

MEDICINAL PLANTS OF GAMO PEOPLE IN BONKE WOREDA OF GAMO ZONE, SOUTHERN ETHIOPIA

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ABSTRACT: A study on medicinal plants of Gamo people was conducted in Bonke Woreda (District) of Gamo Zone, Southern Ethiopia, with the general objective of investigating the traditional medicinal practice, identifying and documenting medicinal plant species and associated traditional knowledge and assessing threats to medicinal plant resources and their customary use. Relevant information was gathered from 70 informants. The informants, except the healers, were selected following a random sampling technique. The relevant data were collected using semi-structured interviews, field observations, guided field walks and group discussions. Seventy seven plant species belonging to 69 genera and 38 families and used for treating 66 ailments were identified. Of these, 55 medicinal plant species were reported to have been used for curing human ailments, 10 species for curing livestock ailments and 12 species for treating both human and livestock ailments. Most of the medicinal species were collected from home gardens (48.75%) followed by wild habitats (38.75%). Leaves and roots are the most frequently utilized medicinal plant parts. The widely used remedy administration is orally followed by dermal application. Among the medicinal plants used in the woreda, *Ruta chalepensis* is the most preferred medicinal plant to treat stomach diseases, whereas *Datura stramonium* is the most effective medicinal plant to cure diarrhea. *Dodonaea angustifolia* ranks first in terms of its various uses. Medicinal plant species and the associated knowledge are under serious threat. This calls for appropriate and timely interventions for ensuring the conservation of the plant resources and the continuation of the traditional medicinal practices on which the local healthcare system heavily relies.

Keywords: Bonke, Gamo, Medicinal plants, Traditional knowledge.

INTRODUCTION

Traditional medicine (TM), in its inclusive form, encompasses health practices, approaches, knowledge and beliefs incorporating plant, animal and mineral-based medicines, spiritual therapies, manual

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techniques and exercises, applied singularly or in combination to treat, diagnose, prevent illnesses and maintain wellbeing (WHO, 2002). TM is the most ancient method of curing diseases (Abdullahi, 2011) and a widely used healthcare system with major economic importance. It has been asserted that plants are the very first and the only true medicine ever used (Soladoye et al., 2011) and plants that possess therapeutic properties or exert beneficial pharmacological effects on the human or animal body are generally designated as medicinal plants (Khan et al., 2013).

The plant-based healthcare system has persisted for millennia and remains intact among local communities as the main treatment option for different illnesses for such reasons as shortage of pharmaceutical products, inaccessibility of health service centers, unaffordable modern medicines, emergence and re-emergence of certain diseases, as well as the appearance of drug-resistant microbes and/or helminths (Ketema et al., 2013).

Like elsewhere in the developing world, TM has played and continued to play a significant role in treating health problems in both livestock and humans in Ethiopia. Up to 80% of the country's population uses traditional medicine due to the cultural acceptability of healers and other factors (Ketema et al., 2013). In the practice, MPs remain the most important and sometimes the only source of therapeutics (Tesfaye et al., 2009). The significant role of medicinal plants in the primary healthcare system of Ethiopia has been supported by various studies as established by a systematic review on the subject by Endashaw (2007). While 1000 identified MP species are reported in the Ethiopian Flora volumes (Edwards, 2001), many others are not yet identified and about 300 of these species are frequently mentioned in many sources (Edwards, 2001; Gidey, 2010).

It is generally recognized that there exists a rich traditional medicinal knowledge in Ethiopia (Endashaw, 2007; Balcha, 2014; Gadisa et al., 2018) which is as equally important as the biological resource base. However, this aspect of TM is not studied well and hence not fully identified and documented (Haile and

Delenasaw, 2007). This important category of knowledge, which has mainly been passed orally from generation to generation has, therefore, been subject to erosion for long (Behailu, 2010).

Although traditional medicine remains to be the major available healthcare service for the majority of the population in the developing world (WHO, 2002), it is often considered as a practice that serves no purpose by modern health professionals, and there still is a tendency to attribute its continued existence only to lack of access to modern healthcare service. Such negative attitudes stem from misgivings about its biomedical values and also a host of other factors (Getachew et al., 2004). As Abbink (2002) indicated, it is common to come across with obvious rejection of indigenous medicine by healthcare service providers, even in remote localities; and such unfair treatments have already resulted in dismay by local communities who rely on the healthcare system. Depletion or local extinction of medicinal plant species originate from a host of factors like deforestation, overexploitation, overgrazing, habitat degradation and loss, agricultural land expansion (Mesfin and Mekonnen, 2001; Endashaw, 2007), and unsustainable extraction or harvesting of medicinal plant resources (Balcha, 2014). The serious erosion of traditional medicine-related knowledge (Gadisa et al., 2018) had further worsened the harm made to the valuable traditional practice.

The Gamo people like other rural communities of Ethiopia, have been using traditional medicines and still heavily rely on plant-based remedies. However, the traditional medicinal system is confronted with threats of neglect and erosion as elsewhere in the country. This necessitates a timely investigation of the local medicinal practices to have an insight into the practice and also document its different aspects. Therefore, this study was conducted with the general objectives to investigate the traditional medicinal practice, identify and document medicinal plant species and associated traditional knowledge and assess threats to medicinal plant resources and their customary use.

