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Ethnobotanical Study of Medicinal Plants in Selected Horro Gudurru Woredas, Western Ethiopia

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Abstract
Background: Plant remedies are still the most important therapeutics to treat diseases in Ethiopia although large knowledge of ethno medicinal plants is declining to deterioration due to the oral passage of herbal heritage verbally. The objective of the study was to identify and document ethno-veterinary medicinal plants. **Methods:** The study was carried out from January to August 2014. The study sites were selected purposefully based on the recommendations of elders and local authorities. Ethno-botanical data were collected using semi-structured interviews, field observations and group discussion. About 56 study participants were involved in this study during the study period. **Results:** A total of 81 major considerable medicinal plant species belonging to 43 families were documented with details on their local name, family, habit and their traditional preparation, mode of application. *Asteraceae* family was constituted the highest proportion (11.6%) followed by *Solanaceae* (9.60%). The informants were reported as rabies and wound are the most commonly treated diseases by traditional healers. Herbs (46.4%) followed by shrubs (28.6%) and tree (25%). Oral route of administration (57.1%) was the most commonly used followed by topical (33.9%). About 75.8% of the plant taxa were available every time. Agricultural expansion (20.0%) has been found to be the first main threat followed by deforestation (4.20%). Agricultural expansion was the most common medicinal plants threats (47.7%) followed by deforestation (32.7 %).**Conclusion:** The study revealed that the traditional health practitioners were with a good of knowledge of medicinal plants used to treat different diseases. Hence, further research should be conducted to evaluate the efficacy and possible toxicity of the plants in the study area.
Keywords: Disease, Horro Guduru Wollega, Human, Medicinal plants

Background

In Ethiopia, plant remedies are still the most important and sometimes the only sources of therapeutics for nearly 80% of human and more than 90% in livestock population. Estimated floras of 6500 to 7000 species of higher plants are of medically important and out of these medicinal plants 12% are endemic to Ethiopia (Mengistu, 2004). The traditional knowledge in Ethiopia is passed verbally from generation to generation and valuable information can be lost whenever a traditional medical practitioner passes without conveying his traditional medicinal plants knowledge (Pankhurst *et al*., 2001). In addition, the loss of valuable medicinal plants due to population pressure, agricultural expansion and deforestation is widely reported by different workers (Abebe, 2001; Berhan and Dessie, 2002). As a result, the need to perform ethnobotanical researches and to document the medicinal plants and the associated indigenous knowledge must be an urgent task (Pankhurst, 2001; Hamilton, 2003).

The majority of the population that lives in the rural and the poor people in urban areas rely mainly on traditional medicines to meet their primary health care needs. However, the traditional knowledge of medicinal plant in Ethiopia is not compiled (Giday *et al*., 2003; Sori *et al*., 2004). Traditional medical knowledge of medicinal plants and their use by indigenous cultures are not only useful for conservation of cultural traditions and biodiversity, but also healthcare and drug development in the present and future (Tamiru *et al.,* 2013). The studies conducted on the traditional medicinal plants in Ethiopia are very limited when compared with the multiethnic cultural diversity and the diverse flora of Ethiopia (Giday *et al*., 2009). Even though traditional knowledge of medicinal plants is very crucial to treat different diseases, there is no study conducted in Horro Guduru Wollega Zone of western Ethiopia on this regard. Hence, the present study was designed to identify and document medicinal plant species and traditional medicinal knowledge of the traditional health practitioners in study area.

Materials and Methods

Study Area

The study was conducted from April to August 2014 at selected Horro Guduru Woredas (Jarte Jardega, Jimma Geneti, Horro woreda, Abay Chomen and Ababo Guduru) in Oromia regional state of Western Ethiopia. The study sites were selected based on the availability of practice of traditional medicine and on the

recommendations of knowledgeable elders and local authorities. Moreover; the agro-climatic zones was considered to select the study Woredas and kebeles purposely. The zone is found about 251 Km from West of Addis Ababa. The study area is located at an elevation of 2,088 m above sea level. The annual minimum and maximum temperature is 15-27°C and the annual average rainfall is 1800 mm (Horro Gudurru District., 2013). The rural and peri-urban areas of the zone are featured by mixed agricultural system where livestock play an important role. The vegetation of the area is dominated by xerophylic plants. There are no adequate veterinary services in case of drug availability, only some broad spectrum drugs were offered.

Study Population

The target populations were voluntary traditional health practitioners. The survey was conducted through questioner surveys designed for farmer particularly knowledgeable elders and traditional healers.

Data Collection

An ethno botanical survey was conducted to gather information on the traditional usage of plants in health care system using a semi-structured interview, observations and field guided walks (Martin, 1995) traditional healers who were willingness to share their indigenous knowledge. A total of 56 individuals were purposively 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 two to three times in order to confirm the reliability of the ethnobotanical information. The responses that were not in harmony with each other were rejected.

