ASIAN JOURNAL OF ETHNOBIOLOGY
Volume 5, Number 1, May 2022
Pages: 35-43

E-ISSN: 2580-4510
DOI: 10.13057/asianjethnobiol/y050104

Ethnobotanical study of medicinal plants used by local people of Mojana Wadera Woreda, North Shewa Zone, Amhara Region, Ethiopia

ABEBE AYELE HAILE♥
Department of Biology, College of Science, Bahir Dar University. P.O. Box. 79, Bahir Dar, Ethiopia. Tel./fax. +25-192-838-3044,
♥email: itl2014a@gmail.com

Manuscript received: 8 March 2022. Revision accepted: 11 April 2022.

Abstract. *Haile AA. 2022. Ethnobotanical study of medicinal plants used by local people of Mojana Wadera Woreda, North Shewa Zone, Amhara Region, Ethiopia. Asian J Ethnobiol 5: 35-43.* This study was conducted in Mojana Wadera Woreda of North Shewa Zone (Ethiopia) to document the indigenous knowledge of local communities on medicinal plants. The data was collected using structured and semistructured interviews with herbalists. Information on medicinal plants was collected from June 2020 to October 2020. Fourteen (10 males and 4 females) key informants were deliberately selected during the data collection, but no group discussion was conducted due to the coronavirus epidemic. Descriptive statists (percentage and frequency) were used to summarize ethnobotanical data and preference ranking, and the Information consensus factor (ICF) was also included. A total of 56 medicinal plants from 52 genera, and 38 families, were identified in the study area, where they were used to treat human and animal diseases. Family-wise, Asteraceae was the most dominant family, followed by Lamiaceae. Herbs were the most dominant growth forms as they accounted for about 29 (52.72%) species, while shrubs had 17 (30.9%) species. Most herbal remedies were prepared by mixing 25.45% of the roots and leaves. The preparation was usually done by crushing to 45.45%, and during the preparation, the herbs were usually fresh. Most medicines were administered orally to the sick. According to the key informant's response, the plants in the study area are under threat. Therefore, the conservation of medicinal plants related to indigenous knowledge is important for future generations.

Keywords: Indigenous knowledge, informant consensus factor, medicinal plants, Mojana Wadera

INTRODUCTION

The role of medicinal plants in health care is significant in developing countries (Smith-Hall et al. 2012; Sofowora et al. 2013; Kassa et al. 2020). According to WHO, 80% of the population in developing countries rely on medicinal plants for healthcare (Khan et al. 2015; Van Wyk and Gorelik 2017). Moreover, many modern-day drugs originated from plants (Farnsworth 1996). However, although plants play an important role in medicinal value, it is difficult to determine many plants' medicinal properties and potential due to their low perception of traditional plants (Makule et al. 2014). Therefore, it is important that this potential is not confined to a single community and that all do their part to pass it on to the next generation and discover a new drug (Heinrich 2003; Suleiman 2015).

Ethiopia is the fifth major country in tropical Africa in terms of the diversity of flora, next to Tanzania, Cameroon, Congo, and South Africa (Jadán et al. 2021). In the Flora of Ethiopia and Eritrea, about 6,027 vascular plant species (including subspecies), with about 10.74% endemism, were documented (Kelbesa and Demissew 2014). From the total vascular plants, 1,882 are common in both countries, while 3,875 have been recorded from Ethiopia and 270 from Eritrea only. Similarly, in the diversity of plant groups, angiosperms and dicotyledons were the most dominant, which estimated about 5,815 and 4,413 species (including subspecies), respectively. Ethiopia is rich in biodiversity, topographical complexity, and climate variability, varied altitudinal gradients ranging from Danakil Depression (125 masl) to the Semien Mountains (4533 masl), which jointly result in different vegetation types (Asefa et al. 2020). According to Tena (2014) and Bekele (2007), more than 1000 medicinal plants species have been reported in Ethiopia, and about 33 of these species are endemic to the country.

Although there is a lot of cultural knowledge in Africa, data on traditional medicinal plants are not systematically documented (Nyamwaya 1967). This means that knowledge of traditional medicine is not recorded and is passed from generation to generation orally. If this trend continues, it poses a risk. Ethiopia is one of the six plant-rich countries of Africa, where about 60% of the plants are said to be indigenous, and most of them with healing potential (Nigatu et al. 2018). Even though a country with a great variety of cultures and diversity of medicinal plants, the alarming population growth with increasing demand and consumption is distracting medicinal plants resources from their natural habitat (Meaza et al. 2015). Threats to medicinal plants in Ethiopia include human migration, agricultural expansion, forest fires, and drought (Kidane et al. 2018; Tefera and Kim 2019). Thus, in this country, studies and research are much needed on conservation, management, cultivation, and ethnobotanical knowledge, including medicinal plant species (Asnake et al. 2016; Kassa et al. 2020).

Despite the significant role of medicinal plants in treating both human and livestock ailments in Ethiopia, a very limited attempt has been made to explore, document,

and promote these widely used medicinal plants in the country (Assen et al. 2021).

Hence, plant research and related indigenous knowledge should be an urgent task to protect and save the indigenous knowledge to transfer this knowledge to future generations. Many studies have been done in Ethiopia on ethnobotanical medicinal plants (Kefalew et al. 2015; Yohannis et al. 2018; Tefera and Kim 2018; Tibebu and Mesele 2019; Gonfa et al. 2020; Assefa et al. 2021; Ayalw and Merawi 2021; Megersa et al. 2022; Megersa and Woldetsadik 2022). However, little research has been done so far in the Mojana Wadera woreda in the North Shewa zone of Ethiopia. Therefore, the present study aimed to document indigenous knowledge of medicinal plants in Mojana Wadera woreda found in the North Shewa zone, Amhara Region, Ethiopia.