METHODS

Description of the study area

Bonke ($5^{\circ} 41' 58''$ to $6^{\circ} 12' 46''$ N and $37^{\circ} 04' 11''$ to $37^{\circ} 25' 07''$ E), is one of the Woredas in Gamo zone, Southern Nations, Nationalities and Peoples Regional State of Ethiopia (Figure 1). Its main town, Geresse, is located 559 km southwest of Addis Ababa and at 54 km distance from Arba Minch town, the zonal capital. The relief of the woreda is characterized by an undulating plain of extensive lowlands, hills and high plateau with an altitude ranging between 900-3200 m a.s.l. Different ethnic groups live in the Woreda with the Gamo people constituting the indigenous and dominant community. *Gamotho* is the local language of the community. Local community members are engaged in mixed farming with barley, wheat, pulses, the Ethiopian indigenous crop Enset (*Ensete ventricosum*) and Taro (*Colocasia esculenta*) being the major tuber crops.

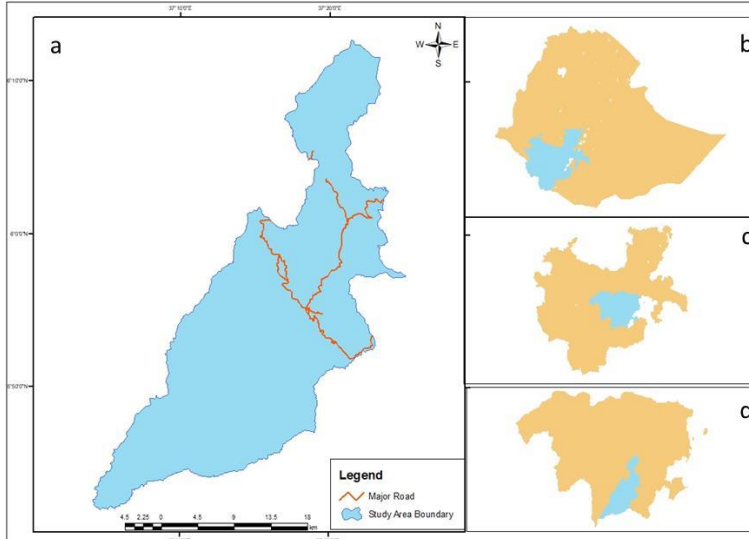


Figure 1. Map of the study area: (a) Bonke woreda, (b) Map of Ethiopia showing SNNPR regional state, (c) Gamo zone in SNNPR regional state, (d) Bonke woreda in Gamo zone.

Data collection and analysis

A reconnaissance survey was conducted at first to select the study kebeles (farmers' villages) in the woreda. Accordingly, seven kebeles were identified from where information on traditional medicinal practice, plant habitats, local healers and plant resources were gathered. Before starting the actual data collection task, members of the local administration and participants of the study were informed about the objective of the research in order to secure their consent. Semi-structured interviews that we reorganized in the form of a checklist helped to address key issues. Additionally, group discussions that focused on common diseases of the studied villages, medicinal plants used to treat ailments, preference to medicinal plants, parts of medicinal plants used and mode of preparation, trend of use and threats to medicinal plants were held with informants of different groups. Seventy individuals (53 men and 17 women) between the ages of 19 and 86 were selected from the seven kebeles as a source of information. Of these, 16 were identified as key informants based on recommendations of local community members, agricultural development agents and members of the local administration. Information on plant species used for treating diseases, plant parts harvested, methods of remedy preparation, aspects of administration and dosage were among the major issues the key informants were requested to provide information on.

Sample specimens of plants cited for their medicinal use were collected, numbered, pressed and dried for identification. Plant species identification was done in the field and at Arba Minch University using the Flora of Ethiopia and Eritrea Volumes 2-7 (Edwards, 1989; Edwards et al., 1995; Hedberg and Edwards, 1995; Edwards et al., 1997; Edwards et al., 2000; Hedberg et al., 2003; Hedberg et al., 2004; Hedberg et al., 2006). This was followed by identification by an expert for some species. The identified species were stored at Arba Minch University's herbarium.

Data analysis

Informant Consensus Factor (ICF) was calculated for each category to identify the agreements of the informants on the reported cures for the group of ailments using the equation:

ICF = $Nur - Nt / (Nur - 1)$, where:

ICF = Informant Consensus Factor,

Nur = number of use citations in each category from informants and

Nt = number of species used

To assess informants' preference of medicinal plants used for treating human diseases, a simple preference ranking and a paired comparison tests were conducted. Furthermore, a direct matrix ranking method was employed to determine the rank of woody medicinal plants of various uses.

RESULTS AND DISCUSSION

Medicinal plant resources of the study area

Seventy-seven plant species belonging to 68 genera and 38 families were documented as having a medicinal value in the study area. Among these, 55 plant species were used for treating only human ailments (Appendix 1), 10 species for treating only livestock ailments (Appendix 2) whereas the rest 12 plant species are mentioned to have been used for treating both human and livestock ailments (Appendix 3). Concerning species diversity of the recorded plant families, Asteraceae and Lamiaceae stood first, each contributing 10 species whereas Cucurbitaceae and Euphorbiaceae came next, each contributing ten and five species, respectively. The dominance of Asteraceae as a source of medicinal plant was reported by previous studies including Endalewu (2007), Seyoum (2009) and Sintayehu (2010).