Plant Specimen Collection and Identification

The reported medicinal plants were collected from natural vegetation and home gardens during the field walks and habits of the plants were listed. Preliminary identification was done at the site (field) and the collected voucher specimens were taken to the National Herbarium of Ethiopia (Addis Ababa University). Specimen identification and confirmation was undertaken by using taxonomic keys and various volumes of the Flora of Ethiopia and Eritrea (Edwards *et al.,* 2000; Hedberg *et al.,* 2006). Finally, the identified specimens were reconfirmed by a taxonomic expert and the specimens with their label stored at the National Herbarium.

Data Analysis

The collected ethnobotanical data were entered into Excel spreadsheet 2007 and summarized using descriptive statistical methods such as frequency and percentages.

Results

General Characteristic of the Informants

In this study, a total of 81 major considerable medicinal plant species and 43 plant families were identified and documented during the period in the study areas. Many knowledgeable local farmers 86 (71.7%) and traditional healers 34 (28.3%) and were participated during the study period. Almost all of the respondents were elder age groups (92.0%) and younger age groups (8%) respectively (Table1).

Sources and Habit of Medicinal Plants

The medicinal plant data collected from the study site revealed that most of the medicinal plants were collected from the wild (65.8%) followed by from home gardens (27.5%) and both (6.70%) respectively (Table 1). In addition, the most indicated habit of the medicinal plants was herbs (46.4%) followed by shrubs (28.6%) and tree (25%) (Table 4).

Medicinal plant parts used for the preparation of the remedies

The study showed that the widely used plant part for the preparation of the remedies in the study area was leaves (51.8%) and followed by seed and fruits (21.4%) and roots (19.6%) (Table 3).

Mode of preparation and Route

The study revealed that the highest mode of preparation was in the form of grinding (73.7%); followed by

crushing (17%) and others like chopping, decoction, roasting, consumption of whole plant part, streaking (9.30%). The majority of the plant remedies were prepared from fresh material of the plants which accounted for (87%) followed by fresh/dry (13%) (Table 2). The most widely used route of administration was oral which accounted (57.1%) followed by topical (33.9%) and inhalation (8.93%) (Table 4).

Availability and Medicinal plant families frequently used

The survey was indicated medicinal plants were affected by season; many of the plants were available every time (75.8%), some are found seasonally (20.0%), and the rest, difficult to get it (4.20%) as described in the study area (Table 5). *Asteraceae* family was constituted the highest proportion (11.6%) followed by *Solanaceae* (9.60%) (Table 3).

Knowledge Transfer of Medicinal plants

According to the survey, knowledge transfer of medicinal plants follows vertical transfer to the most selected family member orally with great secrecy. The highest number of transfer of knowledge about the plant is to trusted eldest son that accounted for (60.1%) followed by trusted sons (20.4%), and others are all members of the family (8.5%), relatives (7%) and friends (4%). The findings of the study showed that as people become older and older their knowledge of traditional medicine becomes better and better. Most of the informants were elders that indicated the trend of transferring knowledge is usually at old age. The study also indicated that there is no widely observed trade of medicinal plants in the study area though some practitioners and women sell some medicinal plants in the market and in their homes. Some of the plant medicines that grow in home gardens and sold were *Olea europaea*, *Nicotiana tabacum*, *Capsicum annum*, *Coffea arabica*, *Justicia- schimperiana* and *Ricinus- communis.*

Conservation and Threats of Medicinal Plants

The study indicated that many of the informants who have knowledge on traditional medicine usage give priority to the immediate use of the medicinal plants than to its sustainable future uses, as a result their harvesting style is destructive. However, some plants has protected for their spiritual and cultural purposes. Thus, these places are good sites for the protection of the medicinal plants since cutting and harvesting are not allowed in such particular areas. This was indicated that a good practice for the conservation of medicinal plants through cultivation. The study revealed that there were a number of threats that affect the medicinal plants in the study area. The threats include agricultural expansion (47.7%) followed by deforestation (32.7%) and overgrazing (12.1%) (Table 6).

Preference Paired Comparison

A paired comparison was made for four medicinal plants which were used to treat rabies in the study area. For this, 25 key informants were requested to give rank to plant taxa according to their effectiveness. Accordingly, *Ricinus communis* stood first and followed by *Clucia lanceolata* (Table 7).