MATERIALS AND METHODS

Description of the study area

The study was conducted in Mojana Wadera Woreda found in North Shewa Zone, Amhara Region, Ethiopia (Figure 1). This woreda is bordered by Menz Lalo Midir on the northeast, Termaber on the east, Menz Mam Midir on the north, and Basona Werana on the south. Mojana Wadera Woreda is located at 090 91’ to 090 94’N and 360 61’ to 390 67’E. The mean altitude of the area is 2678-2935 masl. A unimodal rainfall pattern characterizes the climate of the study area, and the area receives an average annual rainfall of 928 mm, While the minimum and maximum temperatures are 11.18^0C and 24.67^0C, respectively (Kenzemed et al. 2020). The vegetation cover is less compared to other places. According to the 2012 Ethiopian national census data, 75,394 people live in Mojana Wadera woreda, while about 99.87% of the residents practice Ethiopian Orthodox Christianity as their religion. The area is dominated by *Eucalyptus globulus* and *Juniperus procera* tree species. The livelihood of Mojana Wadera depends on agriculture. The major crops produced in this woreda are wheat, barley, and beans.

Selection of potential kebeles and informants

In the study area, 5 kebeles (In Ethiopia, Kebele is the smallest administrative unit) (Namely: Begoch Gat, Brka, Engida washa, Gan Arda, and Zub Amba) were selected. These kebeles were selected based on the capacity of key informants and the supply of herbs. The data was collected from June 2020 to October 2020. During data collection, 14 (10 men and 4 women) traditional healers (key informants) between the ages of 33-75 were included. The key informants were selected purposively.

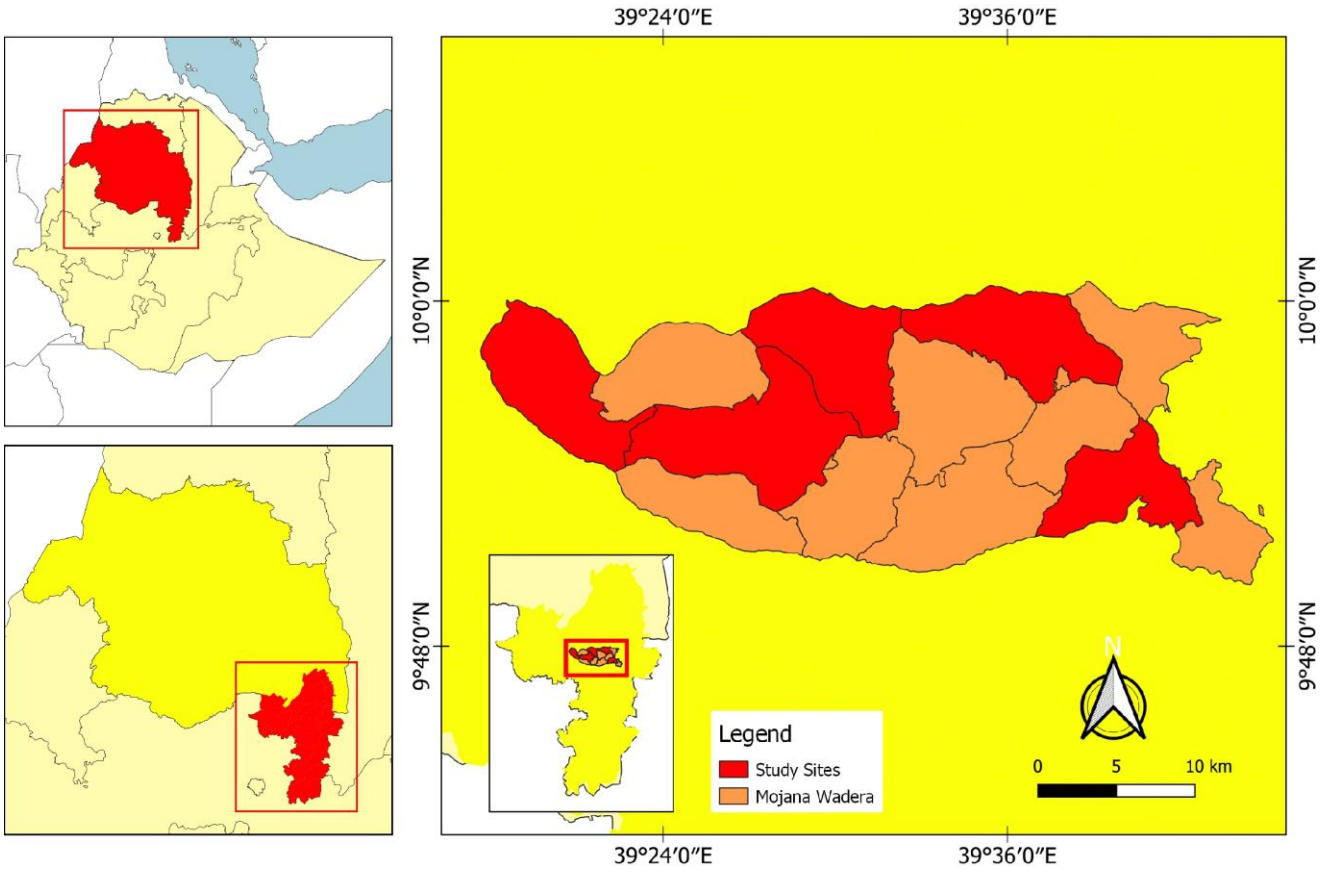

Figure1. Location map of Mojana Wedara Woreda, Amhara National Regional State, Ethiopia

Ethnobotanical data collection and plant specimen's Identification

Data was collected from knowledgeable people about medicinal plants through semistructured and structured interviews (Malik 2020). Each selected traditional healer was interviewed individually about medicinal plants, local names, plant parts used in medicine, methods of preparation for each type of ailments, and ways of remedy administration.

Due to the coronavirus pandemic, there was no group discussion on the data collected on medicinal plants with key informants (Covid19). Still, the information was collected directly from the key informants individually. Botanical experts identified the specimens of reported medicinal plants at Debre Berhan University by comparing the relevant volumes of the flora of Ethiopia and Eritrea. The identified specimens were deposited at Debre Berhan University.

Data analysis

Descriptive statistic procedures like percentage and frequency distribution were applied for analyzing and summarizing the data.