Major diseases of the study area and their treatment

Informants reported 44 different ailments as human health problems. The most frequently cited eight diseases are malaria, pneumonia, skin diseases, stomach diseases, evil eye, intestinal parasites, typhoid and diarrhea (Appendix 1 and 3). On the other hand, 10 kinds of ailments are recognized as livestock diseases by local community members while anthrax, mastitis, pneumonia and ectoparasites are mentioned to be the major ones. When human and animal ailments are considered together, rabies, fire

burn, snake bite and evil eye turned out to be the major diseases of the area (Appendix 1, 2 and 3). As indicated in the previous section, a larger number of medicinal plants were used to treat human diseases when compared with livestock ailments. A study by Seyoum (2009) on medicinal plants in Debre Libanos Woreda of North Shewa Zone in Ethiopia yielded a similar result. This shows the greater reliance of local people of Bonke woreda on traditional medicine for treating their ailments than their livestock. This is associated with the proportional difference in the number of diseases reported to cause health problems in the two categories. However, other studies elsewhere in Ethiopia have reported an equal number of medicinal plants species to treat human and livestock ailments (Haile and Delnasaw, 2007; Ketema et al., 2013). This may be associated with the greater importance of livestock in the economy and socio-cultural aspects of those areas.

Plant parts used and mode of preparation

Different parts of medicinal plants are reported to have been used, either separately or in a mixture, for treating ailments. However, there is variation in the frequency of use of parts with the most dominantly used plant parts for remedy preparation being leaves, roots and seeds in the given order (Figures 2-4).

The most frequent use of leaves was also reported by previous studies (Bayafers, 2000; Mirutse and Gobana, 2003 and Tesfaye et al., 2009). While other studies like Mirutse (2007) and Ermias et al. (2008), mentioned the frequent use of roots as major items for remedy preparation. The fact that leaves are the most frequently used plant parts for the preparation of remedies might be associated with easier accessibility of the plant part as well as the abundance of active compounds in the primary photosynthetic organs. The wide harvesting of roots affects the survival, accessibility and sustainability of useful medicinal plants. On the other hand, the dominant use of leaves (that are readily available and regenerate easily) and also seeds (that are seasonally available and most often produced in abundance) has a lesser impact on the survival of mother plants and hence could be considered as a sustainable utilization practice.

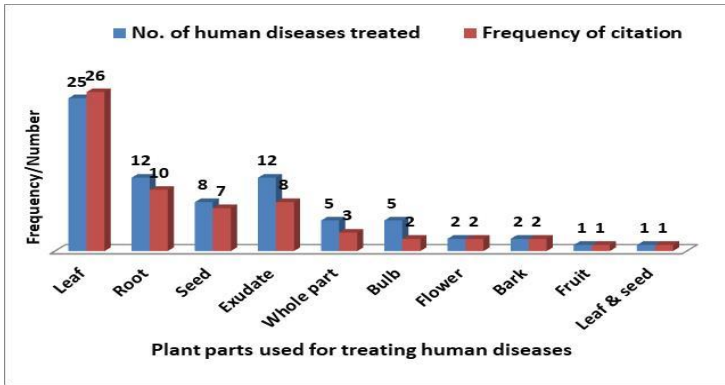


Figure 2. Citation frequency of plant parts used and number of human diseases treated by a plant part.

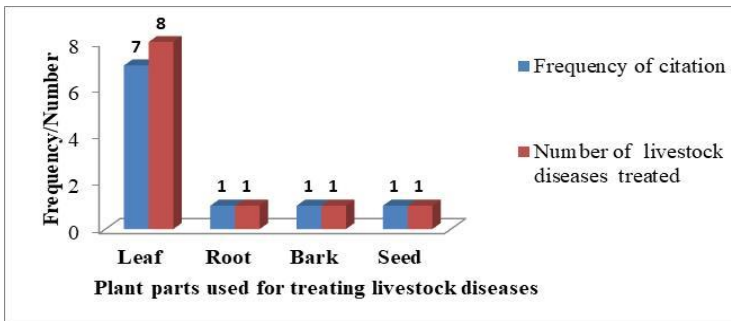


Figure 3. Citation frequency of plant parts used and number of livestock diseases treated by a plant part.

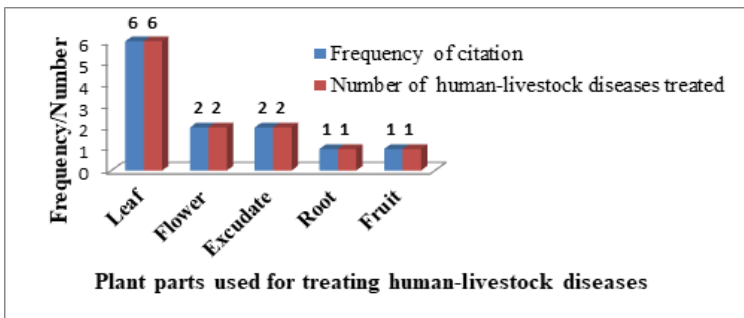


Figure 4. Citation frequency of plant parts used and the number of human-livestock diseases treated by a plant part.

As the study findings indicated, practitioners employ various methods of preparations of remedies for treating different ailments depending on the types of disease treated. Some of the remedies are mixed with different additives like butter, honey, sugar, wheat powder, water, *tella* (local beer) and milk that are meant to reduce the strength of the medicines and also improve the taste. The principal method of remedy preparation is pounding while other methods such as chewing, crushing, chopping, boiling and roasting are also used. Other studies (Sintayehu, 2010; Derebe, 2021; Mulugeta and Erchafo, 2017) have also reported similar results.

