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Ethnobotanical study of medicinal plants in ale woreda, South West Ethiopia

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Abstract
An ethnobotanical study of traditional medicinal plants by local people in Ale Woreda, South West Ethiopia was carried out to investigate the diversity and use of medicinal plants as well as to identify and document the indigenous knowledge of local people. Ninety (90) informants were selected by preferential sampling method of which 78 were males and 12 were females. Data were collected using semi structured interview, field observation, group discussion and specimen collection. A total of 72 medicinal plant species were identified belonging to 68 genera and 39 families. From medicinal plants collected 78.80% were used to treat human ailments 18.20% were used to treat livestock ailments and 3% were used to treat both human and livestock ailments. Herbs (51.39%) were the dominant followed by shrubs (20.80%), trees (19.50%) and climbers (8.30%). The most utilized plant part was leaf (41.56%) followed by root (23.38%). The most widely used method of preparation was crushing (32.32%) followed by chopping (16.20%) and powdering (13.13%). The common route of administration was oral (59%) followed by dermal (24%) application. Agricultural expansion, over grazing, over harvesting of plants for different household utensils and other human induced problems were the major threats of natural habitat, and the conservation practice of medicinal plants in the study area is too petite.

Keywords: Ale woreda, ethnobotany, indigenous knowledge

Introduction
Human life and culture is being affected directly or indirectly by their surrounding environment. People depend on plants found around them for various purposes like food, shelter, clothing, cosmetics, dyes, medicine etc. They classify the plants on the basis of their use, stored information and knowledge of plant use and this information and knowledge passed from one generation to another. Over centuries, indigenous people have developed their own locality specific knowledge on plant use, management and conservation [1]. Therefore, the conservation of ethnobotanical knowledge as part of living cultural knowledge and practices between communities and the environment is essential for biodiversity conservation [2, 3].
Traditional medicines are used to explain the traditional practice that has been in existence, even before the advancement use of modern medicine [4]. This is still widely accepted and used in prevention and treatment of physical and mental disorders as well as social problems of the societies [4]. Traditional medicines are used throughout the world as people are depending on locally available and easily accessible plants in their local indigenous knowledge [5]. It is reported that more than 3.5 billion people in the developing countries depend on traditional medicines of plants for the treatment of both human and livestock diseases [6]. The majority of people (70-80%) in Africa consult traditional practitioners for their health care. Concerning these medical systems in sub-Saharan Africa, thousands of kilograms of medicinal plants are collected and used by healers for treatment of various human and livestock health problems [7].
In Ethiopia, even though there has been some organized ethnomedicinal studies, there is limited development of therapeutic products and the indigenous knowledge on usage of medicinal plants as folk remedies are getting lost owing to migration from rural to urban areas, industrialization, rapid loss of natural habitats and changes in life style. In addition, there is a lack of ethnobotanical study carried out in most parts of the country. In Ethiopia, traditional medicine is faced with a problem of sustainability and stability mainly due to the loss of taxa of medicinal plants. In most situations, the traditional knowledge in Ethiopia is passed verbally from generation to generation and valuable information can be lost whenever a traditional medical practitioner passes away without transferring this traditional medicinal plant knowledge to others [8].

Like many of the developing countries, medicinal plants in Ethiopia have not been well studied, tested or documented, when compared with the multiethnic cultural diversity and the diverse flora of country. Like in different parts of Ethiopia people of Ale Woreda have their own traditional practices through which they develop the traditional use and management of various medicinal plants in the area. The identification and documentation of medicinal plants and indigenous knowledge of the local communities of Ale Woreda was made to enrich the medicinal plants records for the country.

Methods of the study

Description of the study area

The study was conducted in Ale Woreda, Southern Nations Nationalities and Peoples Regional State, Ethiopioa. Ale Woreda is a newly formed departed from the former Konso and Derashe Special Woredas and independently became a Woreda since 2010. Kolango is taken as town of Ale Woreda. The name Ale came from the word Ala which literary means people confined to humid ('Degama') agro climatic condition. The language spoken in the entire Woreda is "Bago Ale" and this language of Ale ethnic group is under Cushitic family. Ale Woreda is located at the latitude of $05^0$20' - $05^0$43' N and $37^0$02'- $37^0$21' E longitudes. However, Ale Woreda is bordered with Derashe Woreda and Bonke Woreda in the North, Konso Woreda in the East, Bena tsemay Woreda in the west and Konso Woreda in the southern part (Figure 1).