Preference ranking

To compare the most effective medicinal plants used by a community to treat a particular diseases, a preference ranking was conducted following by Martin (1995) and Malik (2020) for the most important medicinal plants used in treating a particular illness. For this, five key informants were selected to identify the best preferred medicinal plant species for the treatment of stomachache because it is a frequently occurring disease in the study area. Each informant was provided with the mentioned medicinal plants reported to cure the illness with the leaves of the medicinal plants used being paper tagged and then was asked to assign values of 1 to 4 were used in this ranking (1= less used, 2= good, 3= very good, and 4= excellent. This means that the informant is given 4, which means this plant is the most preferred one but given (1), the plant species is less used to treat stomachache (Table 2).

Informant Consensus Factor (ICF)

The Informant Consensus Factor (ICF) is used to identify the agreement of the informants on the reported use of plant species to treat a particular illness. The ICFS were calculated as follows:

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

Where: nur = number of use citations (nur) minus the number of species used (nt), ICF = Informants Consensus Factor, divided by the number of use citations in each category minus one (Heinrich et al. 1998). The factor provides a range of 0 to 1, where 1 is a high value acts as a good indicator for a high rate of informant consensus.

RESULTS AND DISCUSSION

Diversity of medicinal plants in Mojana Wadera Woreda

A total of 56 medicinal plant species distributed in 52 genera and 38 families were collected and documented (Table 1). From a total of medicinal plants, 92.85% were used to treat human ailments, while 7.15% were used to treat livestock diseases. Among the families that contributed more medicinal species were Asteraceae, represented by 6 (10.7%) species, Lamiaceae with 5 (8.93%) species, Fabaceae 4 (7.4%), Solanaceae and Polygonaceae were represented with 3 species each, and the other 32 families were contributed to 35 (62.5%) of the species represented 1 or 2.

Growth forms of medicinal plants

In the study area, the growth pattern of medicinal plants was mainly herbs, 29 (52.72%) species, followed by shrubs with 17 (30.9%) species (Figure 2).

Plant parts Used to prepare remedies in the study area

Traditional healers use different parts of the plant to prepare the medicine. In this study, most of the plant parts used for medicinal purposes were mixed with roots and leaves (25.45%). The leaves and roots are covered equally (21.8%) (Figure 3).

Methods of medicinal plants preparation and forms

Traditional medicine was prepared through crushing, pounding, grinding, powdering, heating, and juice in the study area. Crushing was the most common (45.45%) method of preparing herbal medicines, followed by the powdering preparation method (27.27%). Similarly, Pounding and grinding (9.09%), heating (10.9%), and juice (10.9%) were the other preparation methods of the remedy used in the study area. Most of the herbal remedies in the study area were made from fresh herbs. Similarly, according to most respondents, herbal remedies were prepared by drying parts of the plant, which will be pounded and stored, then given to the patient when they have a problem.

Route of application

In the study area, the drug was given to the patient through the mouth, skin, nose, or other body parts. Of the prepared traditional medicines, 53.58% were given to patients orally, and 26.79% were given dermal (Figure 4).

Comparison of important medicinal plants in the study area

Preference ranking

Five medicinal plants were selected, after which key informants were asked to rate their value based on the effectiveness of these medicinal plants for treating stomachache (value =1 to 4). *Tavenerara abyssinia* was ranked as one of the most effective plant species for stomachache, followed by *Thalictrum rhynchocarpum*, according to key informants, while *Achyranthes aspera* was the least medicinal plant for treating stomachache (Table 2).