Discussion

In this study, a total of 81 major considerable medicinal plant species belonging to 43 families were identified and documented in the study area during the study period. The study was indicated that the majority of the traditional healers were elder age groups (92%). In comparison of educational status, non-educated informants handled much knowledge of traditional medicine whereas educated informants had low knowledge of traditional medicine, which is an indicative of impact of modern education. This was in line with report of Yirga *et al.* (2012a, b; Yigezu *et al*., 2014) from Jimma. The findings was also agrees with reports of Tamiru *et al*. (2013) from Dabo Hana District, West Ethiopia and Gebrezgabiher *et al*.(2013) from Tigray region. Less medicinal knowledge in relation to young age might be attributed to the fact that traditional knowledge is built with years of experience (Awas, 2007). This might be also due to the transfer knowledge of medicinal plants follows vertical transfers to the most selected family member orally with great secrete from generation to generation. Moreover, transferring the knowledge of medicinal plants is usually at old age.

In the present study, Asteraceae family was constituted the highest proportion (11.6%) followed by *Solanaceae* (9.60%). The finding was in line with other findings that were conducted in different parts of Ethiopia (Gebre, 2005; Tolesa, 2007; Teklehaymanot *et al*., 2009; Gebrezgabiher *et al*., 2013; Lulekal *et al.,* 2014). The medicinal plant species recorded in the zone are also used as remedies in other parts of Ethiopia and Africa (Mesfin *et al*., 2009; Raj Luitel *et al.*, 2014).

The finding was revealed that the majority of the traditional healers in the study area relies on traditional knowledge, practices and locally available materials (Giday and Ameni, 2003) primarily medicinal plants to cure and prevent different diseases such as wound, rabies, abdominal pain, bleeding, , leech infestation, skin diseases, lice infestation, ring worm and gastro intestinal parasites. This indicated that herbaceous medicinal

plants were the widely used for the treatment of various diseases. The finding agrees with studies in other parts of Ethiopia (Tessema *et al*., 2001; Giday and Ameni, 2003; Sori *et al*., 2004; Teklehymanot and Giday, 2007).

In this study, most of the medicinal plants were collected from the wild (65.8%) and others were from home gardens (27.5%) and both (6.70%). This was in line with studies in other parts of Ethiopia (Giday *et al*., 2009), Pakistan (Farooq *et al*., 2008) and Brazil (Barboza *et al*., 2007; Monteiro *et al*., 2011). This indicated that the practice of cultivation of medicine plants for their medicinal purpose in home gardens of most of the country is low although many plants are cultivated for other purposes, mainly for food. In a similar way people in the study area have less effort to cultivate medicinal plants in their home gardens rather go to the nearby or far places and harvest the plants. In addition, the habit of the medicinal plants indicated that most of them were herbs (46.4%) followed by shrubs (28.6%) and tree (25%). The knowledge about the type, part used, dosage, administration of the medicinal plants is circulating only among traditional practitioners of traditional medicine based on the severity of diseases (Tadesse, 1986; Hailemariam *et al*., 2009; Yigezu *et al*., 2014).

In the current, different forms of preparations are investigated; some of them are homogenizing in water, butter and local alcohol. Grinding crushing, pounding, decoction and concoction but homogenizing in water takes the lead (Balemie *et al*., 2004). A similar study showed that different preparations and application methods of medicinal plants were mentioned for internal and external use (Scherrer *et al.,* 2005) in which water is mostly used to dilute plant preparations while some remedies are prepared from dry and fresh plant parts (Giday *et al.,* 2003).

In the present study, all plant growth forms were not equally used as remedies, because of the difference in distribution among the growth forms. This leads to the wide use of herbs and shrub for their medicine. The part of the medicinal plant which is highly used for the preparation of the remedies were leaves (51.8%) followed by seed and fruit (21.4%). This agrees with the reports of Giday *et al*. (2003) and Mesfin (2007). Based on the information gathered from the key informants especially from those who are highly accepted by the society for their ability in healing different health problems, the condition of preparation of remedies was not the same. The highest condition of preparation was fresh (87%) followed by fresh/dry (13%). In contrast to this, some professional traditional healers sell their plant medicines in dried form in the market and also store the dried plant medicines in different containers in their homes. This agrees with another findings conducted at Tigray region (Gebrezgabiher *et al*., 2013).

The study also showed that the information gathered from the key informants especially from those who are highly accepted by the society, most of the plant remedies were administered orally (57.1%) followed by topical (33.9%) and inhalation (8.93%). The result agrees with similar studies elsewhere in Ethiopia (Abebe and Ayehu, 1993; Teklehaymanot and Giday, 2007). But, the dosage determination was the big problem in the study area because there is no standardized known unit of measurements of the plant remedies. However, the dose was determined by using homemade remedies using cup, glass, plant parts like number of bulbs and number of seeds and their own hand as handful were the identified means to treat animals in the study area. The dosage regime is generally dependent on the age, sex, weight and degree of the diseases. This agrees with report of ethno-medicinal plant knowledge and practice by Yineger *et al*. (2008) from Jimma; Abera (2014) from Gimbi district, Southwestern Ethiopia and Hailemariam *et al*. (2009) from lowlands of Konta Special Woreda, SNNP regional state, Ethiopia.

