Ethnobotanical study of medicinal plants used by Dizi people in Maji District, Southwest Ethiopia

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Research

Abstract

*Background***:** Traditional medicine is a cornerstone of Ethiopia's healthcare system, yet the associated traditional knowledge, particularly in biodiverse regions like the southwest, is under-documented and at risk of being lost. This study aimed to document the medicinal plants used by Dizi people in Maji District, Southwest Ethiopia, evaluate their uses, and identify threats to their sustainability.

*Methods***:** The study was carried out from September 2024 to January 2025. Ethnobotanical data were collected from a total of 311 informants. Descriptive statistics and quantitative indices, including Informant Consensus Factor, Fidelity Level, preference ranking, and direct matrix ranking, were employed to evaluate the plant use patterns. One-way ANOVA, and independent t-test were performed with R version 4.2.1 to compare the medicinal knowledge of informants.

Results: A total of 113 medicinal plant species belonging to 102 genera and 51 families were documented for treating 51 different human and livestock ailments. Asteraceae and Fabaceae were the most dominant families recorded. Herbs and shrubs comprise the largest proportion of growth habits. Leaves and roots account for the highest proportion of plant parts used. The majority of the medicinal plant species (67.25%) were collected from wild habitats, followed by semi-wild (20.35%), and only small portions (12.39%) were from cultivated habitats. *Embelia schimperi* and *Nerophila senegambiensis* had the highest Fidelity Level (100%) against their respective ailments. A Significant statistical difference in medicinal plant knowledge between different sociodemographic groups was observed.

*Conclusion***:** The Maji district possesses a rich diversity of medicinal plants and associated indigenous knowledge. However, this knowledge is primarily held by the older generation and is threatened by factors such as agricultural expansion. The heavy reliance on wild-harvested plants highlights a practical need for conservation action.

Keywords: Ethnobotany, Indigenous knowledge, Maji district, Medicinal plant

Background

Since antiquity, plants have played a crucial role in the lives of human beings, providing basic needs such as food, shelter, medicine, fodder, and fuel (Teketay 2001). Medicinal plants have been widely used to strengthen the healthcare system

through the provision of treatment and prevention of specific ailments and diseases that affect human beings (Nwachukwu et al. 2010; Ahlberg 2017), and have contributed to the manufacturing of 20% of drugs in modern medicine (Fabricant & Farnsworth 2001). Approximately 80% of the world's population is estimated to use traditional herbal medicine as part of their health care system (WHO 2002). Such widespread usage is evident in the Hehe community of Tanzania, where it is deeply rooted in socio-cultural heritage (Mkenda *et al*. 2025), and in the Bolivian Andes, where it serves as a critical alternative to scarce modern facilities (Rocabado Imaña *et al*. 2025). This global increase in natural plant product use stems from traditional medicine evolving into cultural heritage and growing worldwide interest, boosting the herbal market (Radjai *et al*. 2025). Furthermore, the extensive use of traditional medicine in Ethiopia is attributed to its perceived efficacy against certain ailments, physical accessibility, and cultural acceptability (Tesfahuneygn & Gebreegziabher 2019). This is because traditional medicines provide more affordable alternatives to the modern health care system (WHO 2002). In rural areas where access to veterinary services and facilities is limited, traditional medicinal plants are often the primary option for livestock keepers to treat various ailments (Teshome & Yohannes 2025). Such reliance mirrors the situation in the Bolivian Andes, where traditional knowledge is essential for community health in isolated areas (Rocabado Imaña *et al*. 2025). This is important as livestock contributes directly to people's livelihoods through income, food, employment, transport, draft power, manure saving, and insurance, indirectly improving the social status of owners (FAO 2019).

Ethiopia is one of the six countries of the world where about 60% of plants are said to be indigenous with healing properties (Kaba 1998). Recent data from the country's Flora report indicated there are over 6027 species of vascular plants, of which 647 are endemic to Ethiopia (Demissew *et al*. 2021). Ethiopia is also home to many ethnic groups with different languages, cultures and beliefs, which in turn contributed to the high diversity of traditional knowledge and use, practice, management and conservation of plant resources (Tesfahuneygn & Gebreegziabher 2019; Teshome & Yohannes 2025). Traditional medicine is a cornerstone of Ethiopia's healthcare system, with an estimated 80% of the human population and 90% of the livestock population depending on it (FAO 2019); and 95% of the traditional medicines were derived from plants (Abebe 2022). The practice of medicinal plants in the country varies from community to community depending on the sociocultural condition of the different ethnic groups (Bekele 2007). Similarly, in the Kallawaya region of Bolivia, medicinal knowledge is not uniformly distributed but varies significantly between experts and the general population (Rocabado Imaña *et al*. 2025).