Table 1. List of medicinal plants used by Mojana Wadera Woreda People, Ethiopia

Local name	Plant family	Scientific name	Habit	For treating	Treated illness	Used parts	Methods of preparation	Route of application
Telenji	Amaranthaceae	*Achyranthes aspera* L	Herb	Human	Stomachache	Root	Crushed and mixed with water and drunk on an empty stomach until recovery	Oral
Smiza (sensel)	Acanthaceae	*Justicia schimperiana* Hochst. ex Nees	Shrub	Human	Evil eye	Root	Mixed with *Carissa spinarum and* put on fire, then sniff	Nasal
Nechshinkurt	Alliaceae	*Allium sativum* L	Herb	Human	Asthma	Bulb	Boiled with *Zingiber officinale*, and the filtrate will be sniffed	Nasal
Chikugn	Asteraceae	*Artemisia abyssinica* Schtz, Afra Jacq	Herb	Human	Diarrhea	Root/ leaf	Crushed and mixed with water then drink	Oral
Senafch	Brassicaceae	*Brassica nigra* L	Herb	Human	Wound	Seed	The powder will be mixed with Vaseline and applied to the affected part.	Dermal
Digita	Fabaceae	*Calpurnia aurea* (Ait.) Benth	Shrub	Human	Jaundice	Leaf	The oiled steam is taken.	Nasal
Etsefaris	Cannabaceae	*Cannabis sativa* L	Herb	Human	Epilepsy	Leaf & root	The root and leaf crushed then sniffed through nostrils	Nasal
Yebeg lat	Brassicaceae	*Capparis tomentosa* L	Herb	Human	Sudden bleeding	Leaf	The crushed leaf juice will be applied to the bleeding body.	Nasal
Habeshasuf	Asteraceae	*Carthamus tinctorius* L	Herb	Human	Constipation	Seed	The powder will be boiled, then drink the filtrate.	Oral
Koshashle	Asteraceae	*Cirsium englerianum* O. Hoffm	Herb	Human	Headache	Root	The boiled steam taken through nostrils.	Nasal
Etse eyesus	Menispermaceae	*Stephania abyssinica* A. Rich	Climber	Human	Stomachache	Root	Crushed and mixed with water, and the filtrated will be drunk.	Oral
Lomi	Rutaceae	*Citrus aurantiifolia* (Christm.) Swingle	Shrub	Human	Dandruff	Fruit	The juice will be applied to the affected part	Dermal
Azohareg	Ranunculaceae	*Clematis simensis* Fres	Climber	Human	Skin rash	Root	The powder mixed with butter apply to the affected part	Dermal
Yejib shinkurt	Amaryllidaceae	*Crinum abyssinicum* Hochst. ex A. Rich	Herb	Human	Swellings	Root & leaf	Leaf and root will be crushed and mixed then applied to the affected part.	Dermal
Bisana	Euphorbiaceae	*Croton macrostachyus* Hochst	Tree	Human	Dandruff	Twig	The twig juice is applied to the head	Dermal
Yemidirenbuay	Cucurbitaceae	*Cucumis ficifolius* A. Rich	Herb	Human	Retained placenta	Root	By mixing the powder with water then drink	Oral
Tejsar	Fabaceae	*Cymbopogon citratus* (DC ex Nees) Stapf	Herb	Livestock	Blotting	Leaf & root	The root and leaf will be crushed and mixed with water then given to cattle.	Oral
Ameraro	Solanaceae	*Discopodium penninervium* Hochst	Shrub	Human	Swellings	Leaf & root	Crushed, mixed with vaseline then applied to the affected part.	Dermal
Gme	Boraginaceae	*Ehretia cymosa* Thonn	Herb	Human	Mental disorder	Leaf & root	Powder of leaf and root is put on fire then smoked	Nasal
Adal *(*Asta*)*	Ericaceae	*Erica arborea* L	Shrub	Human	Lung illness	Root & fruit	The Crushed will be mixed with honey then eaten.	Dermal
Enslal	Apiaceae	*Foeniculum vulgare* Miller	Herb	Human	Evil eye	Root & leaf	The root and leaf are pounded then the powder is put on fire then, sniffed	Nasal
Ameja	Hypericaceae	*Hypericum quartinianum* A.Rich.	Shrub	Livestock	Anthrax	Root & leaf	The powder will be mixed with water then given to cattle	Oral
Weynagift	Asteraceae	*Inula confertiflora* A. Rich	Shrub	Human	Skin rash	Leaf	Juice of the leaf is applied to skin rash	Dermal
Zohun-kechamo	Oleaceae	*Jasminum abyssinicum* Hochst.ex DC	Climber	Human	Herpes	Root & leaf	The crushed powder will be applied to the affected part	Dermal
Habesha tid	Cupressaceae	*Juniperus procera* L	Tree	Human	Mefthe siray	Leaf	The small leaf is mixed with *phytolacca dodecandra* of seven leaves, and one cup of Kulkual milk is mixed with fresh cow milk and then drunk. Finally, the antidote is eaten with hen liver and telba.	Oral
Shinqaq (Enduhahla)	Crassulaceae	*Kalanchoe shimperiana* A. Rich	Herb	Human	Wound (small swelling)	Leaf	The leaf put get fire then immediately fresh put to the affected part	Dermal

Yeferes Zeng	Lamiaceae	*Leonotis ocymifolia* (Burm.f.) Iwarsson	Shrub	Human	Cough	Leaf	The juice will be mixed with coffee then drunk	Oral
Feto	Brassicaceae	*Lepidium sativum* L	Herb	Human	Toothache	Seed	The roasted and pounded fresh powder will be held on the tooth until recovery	Oral
Telba	Linaceae	*Linum usitatissimum* L	Herb	Human	Diarrhea	Seed	The powder will be boiled then drink like soup	Oral
Qelewa	Myrsinaceae	*Maesa lanceolata* Forssk	Tree	Human	Wound	Seed	The crushed seed of *Maesa lanceolata* powder will be applied to the affected part	Dermal
Shenet	Myricaceae	*Myrica salicifolia* Hochst. ex A. Rich	Tree	Human	Tonsillitis	Bark	The dried bark powder will be mixed with water and then drunk until recovery.	Oral
Ades (Barsenet)	Myrtaceae	*Myrtus communis* L	Shrub	Human	cough	Leaf	Crushed juice of leaf will be mixed with water then drunk	Oral
Tinbaho	Solanaceae	*Nicotiana tabacum* L	Shrub	Livestock	Leeches	Leaf	The crushed leaf will be mixed with water and then given to cattle.	Oral
Tikur azmud	Ranunclaceae	*Nigella sativa* L	Herb	Human	Headache	Seed	The crushed powdered is sniff	Oral
Dmakesse	Lamiaceae	*Ocimum lamiifolium* Hochst	Herb	Human	Febrile illness	Leaf	The crushed root will be mixed with coffee then drunk	Oral
Weyra	Oleaceae	*Olea europaea* sub.sp.cuspidata L	Tree	Human	Impotency	Root	The root seedling of *Olea europaea* will be pounded and then tied on pinus for 3 days.	Oral
Endod	Phytolaccaceae	*Phytolacca dodecandara* L'Herit	Shrub	Human	Dandruff	Fruit	The juice of the fruit will wash the affected part.	Dermal
Gorteb	Plantaginaceae	*Plantago lanceolata* L	Herb	Human	Stomach troubles	Root	The root is crushed, then mixed with water and drunk	Oral
Etse libona	Polygalaceae	*Polygala abyssinica* Fres	Herb	Human	Stomachache	Root	The crushed root will be mixed with water and then drunk.	Oral
Gesho	Rhamnaceae	*Rhamnus prinoides* L'Herit	Shrub	Human	Tonsillitis	Twig	The crushed twig will be mixed with water then drunk	Oral
Tsegereda	Rosaceae	*Rosa hybrid* L	Shrub	Human	Ear problem	Leaf & flower	Boiled in water and a drop of suspension will be dropped into the ear	Ear
Rosmeri	Lamiaceae	*Rosmarinus officinalis* L	Herb	Human	Stomachache	Leaf & root	the crushed leaf and root will be mixed with water then drunk	Oral
Meqmeqo	Polygonaceae	*Rumex abyssinicus* Jacq	Herb	Human	Wound	Root	The crushed root powder will be applied to the affected part.	Dermal
Tult	Polygonaceae	*Rumex nepalensis* Spreng	Herb	Human	Tonsillitis	Leaf	The leaf will be crushed and given to patient	Oral
Embwacho	Polygonaceae	*Rumex nervosus* Vahl	Shrub	Human	Dandruff	Leaf	Fresh leaves will be rubbed on the affected area	Dermal
Tenadam	Rutaceae	*Ruta chalepensis* L	Herb	Human	diarrhea	Seed	The pounded seed will be mixed with coffee then drunk	Oral
Hulegeb	Lamiaceae	*Salvia nilotica* Jacq	Herb	Human	Nose bleeding	Leaf	The leaves will be crushed and sniffed.	Nasal
Shikoko gomen	Asteraceae	*Solanecio gigas* (Vatke) C. Jeffrey	Shrub	Human	Rabies	Root &leaf	The ground root and leaf will be mixed with water then drunk	Oral
Dingetgna	Fabaceae	*Taverniera abyssinica* Rich	Shrub	Human	Stomachache	Root	The root of *Taverniera abyssinica* will be chewed and then swallowed during the infusion.	Oral
Sirebizu	Ranunculaceae	*Thalictrum rhynchocarpum* Dill. & A. Rich	Herb	Human	Stomachache	Root	Root will be chewed	Oral
Tosign	Lamiaceae	*Thymus schimperi* Ronniger	Herb	Human	Ascariasis	Leaf	The leaf will be crushed and boiled then drunk like tea	Oral
Abish	Fabaceae	*Trigonella foenumgraecum* L	Herb	Human	Gastric problem	Seed	The pounded seed will be boiled then drunk like soup in the morning	Oral
Qetetina	Scrophulariaceae	*Verbascum sinaiticum* Benth	Herb	Human	stabbing pain	Root	The root will be chewed	Oral
Grawa	Asteraceae	*Vernonia amygdalina* Del	Tree	Livestock	Anthrax	Root & leaf	The crushed leaf & Root will be mixed with water then given to cattle	Oral
Gzawa	Solanaceae	*Withania somnifera* (L.) Dun	Shrub	Human	Evil eye	Root & leaf	The root and leaf will be crushed and put on fire then taken smoke	Nasal
Zinjible	Zingiberaceae	*Zingiber officinale* Roscoe	Herb	Human	Cough	Rhizome	Crushed and boiled then drunk like tea	Oral