Route and dosage of administration

As verified by responses of community members involved in the study, remedies against illnesses are administered via different routes: oral, dermal, nasal, ear canal and anal (Figure 5). The top two most frequently used routes are the mouth and the skin, since in most cases, the remedies are either taken orally or smeared on the skin. Other studies conducted in different parts of Ethiopia also revealed that oral and dermal applications are the principal routes of remedy administration (Emiru et al., 2011; Samuel and Gidey, 2012).

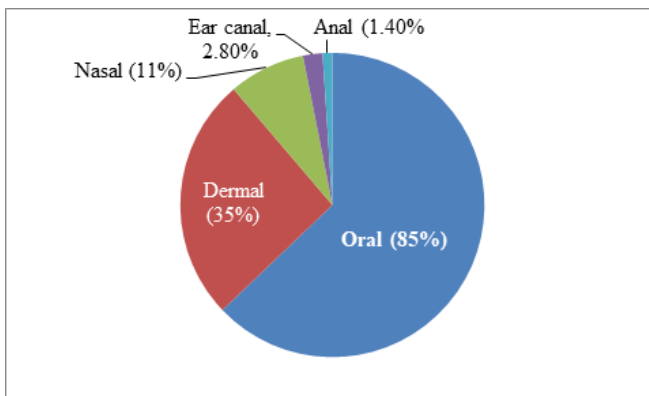


Figure 5. Proportion of respondents who cited the different routes of remedy administration.

As the gathered information indicated, the application of local medicine takes different forms such as drinking, chewing, topical application, sniffing, fumigating and tying the product on the body. This is in agreement with the findings of previous studies (Leul et al., 2018; Emiru, 2011; Sintayehu, 2010), that reported the use of different forms of administration with a varying degree of frequency.

Determining dosage when administering remedies is an aspect to which local healers and community members give attention. Accordingly, various units of measurement such as finger length (for root and bark), number (for seeds and flowers) and containers like cup (for decoction and infusion from plant parts) are used to estimate and fix the dosage of the specific medicine. While administering a medicinal product, dosage prescription is based on such factors as the age of the patients, the stage of illness or malignancy, pregnancy status, etc. A dosage is determined based on the experience of practitioners and healers. A higher or lower dose relative to the required amount is recognized to be not effective or may have negative side effects. Consulted traditional healers indicated that they use antidotes for any adverse effect caused by some medicinal preparations.

Agreement of Informants and their preference to Medicinal Plants

The Informant Consensus Factor (ICF) tool that was used to test agreement of informants on the use of medicinal plants for treating certain categories of diseases yielded different ICF values that ranged from 0.85 to 0.69 as indicated in Table 1. Accordingly, the utmost agreement of informants was displayed for four clusters of diseases: evil eye and evil spirit (0.8), malaria and typhoid (0.84), intestinal parasites, ascaris, tapeworm and hookworm (0.82) and eye-ear-teeth diseases (0.81). This high ICF values could be taken as indicative of the effectiveness of the medicinal plants used to treat diseases in the respective categories.

Table 1. Informant consensus factor by categories of diseases in the study area.

Diseases Categories	Spp.	Use citation	ICF
Evil eye, evil spirit	6	36	0.85
Malaria, typhoid	6	33	0.84
Intestinal parasite, ascaris, tapeworm, hookworm	6	30	0.82
Eye, ear and teeth disease	6	28	0.81
Wound, bleeding, infection, body swelling, fire burn Spider poison	10	45	0.79
Gastritis and stomach pain	15	65	0.78
Rabies and snake bite	4	15	0.78
Pneumonia, jaundice, common cold	10	38	0.75
Febrile illness, headache	4	12	0.72
Scabies, skin rash, tinea versicolor	4	12	0.72
Tonsillitis, goiter	5	14	0.69

To assess informants' preference of medicinal plants that were mentioned to have been used for treating stomach problems of human beings, a simple preference ranking test was conducted and the result is given in Table 2. Accordingly, *Ruta chalepensis* stood first as the most preferred medicinal plant to treat stomach disease; and this aligns with the attitude almost everywhere in Ethiopia to use the plant as a cure for stomach ailments.

Table 2. Preference ranking of medicinal plants used to treat stomach disease in humans (5 = the most preferred, 1 = the least preferred)

Medicinal plants	Informant (I) involved in ranking												
<i>Ruta chalepensis</i>	5	5	4	2	4	2	3	4	5	4	38	1 st	
<i>Artemisia afra</i>	4	3	5	3	5	5	2	3	4	1	35	2 nd	
<i>Echinops kebericho</i>	1	2	2	1	3	4	1	1	2	5	22	5 th	
<i>Solanum incanum</i>	3	4	3	5	2	3	5	2	3	2	32	3 rd	
<i>Foeniculum vulgare</i>	2	1	1	4	1	1	4	5	1	3	23	4 th	

Since diarrhea is among the prevalent health disorders in the study area, a paired comparison test of five medicinal plants that are used to treat the ailment was made by involving seven informants to rank them. The test result indicated that *Datura stramonium* is the much favoured plant in treating diarrhea (Table 3).

Table 3. Paired wise preference comparison of medicinal plants used to treat diarrhea.

Medicinal plants	Informant (I) involved in ranking							Total	Rank
	I1	I2	I3	I4	I5	I6	I7		
<i>Artemisia absinthium</i>	3	4	1	1	3	2	2	16	4 th
<i>Linum usitatissimum</i>	2	1	3	2	2	4	3	17	3 rd
<i>Datura stramonium</i>	3	2	3	4	2	4	4	22	1 st
<i>Achyranthes aspera</i>	1	3	4	2	4	2	2	18	2 nd
<i>Ensete ventricosum</i>	4	2	2	3	1	1	1	14	5 th

Several woody plant species of medicinal importance are used for a variety of purposes such as construction, charcoal production, fencing, firewood and timber production. To assess the relative importance and check the popularity of these multipurpose plants, a direct matrix ranking analysis was conducted. In the process, five commonly reported multifunctional plant species and six use categories were employed and the ranking by five key informants yielded the result indicated in Table 4.