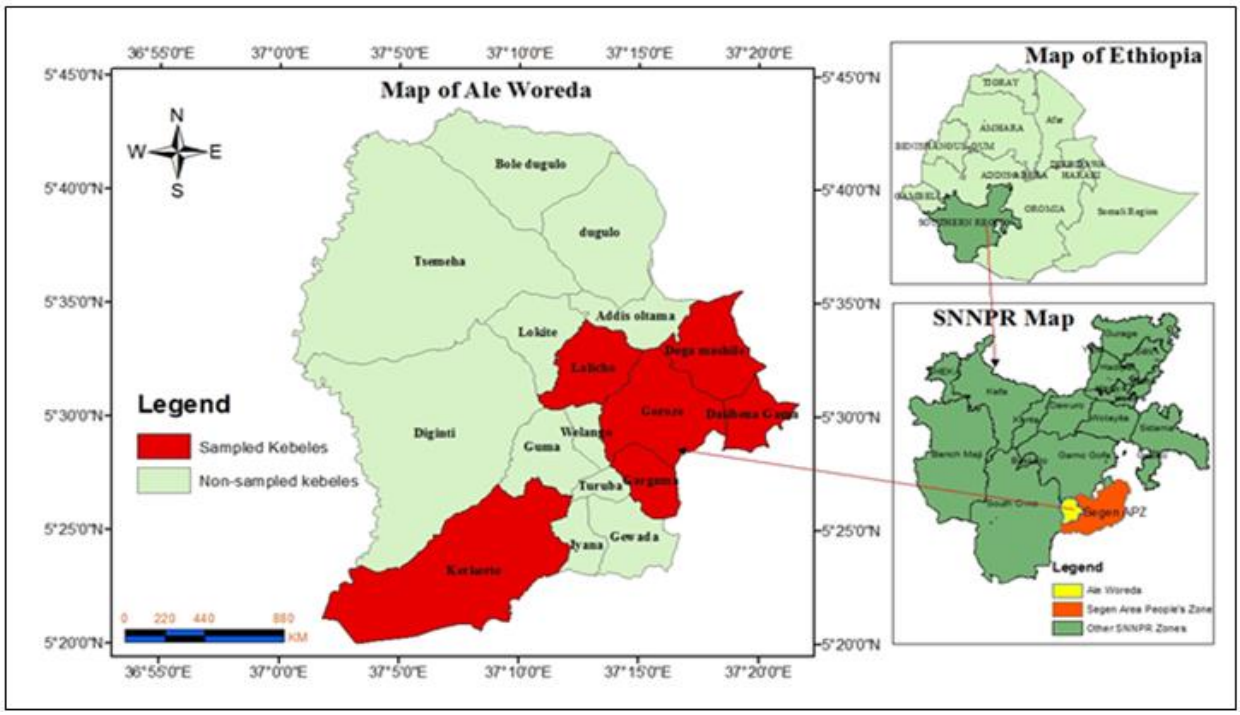

Fig 1: Map of study area

Reconnaissance survey and site selection

A reconnaissance survey of the study area was made from 23 - 30 May 2015 to get general over view and quick assessment of the Woreda's vegetation cover and to select sample Kebeles (the lower administration). Out of 17 Kebeles in the Woreda, 6 Kebeles namely Qerqerte (elevation between 500 and 1500 m a.s.l), Delbena- Gama (elevation 1300 to 1900 m a.s.l), Gargama (elevation 1700 to1800 m a.s.l.), Goroze (elevation 1650 to 2100 m a.s.l.), Lalicho (elevation 1900 to 2300 m a.s.l.) and Dega - Mashille (elevation 2000 to 2800 m a.s.l.) were selected purposefully based on the topography, agro-ecology and the availability of traditional healers (Figure 1). Kebele administrators, local elders, religious leaders and knowledgeable persons were consulted for the availability of the local healers in the area.

Informant selection

A total of 90 informants (all are traditional healers although their medicinal plant knowledge level is different) based on the availability of traditional healers 15 from Gargama, 16 from Qerqerte, 16 from Delbena-Gama, 15 from Goroze, 15 from Lalicho and 13 from Dega-Mashile study Kebeles (78 are males and 12 are females, also based on availability of traditional healers) with appropriate age of 25 and above were selected by preferential sampling method. From general informants, 18 (20%) key informants 3 (16.7%) from each selected Kebele (16 males and 2 females) were taken preferentially. The selection of informants was deliberate choice due to the qualities the informants have about knowledge of medicinal plants based on information and recommendation from local elders, Kebele administration leaders and other concerning bodies [2].

Ethnobotanical data collection

The actual data collection was carried out from July 4/2015 to November 28/2015. A total of 90 informants (all are traditional healers although their medicinal plant knowledge level is different) based on the availability of traditional healers. Prior to data collection, discussions were carried out with Woreda and Kebele administrations, local elders and selected informants as well in order to create smooth ground and get their consent that their cooperation play a vital role to the documentation of the traditional medicinal plants. Both primary and secondary data were collected. Primary data were obtained from both general and key informants using semi structured interview, field observation or guided field walk and focus group discussion. During the study period, each informant was visited two times so as to maximize the

reliability of the information and to make sure that if the response from the informant is the same. Consequently, the responses of an informant that were not in harmony with each other were rejected since they were considered as unreliable information. The ethnobotanical data were collected by standard methods [2].

Semi-structured interview

Semi-structured interviews checklist involving 27 questions were prepared in advance. The interviews were carried out at the proper and suitable time and place chosen with the permission of the informant and the agreement between researcher and informant. The language used most frequently with the informants was "Bago Ale" by the help of translator and at one study site (Delbena Gama Kebele); Affaa xonso was also used by the informants. The interview was from the checklist and some issues were raised based on responses from the informants. During interview, information regarding the background of the informants, local name of medicinal plant about which the informant was interviewed, its use, method of preparation, ingredients used, route of administration, threats and conservation status and all other necessary information were noted.

Field observation/Guided field walk

During field observation/ guided field walk the informants were not volunteered to move with third person or more rather they wanted to move only with researchers in order to keep their knowledge of medicinal plants under study as confidentiality agreement. This practice is exercised by all the healers who have been working in the study area. In the field, the informants provided local name of the medicinal plant and his/her ethnobotanical knowledge of obtained medicinal plant species, the general overview of the area concerning all the issues of vegetation cover, threats on the sites as regard to the community level, the mode of management or disturbance and conservation on the wide range of natural vegetation, and both wild and cultivated medicinal plants in relation to market and other divers perspectives from the sites were observed then the voucher specimen were collected.

Specimen collection

Medicinal plant specimens were collected, numbered, pressed, dried and their attributes were recorded. Similarly, the necessary information about medicinal plant sample specimens where they located like altitude, latitude, longitude, habit and their habitat were also gathered.

Group discussion

The discussion was from semi structured questions prepared as a checklist and additionally other related questions were raised depending on the ideas provoked from the informants. The discussion was made in Goroze and Delbena Gama with selected volunteer healers freely without any disturbance and interference. During discussion general information on the indigenous knowledge and practices of the healers, threats to medicinal plants, their management and conservation and other relevant information were recorded carefully.