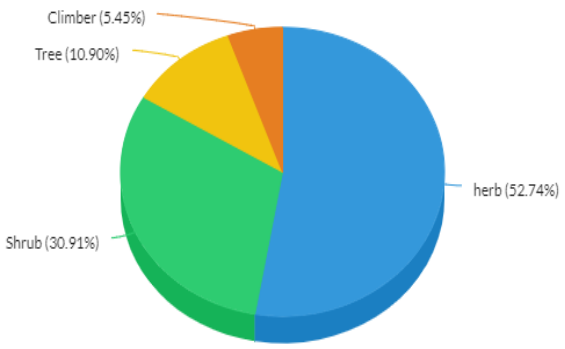

Figure 2. Growth forms of medicinal plants in Mojana Wadera Woreda, Ethiopia

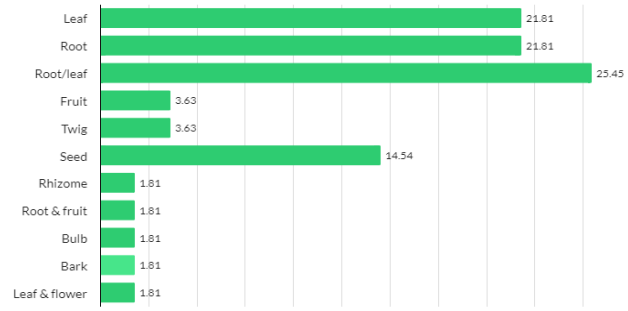

Figure 3. Plant parts used to prepare remedies in the study area

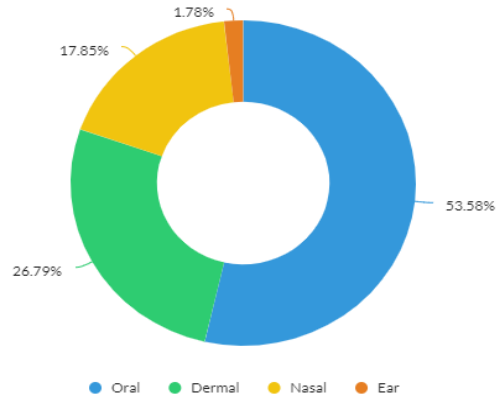

Figure 4. Route of administration in the study area

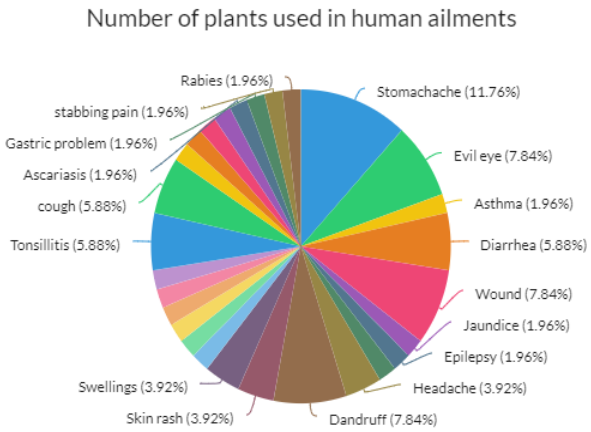

Figure 5. Distribution of different human ailments with a respective number of medicinal plants in the study area

Table 2. Preference ranking of medicinal plant species to treat stomachache

Key informants	*Cissampelos mucronata*	*Polygala abyssinica*	*Taverniera abyssinica*	*Achyranthes aspera*	*Thalictrum rhynchocarpum*
1	2	4	4	3	4
2	4	4	3	2	3
3	3	3	4	3	4
4	3	1	4	4	4
5	4	3	4	2	3
Total	16	15	19	14	18
Rank	3	4	1	5	2

Table 3. Results of Informants consensus factors (ICF) values for more prevalent health problems of the District

