimperii</i> Engl.	Lamiaceae	32	12.30	7th
8	<i>Solanum incanum</i> L.	Solanaceae	30	11.54	8th
9	<i>Croton macrostachyus</i> Del.	Euphorbiaceae	27	10.40	9th
10	<i>Eucalyptus globulus</i> Labill.	Myrtaceae	25	9.60	10th
11	<i>Rhamnus prinoides</i> L.	Rhamnaceae	23	8.85	11th
12	<i>Cucumis ficifolius</i> A. Rich.	Cucurbitaceae	20	7.70	12th
13	<i>Leonotis ocymifolia</i> (Burn.f) Iwarsson, var. <i>ocymifolia</i>	Lamiaceae	19	7.30	13th
14	<i>Justicia schimperiana</i> (Hochst. ex Nees) T.Anders.	Acanthaceae	18	6.90	14th
15	<i>Hagenia abyssinica</i> (Brace) J.F.Gmel.	Rosaceae	17	6.50	15th
16	<i>Olea europaea</i> L. subsp <i>Cuspidata</i> (Wall. Ex G.Don) Cif.	Oleaceae	15	5.80	16th

Table 7: Informant consensus factor (ICF)

Categories	No. Species	Nur	ICF
Stomach ache , Gastritis	14	172	0.92
Headache and Acute Febrile illness	6	106	0.95
Dermatological infection Wound, Swelling , Tumor, Dandruff, Body itching, stabbing , Roobbii	13	97	0.87
Internal and external parasites problems , Tape worm, Ascariasis , Leeches, Blotting	7	75	0.91
Rabies, Diarrhea , Malaria, Horse disease, Black leg , Cattle cough	6	58	0.91
External injury and Poisoning problems Bleeding, Fire burn , Snake breath, Cataracts , Poison and Spider poison	8	81	0.90
Tooth ache, Tonsil, Evil eye , Cough	8	150	0.95
Internal disease problems, Blood pressure , Placenta and urine Retention and Gonorrhoea	6	60	0.92

Table 8 Threats to medicinal plant

Threats	Key Respondents coded (R1-R9)									Total	Rank
	R1	R2	R3	R4	R5	R6	R7	R8	R9		
Deforestation	4	3	4	4	5	6	4	5	5	40	2nd
Agricultural expansion	5	6	4	6	4	5	6	5	5	46	1st
Fire wood collection	4	3	2	1	5	4	3	6	1	29	6th
Over grazing	6	4	5	3	2	1	5	3	6	35	3rd
Charcoal making	5	4	3	2	3	4	5	5	3	34	4th
Construction and furniture making	4	3	4	3	4	3	5	4	2	32	5th