Table 4. Rank of five multipurpose woody plant species as determined by local preference.

Use category	Medicinal plants				
	<i>Croton macrostachyus</i>	<i>Syzygium guineense</i>	<i>Dodonaea angustifolia</i>	<i>Erythrina brucei</i>	<i>Vernonia amygdalina</i>
	(I ₁ -I ₅)	(I ₁ -I ₅)	(I ₁ -I ₅)	(I ₁ -I ₅)	(I ₁ -I ₅)
Medicinal	25	17	20	16	25
Construction	12	19	25	7	7
Charcoal	9	12	18	11	8
Firewood	19	12	20	18	20
Timber production	10	10	5	7	4
Fencing	15	18	15	13	12
Total	90	88	103	72	76
Rank	2 nd	3 rd	1 st	5 th	4 th

Accordingly, *Dodonaea angustifolia*, stood first as the most preferred species followed by *Croton macrostachyus* and *Syzygiumguineense*. The high preference dedicated to these species relates to the

quality of the wood in terms of resistance to weevil or termite attack, complete burning nature, suitability for timber production besides their use for medicinal purposes.

Source habitats of medicinal plants in the study area and their conservation status

As information gathered from local community members indicated, medicinal plants used for treating human and animal diseases are obtained from different sources. These include crop fields, farm edges, home gardens and wild vegetation (Figure 6). While home gardens and wild vegetation served as a source of medicinal plants used to treat human or animal or human-animal diseases, farm edges provided medicinal plants used to treat either human or animal ailments and crop fields supplied medicinal plants used to treat only human diseases. In terms of number of medicinal plants provided by each habitat type, home gardens provided the most (48%) followed by wild vegetation (40.3%) while farm edges and crop fields provided the least (6.5%) and (3.9%), respectively. Only one medicinal plant was reported to be collected from two habitats, i.e. crop fields and wild vegetation (Figure 6).

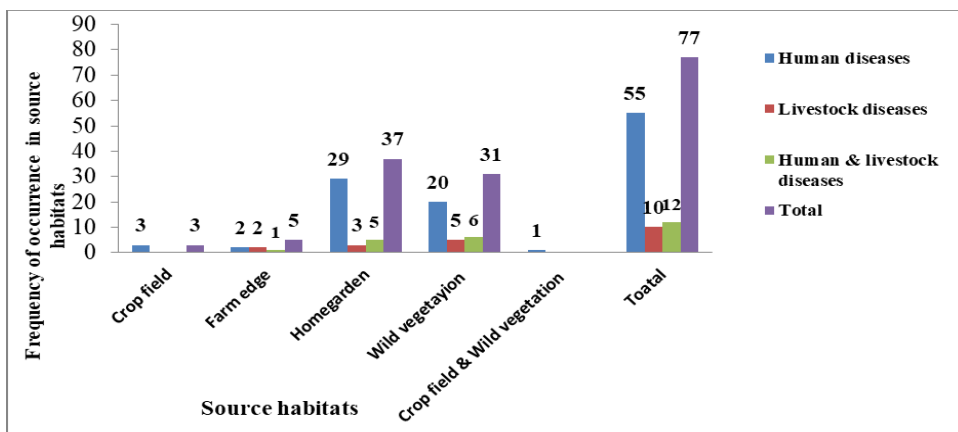


Figure 6. Occurrence of medicinal plants (used against different categories of diseases) in different source habitats.

The occurrence of the largest proportion of medicinal plants in home gardens must have been the result of their continuous incorporation from different sources (like markets and wild vegetation). This could be

taken as a positive situation since the maintenance of the medicinal resources under cultivation helped to ensure sustainability. The availability of medicinal plants in the wild provides an alternative source for accessing them. However, the rapid deterioration of vegetation cover because of land-use changes poses a serious concern regarding the sustainability of the resources. Churchyards and burial grounds covered by vegetation were observed to be important sites of medicinal plants' conservation since components plants are protected due to cultural and spiritual reasons. Such protection, in turn, contributes to the conservation of medicinal plants since cutting and harvesting are not allowed in such revered areas. The other conservation ethic related practice in the study area pertains to the norm of harvesting medicinal plants. In line with this, some local practitioners in the study area demonstrated a peculiar management practice when harvesting. Accordingly, practitioners take the most care when harvesting the root and bark of medicinal plants so as not to kill the resource plants. Only some portion of the bark or the root of the plant is taken and the rest is covered with soil or wrapped with some protective material to prevent the plant from dying.

Threats to medicinal plants and related local knowledge

Anthropogenic factors were identified as the main threats to medicinal plants in the study area. These include agricultural expansion associated with population growth, firewood collection, charcoal production and cutting of trees for construction. During field observations, people were spotted collecting firewood and timber (for house construction) by cutting shrubs and trees from the woodlands and forest patches. According to the traditional healers, it became difficult to collect medicinal plants in the area for the vegetation cover has continually diminished; and this forced the healers to travel long distances in search of resources. A ranking exercise that involved 10 respondents who ranked four factors in their perceived degree of importance (4 = with the greatest impact; 1= with the least impact) helped to order the threatening factors of local vegetation and medicinal plants as indicated in Table 5. Accordingly, agricultural expansion turned to be the most important factor that contributes to the loss of local

vegetation. The main threats for medicinal plants in the natural vegetation are, therefore, agricultural expansion and fuelwood collection. This result was in line with the report made by Zerhiun and Mesfin (1990) and Genene and Reddy (2015).