Category of disease	List of plant species used and number of citation in the bracket	Total number of species	Number of citation	ICF
Stomachache	*Achyranthes aspera* (9), *Stephania abyssinica* (11), *Polygala abyssinica* (13), *Taverniera abyssinica* (14), *Thalictrum rhynchocarpum* (12)	5	59	0.93
Evil eye	*Justicia schimperiana* (11), *Foeniculum vulgare* (10), *Withania somnifera* (12)	3	33	0.94
Wound	*Brassica nigra* (6), *Maesa lanceolata* (8), *Rumex abyssinicus* (11)	3	25	0.91
Diarrhea	*Artemisia abyssinica* (12), *Linum usitatissimum* (6), *Ruta chalepensis* (5)	3	23	0.909
Jaundice	*Calpurnia aurea* (14)	1	14	1

Informant consensus factor

Based on the incidence of the disease in the study area, these diseases were grouped into different categories. Then, ICF was calculated for each category of disease (Table 3). The value of the factor ranges from 0 to 1; if the value of 1 indicates there is a high rate of agreement between informants. As the results showed, Jaundice scored the highest informant consensus factor of 1, followed by Evil eye (0.94), stomachache (0.93), wound (0.91), and diarrhea (0.90), respectively (Table 3). A high value of ICF indicates there is a consistency between key informants to treat jaundice by the same plant species, while a low value indicates there is a variation between key informants' agreement between them on plant species usage in treating a given disease category.

Proportion of medicinal plants used in the study area to treat different human ailments

Respondents say they used other herbs in combination or individually to treat human ailments. For example, 6 (11.76%) of the 51 medicinal plants listed to treat human ailments used to treat stomachache were used to treat stomach ailments (Figure 5).

Discussion

Of 56 medicinal plants, 92.85% were used to treat human ailments, while 7.15% treated livestock. Key informants are more experienced in treating human diseases, but they are less likely to treat their animals because the disease is less common. These findings are in line with other findings in Ethiopia; these findings are agreed with other research areas in Minjar Shenkora district in North Shewa zone, Amhara region from a total of 118 identified medicinal plant species, 63.55% were used to treat humans. In contrast, the remaining 15.25% of species were used to treat livestock ailments (Kassa et al. 2020). In the neighboring country of Kenya, Mutwiwa et al. (2018) also report that of the 51 plant species from their study, 91.67% were used to treat human diseases, while only 7.94% were used for the treatment of livestock diseases. The Asteraceae families were the most common medicinal species in this study area. Similarly, a study in Menz Gera Midir district in North Shewa Zone, Amhara region (Yohannis et al. 2018) showed that Asteraceae were ranked first, contributing 16 species, followed by Lamiaceae with 12 species. This result agrees with others finding that Asteraceae were the most dominant taxa (Uzun and Koca 2020).

Herbs were the most dominant plant growth forms, covering 29 (52.72%) species, followed by shrubs with 17 (30.9%) species. This result is consistent with a study covering 29 (52.72%) species, followed by shrubs with 17 (30.9%) species. Furthermore, this result is consistent with a study conducted by Amsalu et al. (2018) in Gozamen Woreda (East Gojjam Zone), in which herbs were the dominant growth forms. Also, this result is consistent with different parts of the world in which herbs were the dominant growth forms (Mahwasane et al. 2013; Hong et al. 2015; Khan et al. 2015; Hu et al. 2020).

Traditional healers use different plant parts to prepare the medicine in the study area. In this study, most of the plant parts used for medicinal purposes were mixed with roots and leaves (25.45%). This is agreed with Birhan et al. (2017) Enarj Enawga District (East Gojjam Zone), multiple plant parts are recommended for remedy preparation. But, disagree with Malik et al. (2019) that leaves were covered 62% for remedy preparation in Pakistan. The leaves and roots are covered equally (21.8%). Traditional medicine is prepared through crushing, pounding, grinding, powdering, heating, and juice in the study area. Crushing is generally covered by 45.45%, which is an essential way to prepare herbal medicines, and the powdering preparation method covers 27.27% for medicinal purposes. This study is consistent with Kassa et al. (2020) in Minjar-Shenkora District, North Shewa Zone, and Amsalu et al. (2018) Gozamin Wereda, East Gojjam Zone. Similarly, pounding and grinding (9.09%), heating (10.9%), and juice (10.9%). All these are the preparation methods of the remedy used in the study area. But, these results disagree with other authors that preparation of medicinal plants was by infusion covered 54% in Moroccan Rif (Chaachouay et al. 2019), while in the Ayta Communities in Dinalupihan, Bataan, Philippines, the method of preparation was by drinking, which covered 44% (Tantengco et al. 2018). Most of the herbal remedies in the study area are made from fresh herbs. Similarly, according to most respondents, herbal remedies are prepared by drying parts of the plant will be pounded and stored, then giving the patient the medication when they have a problem. Of the prepared traditional medicine, 53.58% was given to patients orally (Figure 3). This result is agreed with Osman et al. (2020) studied in the Raya Kobo District.

In the study area, *T. abyssinia* was the most preferred and important medicinal plant species by traditional healers to treat stomachaches. A high ICF value indicates a consistency between key informants to treat jaundice by the same plant species. In contrast, a low value indicates a variation between key informants' agreement on plant species usage in treating a given disease category.

In conclusion, the results of this study show the existence of indigenous knowledge of medicinal plants used in Mojana Wadera woreda. A total of 56 medicinal plants were identified in the study area. They belonged to 53 families; from these, Asteraceae and Lamiaceae were the most representative families. Most medicinal plants are used to treat human ailments. The growth forms of medicinal plant species are mostly herbs. The major plant parts were the mixture of leaves and roots to prepare a remedy. The route of administration of the prepared remedy is mainly orally. The key informants in the woreda are trusted by the community and certified by its residents. These key informants secretly pass on their knowledge to their children. This, in turn, contributes to the spread of knowledge. Therefore, today's study is a late way to discover new drugs in the future based on these collected documents of medicinal plants in Mojana Wadera Woreda.