Knowledge of traditional medicine is passed down orally from generation to generation, a fragile mode of transmission also observed among the Hehe in Tanzania, where knowledge is often restricted to specific family lines or acquired through spiritual guidance (Mkenda *et al.* 2025). Consequently, crucial information about the use of plants, such as the part used, mode of remedy preparation, method of administration, diseases treated, and others, may be lost or discarded during this process (Megersa *et al*. 2013). Furthermore, the younger generation shows hesitancy towards adopting the conventional way of life, thus posing a greater risk to the preservation of this invaluable knowledge (Teshome & Yohannes 2025). This has an impact on the long- term viability and continuation of traditional medicines, leading to the extinction of medicinal plant species (Asefa *et al*. 2020). This disparity underscores an urgent concern regarding the potential loss of invaluable ethnobotanical knowledge, as younger individuals appear less familiar with traditional practices compared to older generations who hold the majority of this wisdom (Radjai *et al*. 2025). Despite the crucial role of traditional medicine and medicinal plants in primary healthcare, efforts to document and promote this knowledge in Ethiopia are limited. Only small proportion of the country's diverse language and culture have been studied (Megersa *et al*. 2013; Kefalew *et al*. 2015; Bulcha & Zepre 2021; Desalegn *et al*. 2022; Yimam *et al*. 2022) in central and northern Ethiopia and in south and southwestern Ethiopia (Giday *et al*. 2009a; Giday *et al*. 2009b; Maryo *et al*. 2015; Tinsae & Manaye 2017; Kassa *et al*. 2020; Zemede *et al*. 2024).

The southern and southwestern parts of Ethiopia were endowed with rich traditional medicinal plants due to high biological and cultural diversity in these regions (Mesfin *et al*. 2009; Belayneh *et al*.2012). However, threats such as deforestation, environmental degradation, increased population, expansion of modern education, religion and urbanization imperil this invaluable indigenous knowledge (Megersa *et al*. 2023). This serious issue has led to the decline in the country's forests, which serve as a reservoir of medicinal plants (Woldemariam *et al*. 2021).

The Dizi people in Maji district have a traditional way of life in the countryside, with valuable indigenous knowledge of the use and management of traditional medicinal plants to treat human and livestock ailments. Despite the area's dense forest cover and spirited traditional cultures, it suffers from inadequate infrastructure, particularly educational and healthcare services. During the reconnaissance survey, traditional healers in Maji district mentioned that the area is particularly remote from hospitals and health centers, resulting in a high risk of mortality from various ailments, compelling the communities to turn to traditional medicine. Moreover, the dense forest environment and the community's strong bond with forests have

resulted in an increased rate of snake bites, parasitic infections, and vector-borne diseases. These problems are mostly resolved by traditional remedies from traditional healers rather than modern health care systems. Regardless of its importance, this traditional knowledge is largely undocumented and is eroding due to acculturation and environmental changes. Therefore, systematic ethnobotanical research in Maji district is urgently needed to preserve this invaluable cultural and scientific heritage before it is lost. Thus this study was aimed to: (i) Document medicinal plants and associated indigenous knowledge employed by Dizi people to treat various human and livestock ailments; (ii) Identify the plant parts used to treat ailments, method of preparation and route of administration used by Dizi people in the study area; (iii) Analyze the influence of sociodemographic factors on traditional medicinal knowledge; (iv) Compare the findings with prior ethnobotanical studies in Ethiopia; (v) Assess the major threats challenging the medicinal plants in the study area

Materials and Methods

Description of the study area

The study was conducted in the Maji district, West Omo Zone, of the Southwest Ethiopia Peoples' Regional State (Fig. 1). The study area is located approximately 740 km southwest of Addis Ababa (Ethiopia's Capital). The geographical coordinates of the district range from 6°4'30" to 6°25'30" N latitude and from 35°28'30" to 35°45'30" E longitude. The altitudinal variation of the study area ranges from 800-2500 m above sea level. The total area of the district is about 463,930 ha, of which 199,032 ha is cultivated land, 60,801 ha is grazing land, 842 ha is forest and shrub lands, 44,232 ha that can't be cultivated, and 23,023 ha of land covered with others (Boz & Maryo 2020). The Maji district is bordered on the south by the Surma district, on the west by the Bero district, on the north by the Meinit Shahsa district, and on the east by the South Omo Zone. According to the Central Statistical Agency census population projection (CSA 2013), the population of Maji District was projected to be 41,546 for the year 2017, out of which 19,985 were males and 21,561 females. The urban population was 10,298, with 4,888 males and 5,410 females, and the rural population was 31,249, with 15,097 males and 16,151 females. Dizi is the largest ethnic group (84.89%) in the district, followed by the Amhara (9.41%) and the Oromo (3.07%); all other ethnic groups made up 2.63% of the population in the district. The majority of the inhabitants practiced Ethiopian Orthodox Christianity, with 62.23% of the population, followed by traditional beliefs with 18.44%. Additionally, 16.66% were Protestants, and 1.16% were Muslims.