Table 5. Factors responsible for the loss of the local vegetation and medicinal plants in the study area.

Threatening factors	Respondents										Total	Rank
	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10		
Agricultural expansion	4	4	4	4	4	4	4	4	4	4	40	1 st
Construction	1	2	2	3	2	2	3	3	2	2	22	3 rd
Firewood & Charcoal	3	3	3	2	3	3	2	2	2	3	26	2 nd
Overgrazing	2	1	1	1	1	1	1	1	2	1	12	4 th

Most of the knowledge on plant-based medicine is kept secret and held only by practitioners. Even when the medicinal products are administered, the practitioners somehow modify plant parts such as seeds and flowers by deforming their shapes so that they will not be recognized by an observer. The medicinal knowledge, when transferred, is passed only to selected close relatives. One quality that local healers require from a candidate whom they want to pass the medicinal knowledge is trustworthiness in keeping the information confidential. When transferring the knowledge, they remind the recipient to apply the same principle of secrecy. Maintaining secrecy of the knowledge is required as it is an important means of generating income for the family. Furthermore, it is believed that the healing skill which is granted by the almighty creator to the particular family line, as well as the healing power of the plant remedy, will likely be lost if the secret is not maintained. Due to this and other factors such as lack of interest by the young generations in traditional medication systems and the influence of modern education, local medicinal knowledge is confronted with a serious threat of loss.

CONCLUSION

The present study in Bonke Woreda of Gamo zone revealed that local community members rely on the use of traditional medicine for treating a wide range of human and livestock diseases. Though modern medicine is used to a limited extent, the use of diverse medicinal plants as a cure to local health problems is indicative of the well-developed traditional healthcare system of the community as well as the existence of a broad resource base. The tradition of frequently using leaves for remedy preparation could be viewed as a situation that allows sustainable utilization of medicinal resources. The expertise of traditional healers, which is demonstrated in the form of formulating remedies, prescribing appropriate doses, use of antidotes to neutralize unwanted impacts of medicinal preparation and preference of one medicinal plant over the other, is based on local knowledge accumulated over generations. However, the rich medicinal resources accessed from human managed ecosystems and wild vegetation, as well as the associated local knowledge are under threat of erosion, principally due to anthropogenic factors. Such trends, unless corrected in time, will ultimately affect the local people of the study area by disrupting their primary healthcare system. It is, therefore, appropriate to consider interventions that help conserve the medicinal plant resources of the area, the traditional medicinal practice as well as the associated knowledge.

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Appendix 1. List of medicinal plants used for treating human diseases (B: Bark, Bu: Bulb, Cf: Crop field, Cl: Climber, Fe: Farm edge, Fl: Flower, Fu: Fruit, H: Herb, Hg: Home garden, L: Leaf, R: Root, La: Latex, Rz: Rhizome, S: Seed, Sa: Sap, Sh: Shrub, T: Tree, Tr: Trailer, Tu: Tuber, Wp: Whole plant, Wv: Wild vegetation, T: Tree).

No.	Scientific name	Family	Local name (Gamo)	Part Used	Habitat	Habit	Diseases treated	Route of Admin.
1	<i>Achyranthes aspera</i> L.	Amaranthaceae	Bitærqqa	L	Hg	H	Diarrhea	Oral
2	<i>Acmellacaulirhiza</i> Del.	Asteraceae	Fach facho	Fl	Hg	H	Tonsillitis	Oral
3	<i>Aframomum corrorima</i> (A. Braun) P.C.M. Jansen.	Zingiberaceae	Kororuma	S	Hg	H	Pneumonia	Oral
4	<i>Allium sativum</i> L.	Aliaceae	Tummo	Bu	Hg	H	Common cold, typhoid malaria, pneumonia	Oral
5	<i>Artemisia absinthium</i> L.	Asteraceae	Natira	L	Hg	H	Diarrhea	Oral
6	<i>Artemisia afra</i> Jacq. ex Willd.	Asteraceae	Chikugne	L	Hg	H	Stomachache	Oral
7	<i>Artemisia rehan</i> C.	Asteraceae	Artemisia	Wp	Hg	H	Malaria, pneumonia	Oral
8	<i>Basilicum polystachyon</i> (L) Moench.	Lamiaceae	Takeso	L	Wv	Sh	Evil eye, evil spirit	Oral
9	<i>Brassica carinata</i> A.Br.	Brassicaceae	Gomenzere	S	Hg	H	Stomachache	Oral
10	<i>Carica papaya</i> L.	Caricaceae	Baqula	L & Fu	Hg	T	Intestinal parasites, malaria Gastric illness	Oral
11	<i>Citrus limon</i> (L.) Burm. f.	Rutaceae	Lomee	Sa	Hg	Sh	Blood pressure, common cold	Oral
12	<i>Clematis simensis</i> Fresen.	Ranunculaceae	Asayfedhale	R	Hg	Cl	Evil eye (affecting pregnant women)	Oral
13	<i>Commelina petersii</i> Hassk.	Commelinaceae	Galgatsa	L	Hg	Rz	Evil eye	Oral
14	<i>Corchorus trilocularis</i> L.	Tiliaceae	Churja	L	Hg	H	Titanus	Dermal
15	<i>Coriandrum sativum</i> L.	Apiaceae	Dobe	S	Hg	H	Impotence	Oral
16	<i>Cressa cretica</i> L.	Convolvulaceae	Shosha dale	L	Wv	H	Snake bite	Dermal
17	<i>Croton macrostachyus</i> Del.	Euphorbiaceae	Badhite	La	Wv	T	Bleeding, skin rash	Dermal
18	<i>Cucurbita pepo</i> L.	Cucurbitaceae	Lelehe	L & S	Hg	Cl	Tapeworm	Oral
19	<i>Cymbopogon citratus</i> (DC.) Stap.	Poaceae	Chajesare	L	Hg	H	Pneumonia	Oral
20	<i>Datura stramonium</i> L.	Solanaceae	Mazho	L	Hg	H	Diarrhea	Oral
21	<i>Dioscorea alata</i> L.	Dioscoreaceae	Tura boye	L	Cf	Cl	Tinea versicolor Stomachache	Dermal Oral
22	<i>Echinopskebericho</i> Mesfin	Asteraceae	Boroso	R	Fe	Sh	Evil eye Tinea versicolor	Fumiga Dermal