In this study, the information gathered from the key informants was indicated that the treats of medicinal plants increase from time to time in study area. The agricultural expansion was the major medicinal plant treats (47.7%) followed by deforestation (32.7%). The finding was in line with other findings (Giday *et al*., 2001; Mesfin *et al.,* 2009). This might be due to continuous agricultural expansions, deforestation and draught in addition to lack attention towards the medicinal plants. The plants are disappeared because of rapid socioeconomic, environmental and technological changes and as a result of the loss of cultural heritage under the guise of civilization (Lulekal *et al*., 2008; Khan *et al*., 2012).

The traditional medicinal use of some surveyed medicinal plants are recorded in other parts of the country Hussan *et al*. (2013) from Pakistan and Luitel *et al*. (2013) from the Makawanpur district of central Nepal. *Hagenia abyssinica* is used to treat Taneasis in human in Bale, Debark and Kofle rural communities of Ethiopia (Assefa *et al*., 2010). Similarly, its use for treatment of livestock ailments have been also documented (Mesfin and Obsa, 1994; Abebe *et al*., 2000; Wondimu *et al*., 2007; Yineger *et al*., 2007). The therapeutic value of *Achyranthes aspera* is known for skin diseases (Goyal *et al*., 2007) and various gastrointestinal and respiratory problems (Bhandari, 1990). The medicinal use of *Azadirachta indica* to treat endoparasites and ectoparasites is also documented by Sori *et al*. (2004) in the Borena pastoralists, southern Ethiopia. Moreover, the efficacy of leaves of *Azadirachta indica* to reduce the parasitic load (Khan, 2009) and that of the Aloe species in treating *Trychostogylus* in sheep (Ibrahim, 1986) has also been confirmed. The study depicted that the traditional healers and local farmers have rich knowledge about medicinal plants to treat themselves through indigenous knowledge to prevent and control the health problems.

Conclusion

Generally, 81 major considerable species and 43 families of medicinal plants was identified and documented during the study period in the study area. There was large number of valuable resources, practices and knowledge of medicine which can solve problems of shortage of drugs at rural areas as well as drug resistance in different diseases. The plants were mainly collected from the wild by consultation of traditional healers. Agricultural expansion and deforestation were found to be the main threats for the medicinal plants. Thus, attention should be given towards the medicinal plants and research should be needed to determine safety, toxicity and dosage.

Competing Interests

All authors have declared that no competing interests exist

Authors' contributions

TB: Conception of the research idea, designing and data collection, data analysis and interpretation, and manuscript reviewing. DA: Data collection, interpretation of the results, and drafting the manuscript. (EE): Data collection, interpretation of the results and drafting the manuscript with TB. All authors read and approved the final manuscript.

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Table 1. List of medicinal plants used for treatment of human diseases: scientific name; family name; local name; habits; plant parts used; other uses, route of administration and indications