Specimen identification

The medicinal plants used as the treatment of both human and livestock ailments were collected as voucher specimen together with all the information about the plant. Identification of specimens were done using the published volumes of flora of Ethiopia and Eritrea and also related with genuine specimens deposited at the National Herbarium (ETH), at Addis Ababa University, Ethiopia.

Ethnobotanical data analysis

To achieve the formulated objectives of the study, ethnobotanical data were analyzed by different analysis methods such as preference ranking and direct matrix ranking for some selected medicinal plants [1, 2]. In addition to this the data collected from the study sites were analyzed by descriptive statistical methods such as percentages and frequency tables, graphs and charts for the data collected on parts used, habits of medicinal plants, medicinal value, preparation methods, route of administration, disease treated, dosage and other associated indigenous knowledge about the plants and entered Excel spreadsheet and summarized.

The informant consensus factor (ICF) is the factor used to calculate the level of homogeneity between information provided by different informants [9]. Accordingly, ICF was calculated for each category of ailments to identify the agreement of the informants on the reported use of medicinal plants to cure group of ailments. The ICF which fall between the ranges of 0 and 1 was calculated as follow:

$$ICF = \frac{n_{ur} - n_t}{n_{ur} - 1}$$

Where: ICF = informant consensus factor

n_{ur} = number of use citation in each category

n_t = number of species used

Fidelity level (FL) is used to indicate the importance of a given species for a particular purpose in a given cultural group [10]. In this fact, the relative healing capacity of individual medicinal plant used to treat human or livestock ailments were analyzed by Fidelity Level Index (FL) formula which is given as $FL\% = Ip/Iu \times 100$, where Ip is the number of informants who independently indicate the use of a species for the same major ailments and Iu is the total number of informants who indicate the plant for any major ailments [10].

Results and discussion

Distribution and diversity of medicinal plants

A total of 72 ethnomedicinal plant species belonging to 68 genera and 39 families were collected and identified in this study. From recorded medicinal plant families, Lamiaceae was the most distinguished family having 7 genera and 11 species followed by Asteraceae which involves 5 genera and 5 species. Acanthaceae, Fabaceae and Solanaceae were equally dominant with 4 genera and 4 species each; Cucurbitaceae and Rubiaceae took fourth position with 3 genera and 3 species each. Six families (Anacardiaceae, Apiaceae, Euphorbiaceae, Myrtaceae, Oleaceae, and Rutaceae) consist of 2 genera and 2 species each. The remaining 26 families were represented by only 1 genera and 1 species each (Table 1).

Among medicinal plants identified, 23.60% were cultivated in the homegardens. The remaining 76.40% of the medicinal plant species were located outside the homegardens which were obtained from different wild habitats even though their availability is not restricted to the mentioned vegetation habitats (Table 1).

Table 1: Distribution of medicinal plants in various natural habitats

Plant vegetation type	Number of medicinal plants obtained	%
Combretum - Terminalia woodland vegetation	7	9.7
Dry evergreen Afromontane forest and Afromontane bamboo forest	4	5.6
Bush land and thicket vegetation type	4	5.6
Eucalyptus Plantation	4	5.6
Cultivated medicinal plants	17	23.6
Other areas- fallow lands, roadsides, grazing lands, around farms and fences	36	50
Total	72	100

The study showed 55 of the medicinal plants were wild obtained from different natural habitats and only 17 were obtained from homegardens that are cultivated. This might be due to cultivation of rare medicinal plants that are not easily found in the wild and most of the local healers did not cultivate medicinal plants in order to make it secret. Although some medicinal plants were collected from homegarden, they are not directly cultivated for medicinal purpose rather for non-medicinal uses. This indicates that majority of the medicinal plants in the study area are under threat as long as destruction of natural habitats continues. This study is in agreement with different similar works [11, 12, 13]. As the informants indicated like Kasahun Ta'ayo of Goroze, confirmed that some medicinal plant species (*Delphinium dasycaulon* Fresen.) that considered being effective in treating shigellosis were not found elsewhere rather they are confined to specific area and on the verge of disappearing from the area. These showed some useful medicinal plants need careful attention in order to conserve and sustain their potential healing of particular diseases in the community.

Growth forms of medicinal plants

Among the medicinal plant species reported herbs are the dominant growth forms which comprise 51.39% followed by shrub and tree that account 20.8% and 19.5% respectively. Climber is the least dominant (8.31%) medicinal plant in the study area (Figure 2).