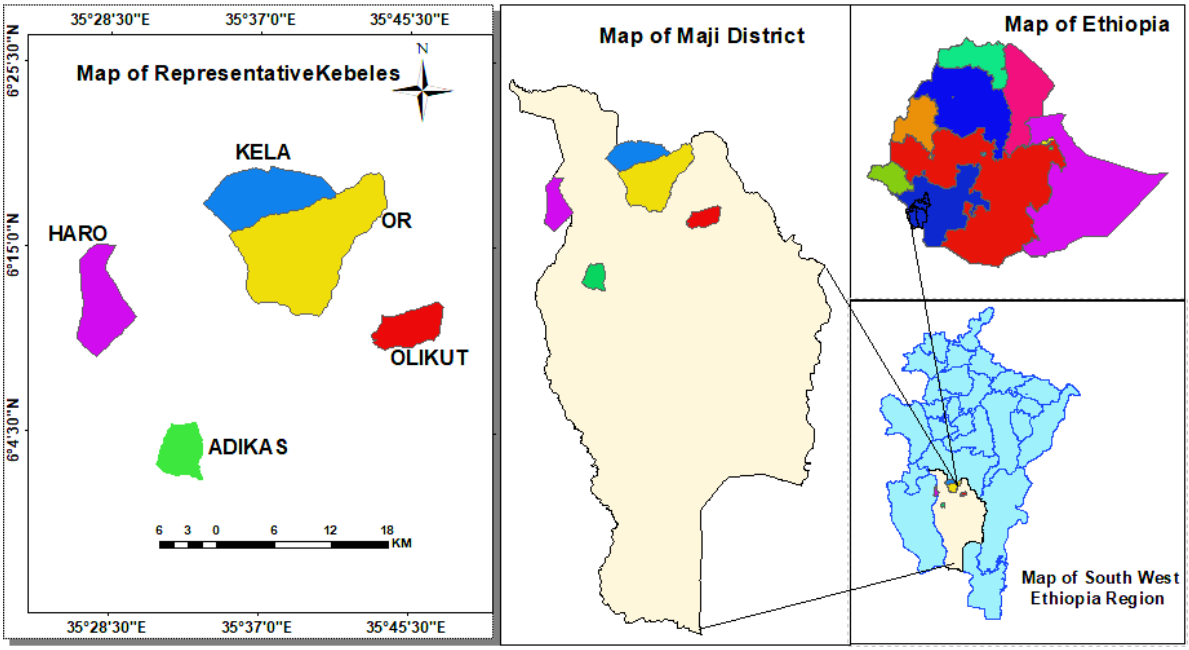

Figure 1. Location of Maji district with study sites

The study area is characterized by moist Afromontane vegetation. Notably, plant species found in the study area include *Allophylus abyssinicus, Nuxia congesta*, *Ozoroa insignis*, *Carissa spinarum, Polyscias fulva*, *Syzygium guineense*, *Schefflera volkensii*, and *Vepris dainellii* (Boz & Maryo 2020). Agriculture is the primary livelihood activity in the study area. The major land use in the study area is subsistence farming and the cropping pattern has been followed by old methods of agriculture. Onions (*Allium cepa*), cabbages (*Brassica oleracea),* and potatoes (*Solanum tuberosum*) are among the vegetables produced during summer. The common cultivated crops are maize (*Zea mays*), sorghum (*Sorghum bicolor*), teff (*Eragrostis tef*) and

others; cash crops include chat (*Catha edulis*) and coffee (*Coffea arabica*). Banana (*Musa balbisiana*), avocado (*Persea americana),* and mango (*Mangifera indica*) are the dominant fruits in the study area (Boz & Maryo 2020)