ACKNOWLEDGEMENTS

I want to thank the key informants and the community of Mojana Wedara woreda residents (Ethiopia) who shared their traditional knowledge of the use of medicinal plants.

REFERENCES

Amsalu N, Bezie Y, Fentahun M, Alemayehu A, Amsalu G. 2018. Use and conservation of medicinal plants by indigenous people of Gozamin Wereda, East Gojjam Zone of Amhara Region, Ethiopia: An Ethnobotanical approach. Evid-Based Complement Altern Med 2018: 23. DOI: 10.1155/2018/2973513.

Asefa M, Cao M, He Y, Mekonnen E, Song X, Yang J. 2020. Ethiopian vegetation types, climate and topography. Plant Divers 42 (4): 302-311. DOI: 10.1016/j.pld.2020.04.004.

Asnake S, Teklehaymanot T, Hymete A, Erko B, Giday M. 2016. Survey of medicinal plants used to treat malaria by Sidama people of Boricha District, Sidama Zone, South Region of Ethiopia. Evid-Based Complement Altern Med 2016: 9690164. DOI: 10.1155/2016/9690164.

Assefa B, Megersa M, Jima TT. 2021. Ethnobotanical study of medicinal plants used to treat human diseases in Gura Damole District, Bale Zone, Southeast Ethiopia. Asian J Ethnobiol 4: 42-52. DOI: 10.13057/asianjethnobiol/y040105.

Assen Y, Woldearegay M, Haile A. 2021. An ethnobotanical study of medicinal plants in Kelala District, South Wollo Zone of Amhara Region, Northeastern Ethiopia. Evid-Based Complement Altern Med 24: 6651922. DOI: 10.1155/2021/6651922.

Ayalw T, Merawi E. 2021. Assessment of traditional knowledge associated with medicinal plants in North Achfer District, Amhara Region, North Ethiopia. J Dis Med Plants 7 (2): 35. DOI: 10.11648/j.jdmp.20210702.12.

Bekele E. 2007. Study on Actual Situation of Medicinal Plants in Ethiopia. Prepared for Japan Association for International Collaboration of Agriculture and Forestry (JAICAF), Addis Ababa.

Birhan YS, Kitaw SL, Alemayehu YA, Mengesha NM. 2017. Ethnobotanical study of medicinal plants used to treat human diseases in Enarj Enawga District, East Gojjam Zone, Amhara Region, Ethiopia. SM J Med Plant Stud 1 (1): 1-20. DOI: 10.36876/smjmps.1006.

Chaachouay N, Benkhnigue O, Fadli M, El Ibaoui H, Zidane L. 2019. Ethnobotanical and ethnopharmacological studies of medicinal and aromatic plants used in the treatment of metabolic diseases in the Moroccan Rif. Heliyon 5 (10): e02191. DOI: 10.1016/j.heliyon.2019.e02191.

Farnsworth NR. 1996. Biological and phytochemical screening of plants. J Pharm Sci 55 (3): 225-276. DOI: 10.1002/jps.2600550302.

Gonfa N, Tulu D, Hundera K, Raga D. 2020. Ethnobotanical study of medicinal plants, its utilization, and conservation by indigenous people of Gera District, Ethiopia. Cogent Food Amp Agric 6 (1): 1852716. DOI: 10.1080/23311932.2020.1852716.

Heinrich M, Ankli A, Frei B, Weimann C, Sticher O. 1998. Medicinal plants in Mexico: Healers' consensus and cultural importance. Soc Sci Med 47: 1859-1871. DOI: 10.1016/s0277-9536(98)00181-6.

Heinrich M. 2003. Ethnobotany and natural products: The search for new molecules, new treatments of old diseases or a better understanding of indigenous cultures? Curr Top Med Chem 3 (2): 141-154. DOI: 10.2174/1568026033392570.

Hong L, Guo Z, Huang K Wei S, Liu B, Meng S, Long C. 2015. Ethnobotanical study on medicinal plants used by Maonan people in China. J Ethnobiol Ethnomed 11 (1): 32. DOI: 10.1186/s13002-015-0019-1.

Hu R, Lin C, Xu W, Liu Y, Long C. 2020. Ethnobotanical study on medicinal plants used by Mulam people in Guangxi, China. J Ethnobiol Ethnomed 16 (1): 40. DOI: 10.1186/s13002-020-00387-z.

Jadán O, Donoso D, Cedillo H, Bermúdez F, Cabrera, O. 2021. Floristic groups, and changes in diversity and structure of trees, in tropical montane forests in the Southern Andes of Ecuador. Diversity 13 (9): 400. DOI: 10.3390/d13090400.

Kassa Z, Asfaw Z, Demissew S. 2020. An ethnobotanical study of medicinal plants in Sheka Zone of Southern Nations Nationalities and Peoples Regional State, Ethiopia. J Ethnobiol Ethnomed 16: 7. DOI: 10.1186/s13002-020-0358-4.

Kefalew A, Asfaw Z, Kelbessa E. 2015. Ethnobotany of medicinal plants in Ada'a District, East Shewa Zone of Oromia Regional State, Ethiopia. J Ethnobiol Ethnomed 11: 1. DOI: 10.1186/s13002-015-0014-6.

Kelbesa E, Demissew S. 2014. Diversity of vascular plant taxa of the flora of Ethiopia and Eritrea. Ethiop J Biol Sci 13: 37-45.

Kenzemed K, Beza S, Lisanu G, Mersha A. 2020. Verification of the response of food barley (*Hordeum vulgare* L.) and bread wheat (*Triticum aestivum* L.) to potassium, boron, and zinc containing fertilizers in the highlands of North Shewa, Amhara Region, Ethiopia. Conference: Crop Proceeding AGP-II 2019, Malt Barley Production and Marketing in Ethiopia, at Bahirdar.

Khan SM, Din NU, Ilyas M, Sohail, Rahman IU, Ijaz F, Iqbal Z, Ali Z. 2015. Ethnobotanical study of some medicinal plants of Tehsil Kabal, District Swat, KP, Pakistan. Med Aromat Plants 4: 189. DOI: 10.4172/2167-0412.1000189.