Scientific name	Family name	Local name	Habit	Part	Other uses	Routes	Indications
Achyranthes aspera	*Amaranthaceae*	Maxxannee	Herb	Root	Fence	Oral	Wound
Rumex nepalensis Spreng	*Polygonaceae*	Timijjii	Herb	Root	-	Oral	Gastritis, Spider poison
Stereospermum kunthianum Cham	*Bignoniaceae*	Botoroo	tree	Leaf		Oral, Inhalation	'Kaashmeer', Evil eye
Allium sativum	*Alliaceae*	Qullubbii adii	Herb	Bark	Food	Oral	Abdominal pain,
Brassica carinata	*Brassicaceae*	Gomenzeera	Herb	Seed	Food	Oral	Wound
Brucea-anti dysentrica	*Simaroubaceae*	Qomonyoo	Herb	Fruit		Oral	Rabies, ring worms
Calpurnia aurea	*Fabaceae*	Ceekkataa	Shrub	Leaf	Fence	Topical	Lice infestation, leech
Malva verticillata L.	*Malvaceae*	Karfichoo	Herb	Leaf	Inhalation		Fibril illness ('Mich')
Kalanchoe laciniata L	*Crassulaceae*	Bosoqqee	Herb	Root	-	Topical	Wound
Hordeum vulgare L.	*Poaceae*	Garbuu	Herb	Seed	Food	Oral	Gastritis
Linum usitatissimum L.	*Linaceae*	Talbaa	Herb	Seed	Food	Topical, Oral	Dandruff, Gastritis
Guizotia abyssinica L.	*Asteraceae*	Nuugii	Herb	Seed	Food	Topical	Swelling, Mada gatetti
Cucurbita pepo L.	*Cucurbitaceae*	Buqqee	Herb	Seed	Food	Oral	Tape worm
Verbascum sinaiticum Benth	*Scrophulariaceae*	Gurra harree	Herb	Leaf	-	Topical	External parasites
Rhus ruspolii	*Anacardaceae*	Xaaxessaa	Tree	Leaf	-	Topical	Ectoparasites
Guizotia scabra	*Asteraceae*	Tuufoo	Herb	Leaf	-	Topical	Ectoparasites, insecticide
Colocasia esculenta	*Araceae*	Goodarree	Herb	Leaf	-	Oral	Delayed placenta
Acanthus polystachius Delile	*Achantaceae*	Kosorruu	Shrub	Leaf	-	Topical	Wound
Ximenia americana L.	*Olacaceae*	Hudhaa	Shrub	Leaf	-	Oral	Menstruation
Vigna vexillata L. A. Rich.	*Fabaceae*	Gurra hantuutaa	Herb	Leaf		Topical	Spider poison
Vernonia auriculifera Hiern	*Asteraceae*	Reejii	Shrub	Leaf		Topical	Dermatitis
Stephania abyssinica	*Mensipermaceae*	Hidda kalaalaa	Herb	Whole		Oral	Common cold
Schinus molle L.	*Anacardaceae*	Qundoobarbaree	Tree	Seed	Food	Oral	Tonsilitis, Abdominal pain
Rumex abyssinicus Jacq	*Polygonaceae*	Dhangaggoo	Herb	Leaf		Topical	Skin infection
Plectranthus edulis	*Solanaceae*	Dinnicha oromoo	Shrub	Root	Food	Oral	Loss of appetite
Lippia javanica	*Verbenaceae*	Kusaye	Shrub	Leaf	Fence	Inhalation	Insect repellent
Lepidium sativum L.	*Brassicaceae*	Fexo	Herb	Seed	Food	Inhalation	'Mich'
Maesa lanceolata Forssk	*Myrsinaceae*	Abayi	Tree	Fruit		Smoking	Insecticide
Brassica nigra L. Koch	*Brassicaceae*	Sanafica	Herb	Seed	Food	Oral	Common Cold, colic
Maytenus senegalensis	*Celastraceae*	Kombolcha	Tree	Leaf	Fence	Topical	Eye infection
Ensete ventricossum Cheesman	*Musaceae*	Baala warqee	Herb	Leaf	For bread baker	Oral	Abdominal pain
Echinops hispidus Fresen.	*Asteraceae*	Keberchoo	Herb	Bark	-	Inhalation	Evil eye
Cordia africana Lam.	*Boraginaceae*	Waddeessa	Tree	Leaf	Fence		Spider poison
Coccinia abyssinica	*Cucurbitaceae*	Ancootee	Herb	Root	Food	Oral	Tuberculosis, Fracture
Clausena anisata (Wild.) Benth	*Rutaceae*	Ulmaayii	Tree	Leaf	Tooth cleaner	Topical	Snake bite, Ectoparasite
Rhamnus prinoides L Herit.	*Rhamnaceae*	Geeshoo	Shrub	Leaf	Food	Oral	Tonsilitis
Girardinia bullosa (Steud.) Wedd.	*Urticaceae*	Gurgubbee	Shrub	Root	-	Oral	Blackleg
Capsicum annum	*Solanaceceae*	Mimmixa	Herb	Seed	Food	Oral	Abdominal pain leech, Tapeworm
Clucia lanceolata	*Euphorbiaceae*	Ulee foonii	Shrub	Root	Fence	Oral	Rabies
Coffea Arabica	*Rubiaceae*	Buna	Shrub	Seed	Food	Topical	Wound, abdominal pain
Croton- macrostachyus	*Euphorbiaceae*	Bakkanniisa	Tree	Leaf	Shed, fire wood	Oral/topical	Ringworm, wound
Grewia bicolar	*Tliaceae*	Harooressa	Tree	Bark	Fence	Oral	Retained fetal membrane
Justicia schimperiana	*Acanthaceae*	Dhummugaa	Shrub	Root/Leaf	Fence	Oral	Rabies, headache
Nicotiana tabacum	*Solanaceae*	Tamboo	Shrub	Leaf	stimulant	Oral	Leech, Tape worm, snake bite
Prunus africana	*Rosaceae*	Hoomii	Tree	Bark	Shed, furniture	Topical	Wound
Phytolacea- dodecandra	*Phytolacaceae*	Handoodee	Herb	Leaf	Detergent	Topical	Wound
Ricinus- communis	*Euphorbiaceae*	Qobboo	Shrub	Leaf, Root	Shed, Food	Oral	Rabies, Liver disease
Vernonia anygdalina	*Asteraceae*	Eebicha	Tree	Leaf	Fence, Fire wood	Oral	Increase milk Production, Retained placental membrane
Zingiber officinale	*Zingebiraceae*	Jinjibila	Herb	Root	Food	Oral	Rabies, Abdominal pain, leech
Olea europaea	*Oleaceae*	Ejersa	Tree	Leaf	Fire wood, furniture	Inhalation	Rabies, snake bite
Cucumis ficifolius	*Cucurbitaceae*	Hiddi hooloto	Shrub	Root	-	Oral	Rabies
Solanum gigantum Jacq.	*Solanaceae*	Hiddii saree	Herb	Root	-	Oral	Rabies
Dodonaea angustifolia	*Sapindaceae*	Itacha	Shrub	Leaf	Fence	Topical	Lice infestation
Citrus aurantifolia	*Rutaceae*	Lommi	Shrub	Fruit	Food	Topical	antiemetic, wound
Carica papaya L.	*Caricaceae*	Paappaayyaa	Tree	Fruit	Food	Oral	Anti malaria
Catha edulis	*Celastraceae*	Caatii	Shrub	Leaf	Stimulant	Oral	Cough, Endoparasite