Figures

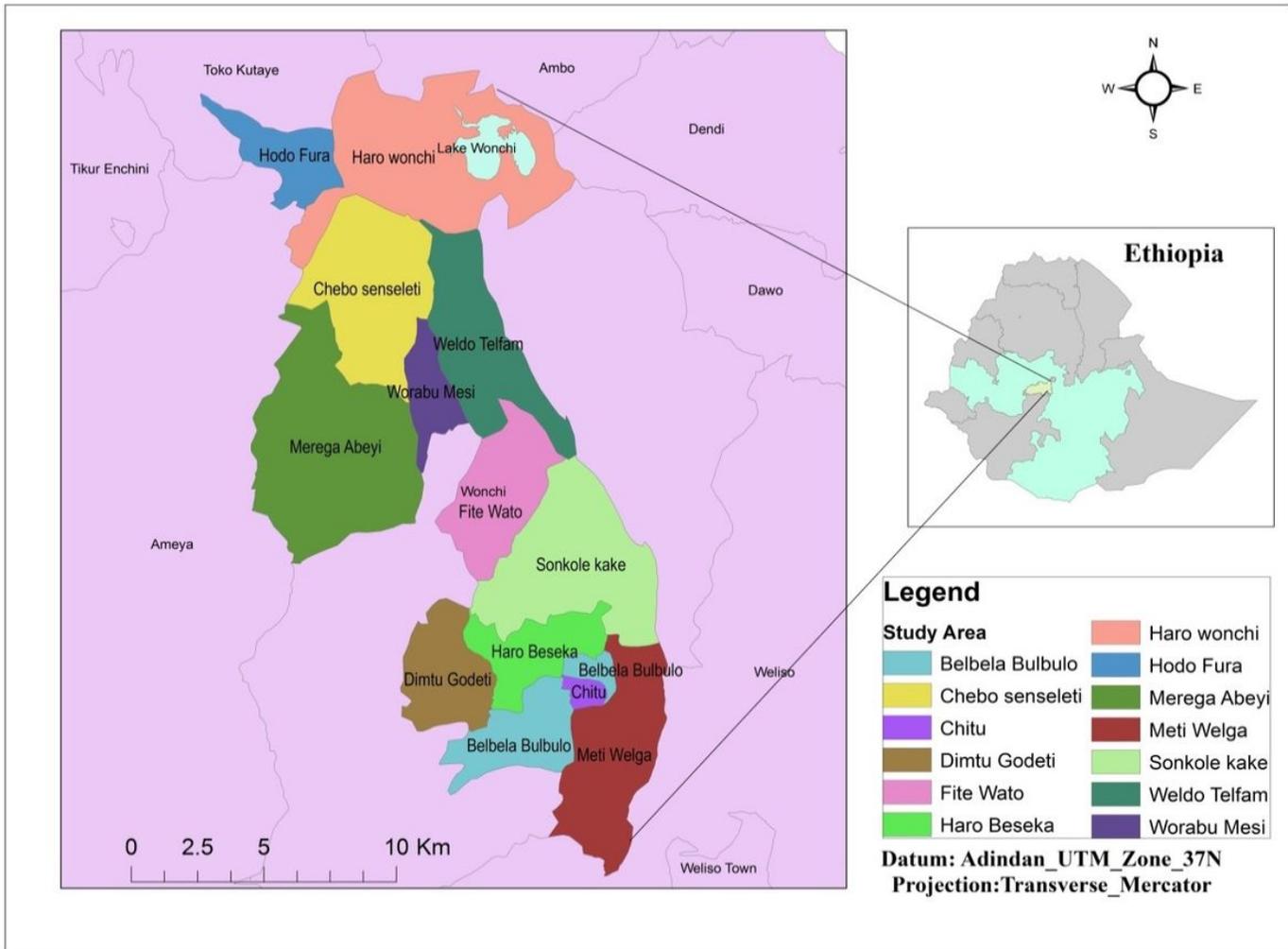


Figure 1

Map of Ethiopia showing Oromia Region and the Wonchi District

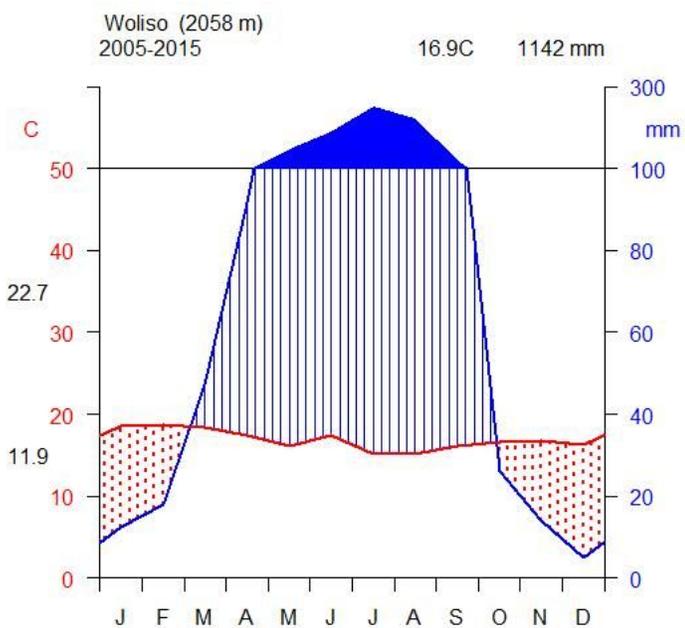


Figure 2

Clima Diagram showing the distribution of rain fall and temperature of the study area Data source: (ENMA, 2016)