No.	Scientific name	Family	Local name (Gamo)	Part Used	Habitat	Habit	Diseases treated	Route of Admin.
23	<i>Endostemon tenuiflorus</i> (Benth.) M. Ashby.	Lamiaceae	Yezilat	Wp	Wv	H	Goiter, headache	Nasal
24	<i>Ensete ventricosum</i> (Welw.) Cheesman.	Musaceae	Utha	R	Hg	T	Typhoid, diarrhea	Oral
25	<i>Euphorbia breviararticulata</i> Pax	Euphorbiaceae	Akkirsa	La	Wv	T	Toothache	Oral
26	<i>Euphorbia candelabrum</i> Trémaux ex Kotschy.	Euphorbiaceae	Mathamitha	La	Wv	T	Gonorrhoea, ascariasi, tooth ache	Oral
27	<i>Foeniculum vulgare</i> Miller Var.	Apiaceae	Katikala	R	Hg	H	Stomach ache	Oral
28	<i>Hagenia abyssinica</i> (Bruce) J.F. Gmel.	Rosaceae	Kosso	S	Fe & Wv	T	Tapeworm, hookworm	Oral
29	<i>Hypericum quartianum</i> A.Rich.	Hypericaceae	Ereka	B	Wv	T	Stomach pain	Oral
30	<i>Isodon schimperi</i> (Vatke) J.K.Morton.	Lamiaceae	Mecha dale	L	Wv	Sh	Stomachache, sore lip	Nasal
31	<i>Jatropha curcas</i> L.	Euphorbiaceae	Tsedaki	La	Hg	Sh	Bleeding	Dermal
32	<i>Justicia flava</i> (Forssk.) Vah.	Acanthaceae	Badalo	L	Hg	H	Amoeba	Oral
33	<i>Lepidium sativum</i> L.	Brassicaceae	Fetso	S	Hg	H	Skin disease, wound, tonsillitis	Dermal
34	<i>Moringa stenopetala</i> L.	Moringaceae	Halako	L	Hg	T	Blood pressure, malaria	Oral
35	<i>Myrtus communis</i> L.	Myrtaceae	Gazhiqano	R	Wv	T	Body swelling	Nasal
36	<i>Nigella sativa</i> L.	Ranunculaceae	Karetsaayfe	S	Hg	Sh	Pneumonia	Oral
37	<i>Ocimum lamiifolium</i> Hochst.	Lamiaceae	Mishatale	L	Hg	H	Sore tounge	Nasal
38	<i>Oliniarochettiana</i> A. Juss.	Olinaceae	Qaga	L	Wv	Sh	Toothache, jaundice	Oral
39	<i>Ostegia fruticosa</i> (Forssk.) Schweinf. ex Penzig.	Lamiaceae	Sosote	L	Hg	Sh	Stomach pain	Oral
40	<i>Phytolacca dodecandra</i> L'Herit.	Phytolaccaceae	Hazinche	R	W	Sh	Jaundice, rabies, hyena bite	Oral
41	<i>Premna oligotricha</i> Baker.	Lamiaceae	Susa	Fl	Fe	Sh	Stomachache	Oral
42	<i>Premnaresinosa</i> (Hochst.) Schauer.	Verbenaceae	Ache dhale	R	Wv	T	Toothache	Oral
43	<i>Ranunculus simensis</i> Fresen.	Ranunculaceae	Gorethse	L	Wv	Sh	Internal parasite	Oral
44	<i>Rumex nervosus</i> Vahl	Polygonaceae	Chole	La	Fe	Sh	Skin disease	Dermal
45	<i>Ruta chalepensis</i> L.	Rutaceae	Tsalado	L	Hg	H	Stomachache, evil eye	Oral
46	<i>Solanum incanum</i> L.	Solanaceae	Bundo	R	Wv	Sh	Stomachache	Oral
47	<i>Syzygium guineense</i> (Willd.) DC.	Myrtaceae	Oche	L	Wv	T	Pneumonia, tonsillitis, sour tounge, typhoid, stomach ache	Oral
48	<i>Tagetes minuta</i> L.	Asteraceae	Tunga	L	Wv	Sh	Pneumonia	Oral
49	<i>Thymus schimperi</i> Ronniger	Lamiaceae	Zimpha	Wp	Hg	H	Stomach ache	Oral