Table 2. List of medicinal plants used for treatment of human diseases: scientific name, family name, local name, route of administration; methods of preparation and application, and solvent mixed with.

Scientific name	Family name	Local name	Routes	Preparation and Indication
.Achyranthes aspera	*Amaranthaceae*	Maxxannee	Topical and oral	The fresh root is chopped and bounded together with a leaf of *Commicarpus podunculosus*, mixed with water. The leaves are also crushed and mixed with water (for remedy of wound, diarrhea)
Rumex nepalensis Spreng	*Polygonaceae*	Timijjii	Oral	Few root chewed and swallowed (Gastric), Fresh leaves crushed and mixed with Leaves of *Acanthus polystachius* by mixing with butter creamed on affected part (Spider poison)
Stereospermum kunthianum Cham	*Bignoniaceae*	Botoroo	Oral, Inhalation	Fresh/Dried bark of *Stereospermum kunthianum Cham*., bark of *Croton macrostachyus*, Root of *Cucumis ficifolius*, bulb of Allium sativum L. and seed of *Capsicum frutescens* powdered together and half of a bottle given for three days. Dried bark put on fire and the smoke inhaled (Evil eye)
Allium sativum	*Alliaceae*	Qullubbii adii	Oral	The bulb taken with 'injera' before eating breakfast (Abdominal pain, Anti-malaria).
Brassica carinata	*Brassicaceae*	Gomenzeera	Oral	Dried seed Powdered and mixed with water then drunk (Common Cold)
Brucea-anti dysentrica	*Simaroubaceae*	Qomonyoo	Oral	Fresh leaves crushed and mixed with Leaves of *Bersema abyssinica Fresen* and cooked With porridge and given for Ascaris
Calpurnia aurea	*Fabaceae*	Ceekkataa	Topical/nose	Fresh leaves soaked in water applied topically (Lice infestation, Leech)
Malva verticillata L.	*Malvaceae*	Karfichoo		Leaves cooked and the smoke inhaled to get relief from 'Mich (Fibril illness).
Kalanchoe laciniata L	*Crassulaceae*	Bosoqqee	Topical	Fresh or dried root of *Kalanchoe laciniata*, seed of *Capsicum frutescens, Allium sativum* and leaves of *Croton macrostachyus* powdered together and mixed with water given topical (Skin Diseases).
Hordeum vulgare L.	*Poaceae*	Garbuu	Oral	Seed of Hordeum vulgare powdered with seed of Brassica carinata and drunk (Back pain)
Linum usitatissimum L.	*Linaceae*	Talbaa	Topical, Oral	The hair washed by seeds of Linum usitatissimum and used as soap (Dandruff, Gastritis).
Guizotia abyssinica L.	*Asteraceae*	Nuugii	Topical	Seed roasted powdered and the decoction drunk, (Wound)
Cucurbita pepo L.	*Cucurbitaceae*	Buqqee	Oral	The dried seed roasted mixed in butter and eaten (Tape worm)
Verbascum sinaiticum Benth	*Scrophulariaceae*	Gurra harree	Topical	Fresh leaves powdered and mixed in water then given orally (Lice and fleas infestation)
Rhus ruspolii	*Anacardaceae*	Xaaxessaa	Topical	Fresh leaves crushed and rubbed on affected part (Hyena bite), Root of *Rhus ruspolii* powdered and mixed with water given orally.
Guizotia scabra	*Asteraceae*	Tuufoo	Topical	Fresh leaves of *Guizotia scabra* and leaves of *Calpurnia aurea* crushed and rubbed (Insecticide).
Colocasia esculenta (L.) Schott	*Araceae*	Goodarree	Oral	Tuber crushed and mixed with butter (Gastritis)
Acanthus polystachius Delile	*Achantaceae*	Kosorruu	Topical	Fresh leaves crushed, mixed with water and rubbed on affected part (Wound)
Ximenia americana L.	*Olacaceae*	Hudhaa	Oral	Crushed and mixed with water and one cup of tea taken for 1–5 days until the blood stop (Menstruation)
Vigna vexillata L. A. Rich.	*Fabaceae*	Gurra hantuutaa	Topical	Leaves crushed with leaves of *Cucumis ficifolius* in water and rubbed on affected part (spider poison).
Vernonia auriculifera Hiern	*Asteraceae*	Reejii	Topical	Fresh leaves smashed and the extracts dropped on the cut skin (Dermatitis).
Stephania abyssinica	*Mensipermaceae*	Hidda kalaalaa	Oral	The whole part is crushed and boiled in water then the smoke will be inhaled until the patient getting sweat (Common cold).
Schinus molle L.	*Anacardaceae*	Qundoobarbaree	Oral	Fresh seed chewed and given by water (Tonsilitis, Abdominal pain)
Rumex abyssinicus Jacq	*Polygonaceae*	Dhangaggoo	Topical	Leaves crushed and smashed in water then applied on affected part (Skin infection)
Plectranthus edulis	*Solanaceae*	Dinnicha oromoo	Oral	Root cooked with water and eaten (Loss of appetite)
Lippia javanica	*Verbenaceae*	Kusaye	Inhalation	Fresh leaves chewed with butter (Chest pain, Cough).
Lepidium sativum L.	*Brassicaceae*	Fexo	Inhalation	Seed crushed and smoked 'Mich'
Maesa lanceolata Forssk	*Myrsinaceae*	Abayi	Topical	Fresh leaves crushed and rubbed by mixing with water on the body (Ectoparasites).
Brassica nigra L. Koch	*Brassicaceae*	Sanafica	Topical	Seed crushed and its juice applied topically (Wound)
Maytenus senegalensis	*Celastraceae*	Kombolcha	Topical	Leaf and bark juice applied topically (Wound)
Ensete ventricossum Cheesman	*Musaceae*	Baala warqee	Oral	The latex half cup of tea taken to get relief from stomach ache (Abdominal pain)
Echinops hispidus Fresen.	*Asteraceae*	Keberchoo	Inhalation	Dried bark put on fire and the smoke inhaled (Evil eye)
Cordia africana Lam.	*Boraginaceae*	Waddeessa	Tropical	Leaves crushed together with feces of goat then put on fire the ash mixed with butter and creamed on affected part (Spider poison)
Coccinia abyssinica	*Cucurbitaceae*	Ancootee	Oral	Root cooked with leaves of *Croton macrostachyus* and eaten with 'injera' for four days (Fracture)
Clausena anisata	*Rutaceae*	Ulmaayii	Topical	Snake bite, Ectoparasite
Rhamnus prinoides	*Rhamnaceae*	Geeshoo	Oral	Fresh leaves chewed with water (Tonsilitis)
Girardinia bullosa	*Urticaceae*	Gurgubbee	Oral	Root powdered and mixed in water and applied orally
Capsicum annum	*Solanaceceae*	Mimmixa	Oral	Fruits are crushed together with salt and eaten with 'injera' (Abdominal pain, Tapeworm)
Clucia lanceolata	*Euphorbiaceae*	Ulee foonii	Oral	Fresh leaves hold in teeth (Toothache, Rabies)
Coffea Arabica	*Rubiaceae*	Buna	Topical	The dried coffee bean roasted and powdered with mixed with honey (Wound, abdominal pain, diarrhea).
Croton- macrostachyus	*Euphorbiaceae*	Bakkanniisa	Oral/Topical	Fresh leaves chewed with butter (Ring worm, Wound).