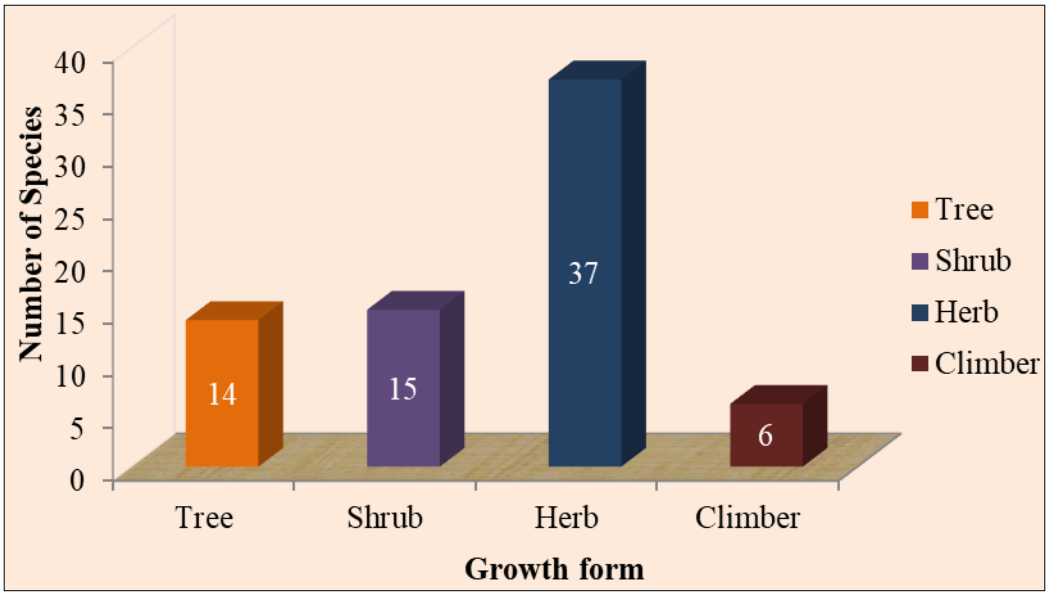

Fig 2: Medicinal plant habits in the study area

The result showed that the people in the study area mostly rely on herbs than other forms of plants because of the degradation of the forests and useful shrubs that indicate the abundance of herbs elsewhere in the study area as observed during investigation. Except the lowland and parts of midland the area remains humid which ensure the appearance of herbs in most of the areas. This agree with the work of Tizazu who stated that people rely on herbs due to degradation of vegetation and trees which were scattered relics in agro forests and remnant patches [12]. This study also agrees with similar studies in different parts of Ethiopia [13, 14, 15, 16, 17]. This finding did not agree with the findings of in which shrubs were considered as dominant plant forms for remedies [18, 19].

Medicinal plants used to treat human and livestock ailments

Among the total medicinal plants recorded from study area, 78.8% were used to treat human ailments; 18.2% were used to treat livestock ailments and 3% were used to treat both human and livestock ailments in which herbs play a prominent role in treating both ailments (Table 2).

Table 2: Medicinal plant with their growth forms to treat human and livestock ailments

Used to treat	Tree	Shrub	Herb	Climber	Total	%
Human	11	15	45	7	78	78.8
Livestock	6	3	8	1	18	18.2
Both Human and Livestock	-	1	1	1	3	3.0
Total	17	19	54	9	99	100

The result indicated that most of the diseases commonly occurred in the study area were human diseases. Based on the findings most of the medicinal plants were used for treating human ailments. This might be due to fewer occurrences of livestock ailments other than the mentioned diseases which were under the attention and skill acquired by the local healers. Similar findings were obtained by various researchers from different sites of Ethiopia [5, 20, 21]. Although the modern medicinal accessibility has been increasing in the area, most of the people rely on traditional remedies of the reported medicinal plants to get relief from different ailments.

Out of medicinal plants documented, the majorities were identified with their local names and some of them were called by the ailment they treat. This might be the intentional consideration by the traditional healers in order to keep the

medicinal plants secrete. For example, medicinal plants that have had no direct local names (common names) but distinguished with the disease they treat include *Crabbea velutina S.* Moore, *Acmella caulirhiza* Del., *Enicostema axillare* (Poir.ex Lam) A.Raynal. and *Stachys jijigaensis* Sebsebe as 'Karcko Qonqitie' where 'Karcko' stands for wood and 'Qonqitie' stands for epiglottis hence it means epiglottis tree (plant used to treat tonsillitis); *Indigofera vohemarensis* Baill. as 'Karcko Elkitie' where similarly 'Karcko' stands for wood and Elkitie stands for tooth hence it means tooth tree (plant used to treat toothache). But it does not mean that all growth forms are tree rather it was a general name given to herbs, shrubs or trees based on the ailment they treated. This indicated that plants known by their name might be due to their popularity and plants with unknown names reflect less popular. Similar ideas were reported by Mersha who suggested that the fact that most of the medicinal plants had local names could be attributed to their popularity in the study area whereas the absence of local names for few species could reflect their importance is minor [13].

Parts of medicinal plants used

According to the information gathered from the study area, different plant parts are used as medicines by the local people. From the parts reported, the most frequently utilized plant parts were leaf (41.56%) followed by root and fruit which accounted for 25.97% and 14.29% respectively (Figure 3).

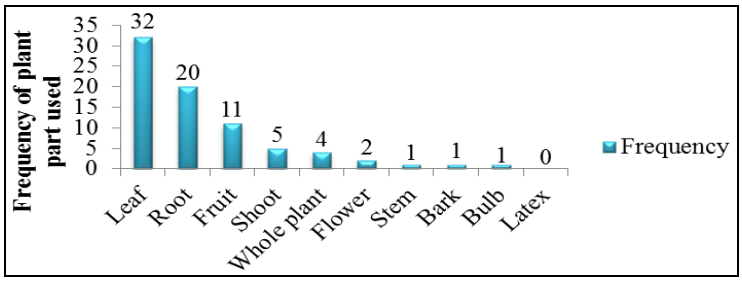

Fig 3: Plant parts used for remedy preparation in the study area

This result showed that leaf is predominantly used for remedy preparation than any other plant part in the study area. The common use of the leaf might be due to the relative ease of finding this plant part and effective cure of ailments which agrees with similar work [22]. Many studies that carried out in Ethiopia and other parts of the world showed leaf is the dominant part to prepare the remedy [17, 20, 22, 23, 24, 25, 26]. This study revealed that using leaf for remedy preparation help the whole plant from disappearing and sustains the plant in the area compared to root part, stem or whole plant which would result in loss of the plant species in continuous use.

Processing methods of medicinal plant resources

On the way of preparation of medicines for both human and livestock treatment, the local community employed various methods of preparation for different types of ailments. The preparations of remedies vary based on the type of diseases treated and the actual site of the ailment. The primary methods of plant parts remedy preparation among local people in the study area was reported to be by crushing which involves 32.32% followed by chopping, powdering and pounding that consist of 16.2%, 13.13% and 10.1% respectively (Table 3).