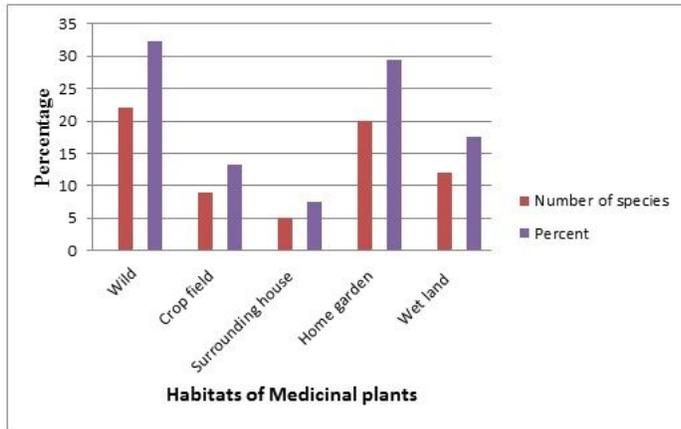


Figure 3

Habitats of medicinal plants in the study area

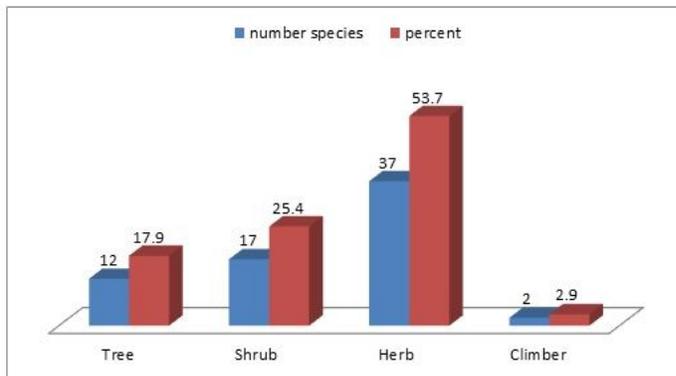


Figure 4

Habitats of medicinal plants used for human and livestock

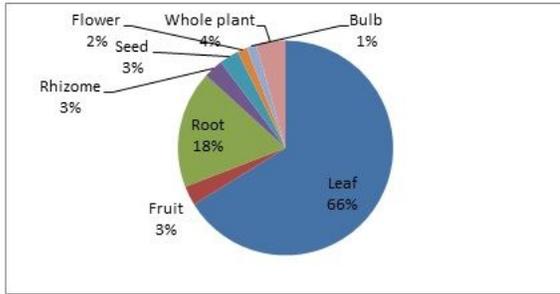


Figure 5
Parts of medicinal plants used

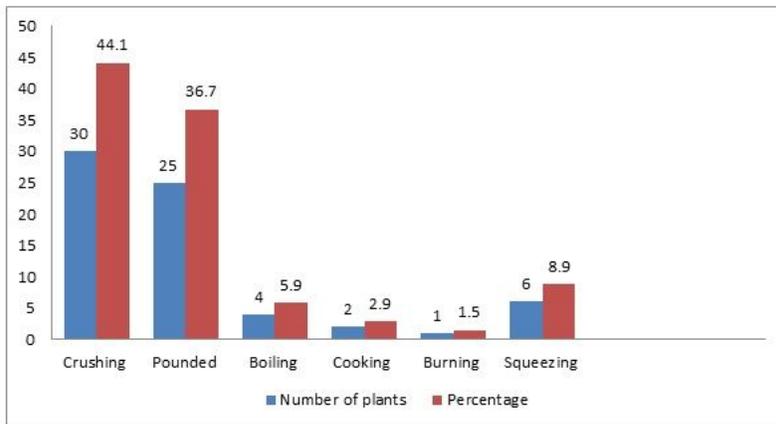


Figure 6
Method of Preparation of remedies

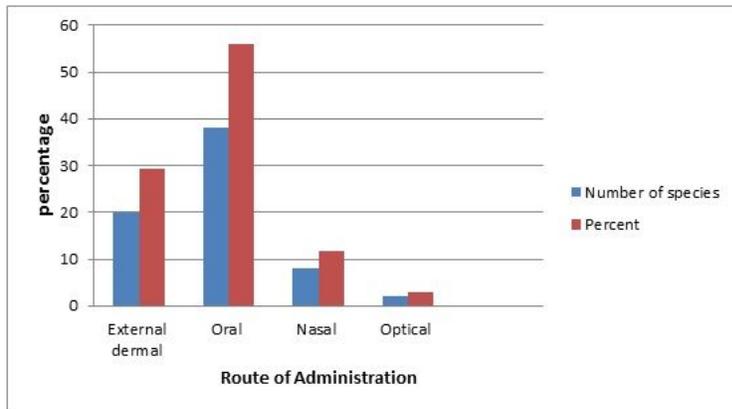


Figure 7

Route of Administration of medicinal plants

Supplementary Files

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- [Appendices.docx](#)