No.	Scientific name	Family	Local name (Gamo)	Part Used	Habitat	Habit	Diseases treated	Route of Admin.
50	<i>Triticum aestivum L.</i>	Poaceae	Giste	S	Fe	G	Spider poison	Dermal
51	<i>Vernonia bipontini Vatke.</i>	Asteraceae	Kacheta	R	Wv	Sh	Delayed placental delivery	Oral
52	<i>Vernonia hochstetteri Sch. Bip. ex Walp.</i>	Asteraceae	Buzo	L	Wv	Sh	Stomach ache	Oral
53	<i>Zehneria anomala C. Jeffrey.</i>	Cucurbitaceae	Kurkuchi	R	Wv	Cl	Rabies	Oral
54	<i>Zehneriascabra (Linn.f.) Sond</i>	Cucurbitaceae	Shoshadhale	L	Wv	Cl	Snake bite	Dermal
55	<i>Zingiber officinale Roscoe</i>	Zingiberaceae	Jenjelo	Bu	Hg	H	Common cold, tonsillitis	Oral

Appendix 2. List of medicinal plants used for treating livestock ailments (B: Bark, Bu: Bulb, Cf: Crop field, Cl: Climber, Fe: Farm edge, Fl: Flower, H: Herb, Hg: Home garden, L: Leaf, R: Root, La: Latex, Rz: Rhizome, S: Seed, Sa: Sap, Sh: Shrub, T: Tree, Tr: Trailer, Tu: Tuber, Wp: Whole plant, Wv: Wild vegetation, T: Tree).

No.	Scientific name	Family	Local name	Part Used	Habitat	Habit	Diseases treated	Route of admin.
1	<i>Brucea antidysenterica</i>	Simaroubaceae	Mehe dhale	L	Wv	Sh	Ticks	Dermal
2	<i>Cyphostemma cyphopetalum</i> (Fresen.) Desc. ex Wild & R. B. Drumm.	Vitaceae	Dodhe	R	Hg	H	Evil eye	Oral
3	<i>Dodonaea angustifolia</i> L. f.	Sapindaceae	Sagira	L	Wv	Sh	Stomach disorder	Oral
4	<i>Erythrina brucei</i> Schweinf.	Fabaceae	Kore	L	Wv	T	Ticks	Dermal
5	<i>Premna schimperi</i> Engl.	Lamiaceae	Hafra	L	Fe	Sh	Diaharea	Oral
6	<i>Ricinus communis</i> L.	Euphorbiaceae	Gulo/Qobbo	S	Hg	Sh	Anthrax	Oral
7	<i>Salix subserrata</i> Willd.	Salicaceae	Bola dhale	L	Wv	T	Physical weakening	Oral
8	<i>Tetrapanax papyrifera</i> (Hook.) K. Koch	Araliaceae	Hatsa	B	Fe	Sh	Mastitis	Oral
9	<i>Vernonia adoensis</i> Sch. Bip. ex Walp	Asteraceae	Gingina	L	Wv	T	Cough, Constipation	Oral
10	<i>Vernonia amygdalina</i> Del.	Asteraceae	Gara	L	Hg	T	Internal parasite	Oral

Appendix 3. Medicinal plant species used for treating both livestock and human ailments (Cl: Climber, F: Fruit H:Fl:Flower, Herb, Hg: Homegarden, L: Leaf, La: Latex, R:Root, Sa: Sap, Sh: Shrub, T: Tree Tu: Tuber, Wp: Whole plant, Wv: Wild vegetation, T: Tree).

No.	Scientific name	Family	Local name	Part Used	Habitat	Habit	Diseases treated	Route of admin.
1	<i>Aloe</i> spp.	Aloaceae	Godareuutha	La	Hg	H	Fire burn	Dermal
2	<i>Clausenaanisata</i> (Willd.) Hook.f. ex Benth.	Rutaceae	Alga	L	Hg	Sh	Skin rash	Dermal
3	<i>Cressa arabica</i> Forssk.	Convolvulaceae	Shoshadhale	L	Wv	Cl	Snake bite	Dermal
4	<i>Cucumis ficifolius</i> A.Rich.	Cucurbitaceae	Phirifithi	Fl	Hg	Cl	Ear pain	Ear canal
5	<i>Cucumis zeyheri</i> Sond.	Cucurbitaceae	Kurkuchi	R	Wv	Cl	Rabies	Oral
6	<i>Ekebergia capensis</i> Sparm.	Meliaceae	kintsipile	Sa	Wv	T	Hemorrhoid	Anal
7	<i>Lagenaria siceraria</i> (Molina) Standl.	Cucurbitaceae	Bitu wororo	Fl	Wv	Cl	Malaria	Oral
8	<i>Leucas urticifolia</i> (Vahl) Sm.	Lamiaceae	Olge	L	Fe	H	Constipation	Oral
9	<i>Linum usitatissimum</i> L.	Linaceae	Tura	S	Hg	H	Diaharea	Oral
10	<i>Lippia adoensis</i> Hochst. ex Walp. var. koseret Sebsebe	Verbenaceae	Chozhe	L	Wv	Sh	Skin rash	Dermal
11	<i>Ocimum gratissimum</i> L.	Lamiaceae	Mimicho	L	Hg	H	Febrile illness	Nasal
12	<i>Plantago lanceolata</i> L.	Plantaginaceae	Yezale	L	Wv	H	Wound	Dermal