Table 3: Different methods of remedy preparation

No.	Processing method	Total number	%
1	Chewing	7	7.10
2	Chopping	16	16.2
3	Concoction	3	3.03
4	Cooking	1	1.01
5	Crushing	32	32.32
6	Decoction	1	1.01
7	Fumigating	1	1.01
8	Heating	2	2.02
9	Pounding	10	10.1
10	Powdering	13	13.13
11	Roasting	3	3.03
12	Rubbing	4	4.04
13	Squeezing	6	6.10
Total		99	100

The principal method of preparation that people in the area used for both cattle and human remedies was crushing followed by chopping, powdering and pounding. This revealed that some medicinal plants were used immediately where as some of them crushed, powdered and stored for further use especially during drought seasons in which annual herbs were not accessible. They also used on the way they were prepared to keep their effectiveness for the treatment of corresponding diseases in which crushing is the dominant method. It agreed with the finding of Behailu and Gidey in which they mentioned crushing is the dominant method of preparation [14, 27].

Composition of remedy preparation by the local people

The local people of study area prepared remedies from single or mixtures of more than one medicinal plant based on the type of ailment treated and the effectiveness of the medicinal plant used. Most of the time the traditional healers prepared a remedy from single species which accounted 73.2% followed by two and three and accounted for 16.5% and 7.2% respectively (Table 4).

Table 4: Composition of medicinal plants

Amount of composition	Number	%
Single species	71	73.2
Two species	16	16.5
Three species	7	7.2
Four species	3	3.1
Total	97	100

This revealed that the remedy prepared from single species with its natural efficacy is more effective than the remedy prepared from multiple species for most of the ailments in the study area. The fact that some diseases are treated by multiple species was coupled with the frequent occurrence of the diseases that were not treated by single species and effectiveness of these medicinal plant species to treat the ailments. Correspondingly, continuous practice with different

medicinal plants for the treatment of specific ailment also leads to the usage of multiple species. This agrees with similar work in somewhere else Ethiopia [13]. Therefore, in this study some ailments were treated with double species based on the efficacy of the remedy from each species.

The Nature of medicinal plant used for preparation of remedies: The data gathered for the study showed that the majority of the remedies were prepared from fresh material (81.82%) followed by dry material (13.13%) and constitute made from both fresh and dry material mixed together (5.05%) (Figure 4).

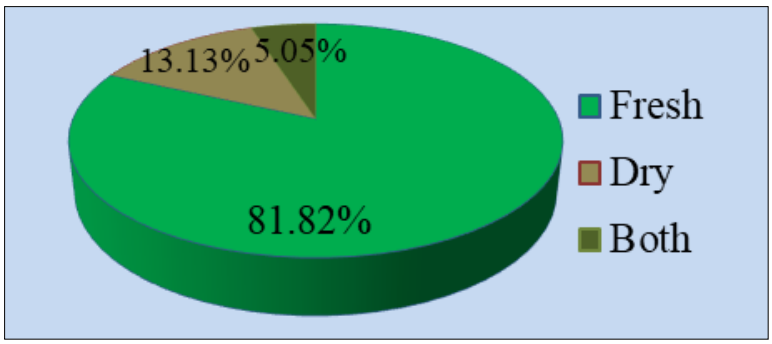

Fig 4: Condition of remedy preparation in the study area

The finding of this study showed that most of the plant parts were prepared in fresh condition from single species because their efficacy were high and retrieve the individual from the problem immediately when fresh material are used. In spite of the fact that fresh material was effective in treating diseases, using fresh plant material as remedy which resulted in continuous harvesting of fresh plants might prone to destroyed medicinal plants from the area. Similarly, some remedies were prepared from dry material as powder and preserved for a long time that might decrease frequent harvesting and increase the availability of medicinal plants in the area.

Mode of administration of remedies

The mode of administration of the traditional remedies by traditional healers in Ale Woreda depends on the type of the medicinal plant and the disease to be cured. Accordingly, oral application was a primary mode of administration accounted for 59% followed by external (dermal) application which accounted 24%, and ocular accounted for 7% (Figure 5).

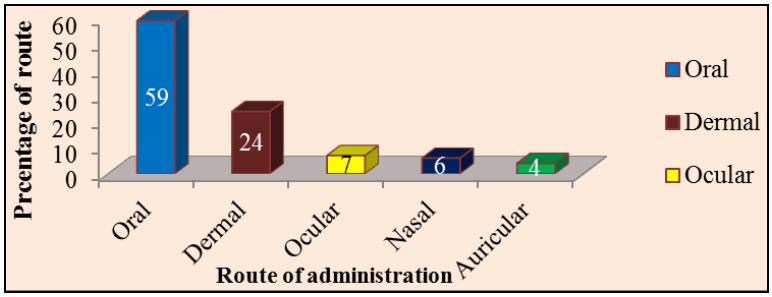

Fig 5: Percentage of mode of administration of remedies

The result of the study indicated that most of the medicinal plant remedies prepared for the specific ailment were predominantly taken orally followed by dermal application. This revealed that the majority of diseases are internal problems and the remedies are more efficient with their potential efficacy when taken orally as well. This study coincides with the findings others who reported that oral application is the dominant route [24, 25, 26, 28].

Dosage of the prepared remedies to treat human or livestock ailments

Though the concentrations of locally prepared remedies were not scientifically well known, the dosage of the remedy used depends mainly on the age, type of disease, body size or weight, physical fitness and pregnancy. There were also variations in frequency of taking the remedy and duration at which the remedies are taken and prescribed for the same kind of diseases as well. Most of the time the type of measurements used frequently was different. Accordingly, even though the measurement types were different, the principal dosage measurements practiced by the local healers of study area was coffee cup, tea glass, water glass mostly for livestock ailments, tea spoon made from wooden material and bottle stopper. Calabash was also used when the prescription include the mixture of the remedy with local drink, 'Warshe'. In addition, some remedies were prescribed by the healers to take them with drinks prepared from coffee leaves, 'Hashe' early in the morning before getting meal.