Grewia bicolar	*Tliaceae*	Harooressa	Oral	Bark of *Grewia bicolor* grinded and mixed in water and salt added finally given delayed placenta
Justicia schimperiana	*Acanthaceae*	Dhummugaa	Oral	Leaves put on fire with leaves of *Brucea antidysentrica* and rubbed on bite area (Rabies).
Nicotiana tabacum	*Solanaceae*	Tamboo	Oral	Leaves crushed and mixed with water and drunk (Snake bite), Leaves crushed and tied on affected part (Snake Poison).
Prunus africana	*Rosaceae*	Hoomii	Topical	Part of bark is powdered and tied for five days (Wound)
Phytolacea- dodecandra	*Phytolacaceae*	Handoodee	Topical	Leaf concoction is applied topically (Wound)
Ricinus- communis	*Euphorbiaceae*	Qobboo	Oral	Fresh leaves crushed and mixed with water and taken one cup of tea for 5 days (Liver Diseases, Rabies).
Vernonia anygdalina	*Asteraceae*	Eebicha	Oral	Leaves crushed and mixed with remnants of local beer (‘Tella’) and given orally for delayed placenta; Leaves crushed and soak in water and the exudates drenched.
Zingiber officinale	*Zingebiraceae*	Jinjibila	Oral	Chewed and swallowed (Cough, abdominal pain)
Olea europaea	*Oleaceae*	Ejersa	Inhalation	Fresh root chewed with water (Abdominal pain)
Cucumis ficifolius	*Cucurbitaceae*	Hiddi hooloto	Oral	Root concoction is drunk (Rabies)
Solanum gigantum	*Solanaceae*	Hiddii saree	Oral	Root crushed and taken with coffee (Rabies)
Dodonaea angustifolia	*Sapindaceae*	Itacha	Topical	leaves juice sprayed to the affected area (Lice infestation, Wound)
Citrus aurantifolia	*Rutaceae*	Lommi	Topical	Fruit paste is applied to the affected area (Antiemetic, Wound)
Carica papaya L.	*Caricaceae*	Paappaayyaa	Oral	Fresh leaf is crushed and given orally (Wound and Anti malaria).
Catha edulis	*Celastraceae*	Caatii	Oral	Fresh leaves chewed with water (Cough, Endoparasite)