Kidane L, Gebremedhin, Beyene T. 2018. Ethnobotanical study of medicinal plants in Ganta Afeshum District, Eastern Zone of Tigray, Northern Ethiopia. J Ethnobiol Ethnomed 14: 64. DOI: 10.1186/s13002-018-0266-z.

Mahwasane S, Middleton L, Boaduo N. 2013. An ethnobotanical survey of indigenous knowledge on medicinal plants used by the traditional healers of the Lwamondo Area, Limpopo Province, South Africa. S Afr J Bot 88: 69-75. DOI: 10.1016/j.sajb.2013.05.004.

Makule E, Heilmann J, Kraus B. 2014. Ethnobiological survey of Maasai traditional medicinal plants. Planta Med 80: 16. DOI: 10.1055/s-0034-1394923.

Malik K, Ahmad M, Zafar M, Ullah R, Mahmood HM, Parveen B, Rashid N, Sultana S, Shah SN, Lubna. 2019. An ethnobotanical study of medicinal plants used to treat skin diseases in Northern Pakistan. BMC Complement Altern Med 19: 210. DOI: 10.1186/s12906-019-2605-6.

Malik Z. 2020. Ethnobotany of the mountain regions of far Eastern Europe/ ethnobotany of the mountain regions of Central Asia and Altai - a review. Ethnobot Res Appl 20: 1-2. DOI: 10.32859/era.20.36.1-2.

Martin GJ. 1995. Ethnobotany A People and Plants Conservation Manual. Chapman and Hall, London, UK.

Meaza G, Tadesse B, Maria A, Piero B, Gidey Y. 2015. Traditional medicinal plants used by Kunama ethnic group in Northern Ethiopia. J Med Plant Res 9 (15): 494-509. DOI: 10.5897/jmpr2014.5681.

Megersa M, Dida G, Gadissa F, Sebsibe A, Germame A, Alemayehu G, Kebede B, Bekele D, Belachew S. 2022. Food, medicinal plants, and homemade beverages, used as a response to the pandemic in Ethiopia. Biodiversitas 23: 2146-2155. DOI: 10.13057/biodiv/d230450.

Megersa M, Woldetsadik S. 2022. Ethnobotanical study of medicinal plants used by local communities of Damot Woyde District, Wolaita Zone, Southern Ethiopia. Nusantara Biosci 14: 10-24. DOI: 10.13057/nusbiosci/n140102.

Mutwiwa C, Rotich B, Kauti M, Rithaa J. 2018. Ethno botanical survey of medicinal plants in Mwala Sub-County, Machakos County, Kenya. J Dis Med Plants 4 (4): 110-119. DOI: 10.11648/j.jdmp.20180404.12.

Nigatu T, Petros B, Asfaw Z. 2018. Medicinal plants used by traditional healers to treat malignancies and other human ailments in Dalle District, Sidama Zone, Ethiopia. J Ethnobiol Ethnomed 14 (1): 15. DOI: 10.1186/s13002-018-0213-z.

Nyamwaya NA. 1867. Case study of the interaction between indigenous and western medicine among the Pokot of Kenya. Soc Sci Med 25 (12): 1277-1287. DOI: 10.1016/0277-9536(87)90126-2.

Osman A, Sbhatu D, Giday M. 2020. Medicinal plants used to manage human and livestock ailments in Raya Kobo District of Amhara Regional State, Ethiopia. Evid-Based Complement Altern Med 2020: 1329170. DOI: 10.1155/2020/1329170.

Smith-Hall C, Larsen H, Pouliot M. 2012. People, plants and health: A conceptual framework for assessing changes in medicinal plant consumption. J Ethnobiol Ethnomed 8 (1): 43. DOI: 10.1186/1746-4269-8-43.

Sofowora A, Ogunbodede E, Onayade A. 2013. The role and place of medicinal plants in the strategies for disease prevention. Afr J Trad Complement Altern Med 10 (5): 210-229. DOI: 10.4314/ajtcam.v10i5.2.

Suleiman M. 2015. An ethnobotanical survey of medicinal plants used by communities of Northern Kordofan region, Sudan. J Ethnopharmacol 176: 232-242. DOI: 10.1016/j.jep.2015.10.039.

Tantengco OAG, Condes MLC, Estadilla HHT, Ragragio EM. 2018. Ethnobotanical survey of medicinal plants used by Ayta Communities in Dinalupihan, Bataan, Philippines. Pharmacogn J 10 (5): 859-870. DOI: 10.5530/pj.2018.5.145.

Tefera B, Kim Y. 2019. Ethnobotanical study of medicinal plants in the Hawassa Zuria District, Sidama zone, Southern Ethiopia. J Ethnobiol Ethnomed 15: 25. DOI: 10.1186/s13002-019-0302-7.

Tena R. 2014. Endemic Medicinal Plants of Ethiopia: Review of the Literature. [PhD Seminar]. Addis Ababa University, Addis Ababa.

Tibebu T, Mesele Y. 2019. Ethnobotanical study on medicinal plants used by indigenous people in Tenta District, South Wollo, Ethiopia. J Med Plant Res 13 (2): 47-54. DOI: 10.5897/jmpr2018.6599.

Uzun SP, Koca C. 2020. Ethnobotanical survey of medicinal plants traded in herbal markets of Kahramanmaraş. Plant Divers 42 (6): 443-454. DOI: 10.1016/j.pld.2020.12.003.

Van Wyk B-E, Gorelik B. 2017. The history and ethnobotany of cape herbal teas. S Afr J Bot 110: 18-38. DOI: 10.1016/j.sajb.2016.11.011.

Yohannis SW, Asfaw Z, Kelbessa E. 2018. Ethnobotanical study of medicinal plants used by local people in Menz Gera Midir District, North Shewa Zone, Amhara Regional State, Ethiopia. J Med Plant Res 12 (21): 296-314. DOI: 10.5897/JMPR2018.6616.