Relation of medicinal plant knowledge and age of informants

With respect to their age group, there was a great knowledge difference among informants. The study showed that informants with older age know more medicinal plants than youngsters. The coefficients provide information on each predictor variable obtained from Linear Regression Analysis using Excel spread sheet. Based on individual medicinal plant citation, the figure 6 showed that older aged informants discovered more medicinal plants. The P- value was 1.76E-05 that showed a great significant difference to a confidence interval of 95%. As the age increase, medicinal plant knowledge also increases through experience and day to day practices of traditional healers. Thus, the regression equation

is expressed as MPK= 0.66 + 0.13 * Age where MPK is dependent variable, 0.66 is Y- intercept (predicted number of medicinal plants), 0.13 is the slope of regression line and age is an independent variable and there is positive relation between predictor and explanatory variables (Figure 6).

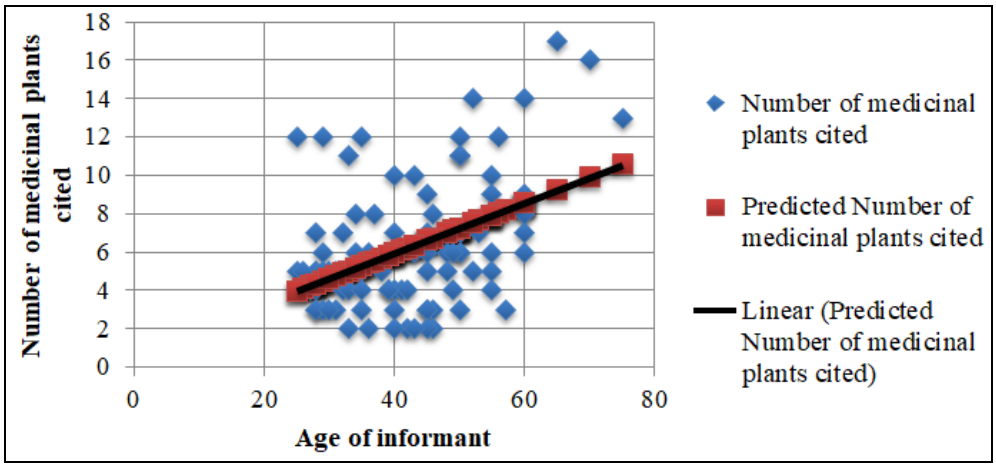

Fig 6: Relationship of medicinal plants with age of informants

The indigenous knowledge of traditional medicines among informants varies with regard to age in that medicinal plant knowledge was commenced by elders and still well practiced by them as higher number of medicinal plants was cited by older aged informants. The number of medicinal plants cited by youngsters was very small for each. This indicates that the youngsters were not well practiced about the healing potential of each and every medicinal plant remedies as old aged informants. This finding agrees with similar work who suggested that elderly informants have long lasting and regular contact with the forest and other natural plant resources [21]. This helped them be more experienced and knowledgeable than the younger aged informants. Therefore, young people have relatively less medicinal plant knowledge compared to elders which is an indication of decline of indigenous knowledge besides secrecy [16].

Effectiveness of medicinal plants/Informant consensus factor/

The result of the study showed that the effectiveness of medicinal plants in treating a disease varies one from another. Medicinal plants that had the capability of treating a number of specific diseases had given a high informant consensus factor (ICF) value. Therefore, the highest ICF value (0.93) was obtained from problems of snake bite and malaria followed by eye illness, ear pain and cataract (ICF value of 0.91) and intestinal parasites and tapeworm (ICF value of 0.87). The least ICF (0.76) was obtained from problems of muscular rigidity of the neck and the like (Table 5).

Table 5: Informant consensus factor on each category of human and livestock diseases

Category	n_t	n_{ur}	ICF
Tonsillitis, Headache	13	75	0.84
Blackleg, Leech	13	83	0.85
Diarrhea, Blood dysentery, Shigellosis	10	59	0.84
Eye illness, Ear pain, Cataract,	7	70	0.91
Intestinal parasites, Tapeworm	3	16	0.87
Abdominal pain, Gastritis	9	52	0.84
Snake bite, Malaria	4	45	0.93
Wound, Cut surface, Fire burn, Skin rush	11	60	0.83
Muscular rigidity of the neck, Swelling, swelling around neck region, Breast swelling, Mumps	7	26	0.76
Febrile illness, 'Mich', Dizziness, Rheumatism, Pain/'Waransa', Thinness	9	35	0.77

Based on the findings the ICF of some categories of diseases was high and it showed there was a good indicator for a high rate of informant consensus on the frequent use of some medicinal plants for the health problems occurring in the area. This would be due to poor socio-economic as well as personal and environmental hygiene of the people in the study area, indicating that category with high ICF was prevalent and that with low ICF was relatively rare. The high level of ICF regarding veterinary uses of medicinal plants for blackleg and leech also showed the prevalence of these diseases in the study area.

Relative healing capacity of medicinal plants/Fidelity level

Fidelity level indicates that the comparison of the species for particular disease. Thus, the following medicinal plants were observed to be with high fidelity level indicated that they had good healing capacity. From these *Cucumis ficifolius* A. Rich. was the major one in relative treating veterinary ailment of Blackleg followed by *Allium sativum* in treating Leech, and *Plumbago zeylanica* L. ranked 1st in relative healing capacity of specific human ailments followed by *Nepeta azurea* R.Br.ex Benth (Table 6).