Table 3. Summary of medicinal plants’ frequencies in the study area

Family name	Botanical Frequency	Percentage (%)
Amaranthaceae	1	2.33%
Acanthaceae	1	2.33%
Achantaceae	1	2.33%
Alliaceae	1	2.33%
Anacardaceae	2	4.65%
Araceae	1	4.65%
Asteraceae	5	11.6%
Bignoniaceae	1	2.33%
Boraginaceae	1	2.33%
Brassicaceae	3	6.98%
Caricaceae	1	2.33%
Celastraceae	2	4.65%
Crassulaceae	1	2.33%
Cuccurbitaceae	1	2.33%
Zingebiraceae	1	2.33%
Oleaceae	1	2.33%
Sapindaceae	1	2.33%
Rutaceae	1	2.33%
Cucurbitaceae	3	6.98%
Euphorbiaceae	3	6.98%
Fabaceae	2	4.65%
Linaceae	1	2.33%
Malvaceae	1	2.33%
Mensipermaceae	1	2.33%
Musaceae	1	2.33%
Myrsinaceae	1	2.33%
Olacaceae	2	4.65%
Phytolacaceae	1	2.33%
Poaceae	1	2.33%
Polygonaceae	2	4.65%
Rhamnaceae	1	2.33%
Rosaceae	1	2.33%
Rubiaceae	1	2.33%
Rutaceae	2	4.65%
Sapindaceae	1	2.33%
Scrophulariaceae	1	2.33%
Simaroubaceae	1	2.33%
Solanaceae	4	9.30%
Tliaceae	1	2.33%
Urticaceae	1	2.33%
Verbenaceae	1	2.33%
Zingebiraceae	1	2.33%
Scrophulariaceae	1	2.33%

Table 4. Summery medicinal plants parts, habit, Mode of administration application with respective Woredas (Total number of plants identified=**56**).

Characteristics		Frequency	Percentage
Parts of Plants	Leaf	29	51.8%
	Seed and fruit	12	21.4%
	Whole	1	1.79%
	Bark	4	7.14%
	Root	11	19.6%
Habit	Herb	26	46.4%
	Shrub	16	28.6%
	Tree	14	25%
Medicinal plants with respective Woredas	Jarte Jardega	18	32.1%
	Jimma Geneti	11	19.6%
	Horro	8	14.3%
	Abay Chomen	9	16.1%
	Ababo Guduru	10	17.9%
Mode of administration	Orally	32	57.1%
	Topically	19	33.9%
	Inhalation	5	8.93%
Application	External	18	32.1%
	Internal	38	67.9%

Table 5. The number of Medicinal plant remedies used to treat Human diseases in the study area

Variables		No of respondents	No of identified major risk factors (%)
Sources of Plants	Wild	79	65.8%
	Domestic	33	27.5%
	Both	8	6.70%
Total		**120**	**100**
Group of interviewed	Local farmers	86	71.7%
	Traditional healers	34	28.3%
Total		**120**	**100**
Availability of the medicinal plants	Every time	91	75.8%
	Seasonally	24	20.0%
	Difficult to get	5	4.20%
Total		**120**	**100**

Table 6. Priority ranking of factors perceived as threat to Medicinal plants on the level of destructive effects in Horro Guduru based on interviews.

Treats of Medicinal Plants	No of Respondents (n=120).	Percentage (%)	Rank
Agricultural expansion	83	47.7	1
Deforestation	57	32.7	2
Overgrazing	21	12.1	3
Drought	13	7.50	4

Table 7. Paired comparison of medicinal plants for treating of Rabies in study area

Scientific name	Family name	Local name	No of informants
Ricinus- communis	*Euphorbiaceae*	Qobboo	10
Clucia lanceolata	*Euphorbiaceae*	Ulee foonii	7
Cucumis ficifolius	*Solanaceae*	Hiddii saree	6
Solanum gigantum Jacq	*Cucurbitaceae*	Hiddi hoolota	2
Total			**25**

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