Table 6: Fidelity level (Key: I_p is the number of informants who independently indicate the use of a species for the same major ailments and I_u is the total number of informants who indicate the plant for any major ailments)

No.	Plant species	Ailment treated	Ip	Iu	FL %	Rank
1	*Acmella caulirhiza*	Tonsillitis	28	31	90.3	5th
2	*Allium sativum*	Leech	30	32	93.8	4th
3	*Cucumis ficifolius*	Blackleg	35	35	100	1st
4	*Cyphostemma adenocaule*	Fire burn	27	30	90	6th
5	*Dicrocephala integrifolia*	Headache	25	29	86.2	8th
6	*Hypoestes forskaolii*	Snake bite	29	34	85.3	10th
7	*Moringa stenopetalla*	Hypertension	24	28	85.7	9th
8	*Nepeta azurea*	Liver problem	32	33	97	3nd
9	*Plumbago zeylanica*	Toothache	39	39	100	1st
10	*Jasminum abyssinicum*	Diarrhea	24	27	88.9	7th

The result showed that some medicinal plants had high healing potential to specific ailment compared to others according to their fidelity level computed. This revealed that some medicinal plants were essential on which local people rely on to cure human and livestock problems that frequently

occur in their respective locality and the choice of the informant is mainly depends on the efficacy of the medicinal plants utilized. This indicated that the medicinal value of some plants in the study area was high in relation to other medicinal plants investigated.

Threats to medicinal plants

Different anthropogenic factors threatened useful medicinal plants in the study area. The information from informants showed that the most mentioned threats to medicinal plants include agricultural expansion, cutting for different purpose, over grazing, charcoal production, fire wood, timber and drought. The informants were allowed to rank the threats based on their potential effect that exacerbated the problem. From this, the main threat to medicinal plants in the study area were agricultural expansion (29.3%) followed by over grazing (26.7%) and deforestation of natural forests (21.3%). In lowlands the long lasting shortage of rain which might be resulted in seasonal drought due to climate change was also considered as threat in the study area (9.3%) which ranked the least (Table 7).

Table 7: Threatening factors of medicinal plants in the study area

Threatening factors	Respondents										Total	%	Rank
	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10			
Agricultural expansion	5	4	4	5	4	3	5	5	4	5	44	29.3	1st
Over grazing	4	3	5	3	5	4	4	4	5	3	40	26.7	2nd
Forest fire	1	2	1	1	2	1	3	1	1	2	15	10.4	4th
Deforestation	3	5	2	4	3	5	2	3	1	4	32	21.3	3rd
Climate change	1	1	1	2	1	2	1	2	2	1	14	9.3	5th

The result showed that the loss of medicinal plants has been occurred by anthropogenic and natural conditions. The informants assured that the threatening factors were resulted from increase in human population and the need for more farm lands and grazing lands which coincides with the finding of Mersha [16]. The degree of threats in the study area varies from place to place and species to species. These major factors were perceived as predominant threats that contributed to loss of biodiversity in general and medicinal plants in particular in the study area.

Conservation of medicinal plants in the study area

According to the informants and personal observation of the researcher, the natural vegetation in the entire study sites were cleared from the area for the contest of agricultural expansion. Over utilization of plant resources by the local communities were also seen except for some remnant patches in midlands and highlands as well as afromontane forest of Deneko high lands. These areas were covered by densely populated bushes, shrubs, herbs and trees. The homegarden produced medicinal plants have not been intentionally cultivated for medicinal purpose except by some traditional healers rather they were cultivated for their primary purpose such as food or as spice other than medicinal value. That is why no plant parts sold directly in the market purposefully as medicine in the Woreda but those healers who know the plant type as medicine bought the parts from the market to heal others. Consequently, this helped in conservation of medicinal plants indirectly in the area. But this has to be strengthened by creating awareness in the community to protect these natural resources. Wild medicinal plants were kept in forest remnants, fallow lands, forests and as agroforestry trees in the farmlands for different purpose but not only for medicinal determination because medicinal values of those plants were known only by the corresponding healers.

Conclusion

The study carried out in the area showed that Ale Woreda was relatively endowed in medicinal plant diversity and associated indigenous knowledge. These medicinal plants are especially used in order to treat both human and livestock ailments. The utilization of the traditional medicines regarding to the practice of the local people dates back from their day to day experience with locally available natural vegetation and not from any other cultural adoption. This indigenous knowledge of the local people contributed to the sustainable use, management and conservation practices in the study area.

Most of the medicinal plants were obtained from wild and some were obtained from home gardens that are cultivated for different purposes besides medicinal value. The medicinal plants collected from all these places were only known by the corresponding healers that were kept in touch with the effectiveness of these medicinal plants. Herbs were found to be the major growth forms used for medicinal plant collection followed by shrubs and trees. Leaf was the principal plant part used for remedy preparation. The most widely used method of preparation was crushing and oral was the frequently used route of administration.

Moreover, medicinal plants have been threatened by agricultural expansion, over grazing and the like that may diminishes the number of medicinal plants in the study area and the indigenous knowledge. The conservation status of medicinal plants in the study area is mainly under the shade of natural resource conservation as traditional practice by the local community other than traditional healers. Therefore, careful attention should be needed to ensure the upgrade and improvement of the cultivation of medicinal plants and the way in which the healers harvest the parts for remedy preparation.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

Corresponding author is developed the study design and procedure, collected the data, carried out the statistical analysis, and prepared the draft manuscript. Corresponding author and all co-authors have read, enriched, approved, and agreed on the submission of the final manuscript.

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References

1. Cotton, C. Ethnobotany, Principles and Applications. Chichester (UK), Wiley: John Wiley & Sons, 1996.
2. Martin, GJ. Ethnobotany: A methods manual. Chapaman and Hall, London, 1995, 1-251.
3. Balick MJ, Cox PAR. Plants People and Culture: The science of ethnobotany. Scientific American Library, New York, USA, 1996, 220.
4. Getachew Addis, Dawit Abebe, Timotewos Genebo, Kelebessa Urga. Perceptions and practices of modern and traditional health practitioners about traditional medicine in Shrinke District, Arsi Zone, Ethiopia. Ethiop. J. Health Dev. 2002; 16(1):19-29.
5. Tesfaye Awas, Sebsebe Demissew. Ethnobotanical study of medicinal plants in Kafficho people, southwestern Ethiopia. In: Proceedings of the 16th International Conference of Ethiopian Studies, 2009, 711-726.
6. FAO. Non- Wood Forest Products 11: Medicinal plants for forest conservation and health care. FAO, UN, Rome, 1997, 1-165.
7. Parvez N, Yadav S. A Survey of Ethinopharmacology of single herbal preparations of medicinal plants in Asendabo District, Jimma, Ethiopia. Continental. J. Pharmaceutical Sciences. 2008; 2(1):15-26.
8. Ensermu Kelbessa, Sebsebe Demissew, Zerihun Woldu, Edwards S. Some threatened Endemic plants of Ethiopia. In: (Edwards, S. and Zemede Asfaw eds.). The status of some plants in parts of tropical Africa. NAPRECA, No.2. Botany 2000: East and Central Africa, 1992, 35-55.
9. Trotter RT, Logan MH. Informant Consensus: a new approach for identifying potentially effective medicinal plants. In: Plants in Indigenous Medicinal and Diet, N.L. Etrin (eds), Red grave publishing company, Bedford Hill, NY, 1986, 91-112,
10. Alexiades MN. Selected Guidelines for Ethnobotanical Research: A Field Manual. In Advances in Economic Botany Volume 10. Bronx: The New York Botanical Garden, 1996.
11. Kent M, Coker P. Vegetation description and analysis: A practical approach, Belhaven press, London, 1992, 363.
12. Tizazu Gebre. Ethnobotanical Study of Medicinal Plants in the Konso Special Woreda (SNNPR), Ethiopia, Msc Thesis (Unpublished). Addis Ababa University, 2005.
13. Mersha Ashagre, Ensermu Kelbessa, Gemedo Dalle. Ethnobotanical Study of Medicinal Plants in Guji Agro Pastoralists, Bule Hora District of Borena Zone, Oromia Region, Ethiopia. Journal of Medicinal Plants Studies. 2016; 4(2):85-90.
14. Mengistu Gebrehiwot. An Ethnobotanical Study of Medicinal Plants in Seru Wereda, Arsi Zone of Oromia Region, Ethiopia, Msc Thesis (Unpublished), AAU, 2010, 132p.
15. Behailu Etana. Ethnobotanical Study of Traditional Medicinal Plants of Goma Wereda, Jima Zone of Oromia Region, MSc Thesis (Unpublished). Addis Ababa University, Addis Ababa, 2010.
16. Moa Megersa, Zemede Asfaw, Ensermu Kelbessa, Abebe Beyene, Bizuneh Woldeab. An ethnobotanical study of medicinal plants in Wayu Tuka district, east Welega zone of oromia regional state, West Ethiopia. J Ethnobiol Ethnomed. 2013; 9(68):1-12.
17. Zeleke Woldetensay, Mekonnen Amberber, Anteneh Tamirat, Ablyselassie Mulatu. Opportunities for Bioprospecting Genetic Resources in Ethiopia. Journal of Biodiversity, Bioprospecting and Development. 2014; 1(1):133-139
18. Fisseha Mesfin, Sebsebe Demissew, Tilahun Teklehaymanot. An Ethnobotanical study of medicinal plants in Wonago Woreda, SNNPR, Ethiopia. Journal of Ethnobiology and Ethnomedicine. 2009; 5(28):1-18.
19. Fisseha Mesfin, Talemos Seta, Abreham Assefa. An Ethnobotanical Study of Medicinal Plants in Amaro Woreda, Ethiopia. A Journal of Plants, People and Applied Research: Ethnobotany Research & Applications. 2014; 12(1):341-354.
20. Mirutse Gidey, Zemede Asfaw, Zerihun Woldu, Tilahun Teklehaymanot. Medicinal Plant Knowledge of the Bench ethnic group of Ethiopia: An Ethnobotanical investigation. Journal of Ethnobiology and Ethno medicine. 2009; 5(34):1746-4269.
21. Getaneh Gebeyehu. An Ethnobotanical Study of Traditional Use of Medicinal Plants and Their Conservation Status in Mecha Wereda, West Gojjam Zone of Amhara Region, Ethiopia, MSc Thesis (Unpublished), AAU, 2011, 125p.
22. Panghal M, Arya V, Yadav S, Kumar S, Yadav JP. Indigenous knowledge of medicinal plants used by Saperas community of Khetawas, Jhajjar District, Haryana, India. J Ethnobiol Ethno medicine. 2010; 6(1):4-14.
23. Kala CP. Ethnomedicinal botany of the Apatani in the eastern Himalayan region of India. Journal of Ethnobiology and Ethno medicine. 2005; 1(2):11-18
24. Haile Yineger, Delenasaw Yewhalaw. Traditional medicinal plant knowledge and use by local healers in Sekoru District, Jimma Zone, Southwestern Ethiopia.Journal of Ethnobiology and Ethno medicine. 2007; 3(1):1-7.
25. Etana Tolosa. Use, Treat and Conservation of Traditional Medicinal Plants by Indigenous people in Gimbi Wereda, Western Wellega, Ethiopia. M.Sc.Thesis (Unpublished), Addis Ababa University, 2007.
26. Tesfaye Hailemariam, Sebsibe Demissew, Zemede Asfaw. An ethnobotanical study of medicinal plants used by local people in the lowlands of Konta special Wereda, Southern Nations, Nationalities and People Regional State, Ethiopia. Journal of Ethnobiology and Ethno medicine. 2009; 5(1):26-40
27. Gidey Yirga. Assessment of indigenous knowledge of medicinal plants in Central Zone of Tigray, Northern Ethiopia. Afr J Plant Sci. 2010; 4(1):6-11.
28. Endalew Amenu. Use and management of medicinal plants by indigenous people of Ejaji area (Chelya Woreda) west Shoa, Ethiopia: An ethnobotanical approach. M.Sc. Thesis (Unpublished), Addis Ababa University, 2007.