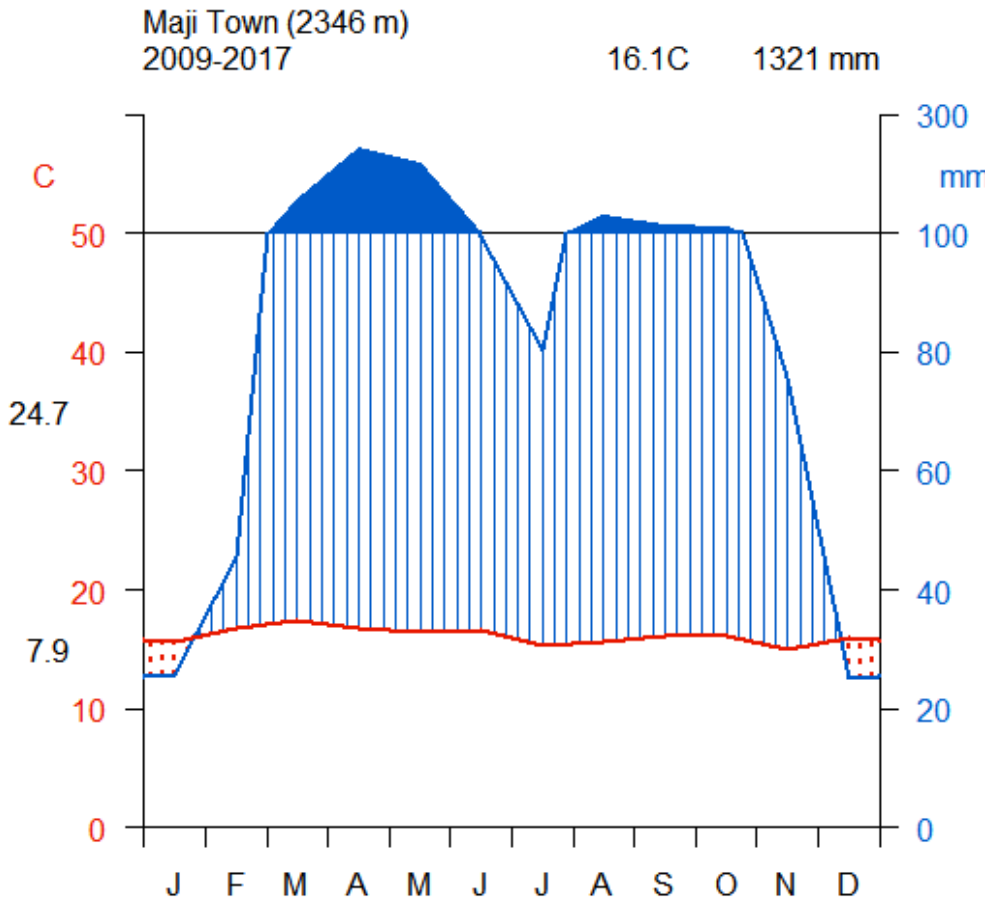

Figure 2. Climate diagram of the nearest station (Maji) Source: (Boz & Maryo 2020)

Climate

The Maji district has four distinct traditional agro-climatic zones: 12% *Dega* (highland), 42.8% *Woinadega* (mid-highland), 40.6% *Kola* (lowland), and 4.6% *Bereha* (desert and semi-desert). The climate data taken from the Maji meteorological station show the mean annual temperature of 16.1°C, the mean maximum temperature of 24.7°C recorded in March, and the mean minimum temperature of 7.9°C recorded in November (Fig. 2). The rainfall pattern is bimodal, with precipitation peaks from March to May and August to October and a mean annual rainfall of 1321 mm. The highest mean monthly rainfall is 243.9 mm, recorded in April, and the lowest is 25.1 mm, recorded in December (Boz & Maryo 2020).

Reconnaissance survey, Study site and informant selection

A reconnaissance survey was made from August to September 2024 to get a preliminary understanding of the agro-ecological conditions of the study sites, the status of the vegetation cover and indigenous knowledge of the local communities about the uses of plants. Five (5) kebeles (the smallest administrative unit), namely, Adikas, Or, Olkut, Kela, and Haro, were selected purposively based on their agro-ecological conditions, recommendations of local elders, the availability of traditional medicine practitioners, and the richness of local botanical resources (Table 1). Three kebeles (Adikas, Kela and Haro) were from the middle agro-ecology zone and Or and Olkut were from the highland agro-ecology zone. The sample size was determined using a formula developed by Yamane (1967)

$$n = \frac{N}{1 + N(e)^2}$$

Where n = sample size; N = total number of households in the selected kebeles in the district; e is the margin o f error $(0.05)^2$ at a 95% confidence level. The total number of households in the selected kebeles was 1398. Then (N=1398)

$$n = \frac{1398}{1+1398(0.05)^2} = 311$$

Thus, three hundred eleven informants (280 general and 31 key informants / traditional healers) participated in the study. General Informants were selected with a stratified random sampling technique and key informants were selected purposively based on recommendations from community members, elders and knowledgeable inhabitants. The selected key informants were those recognized by the community as experienced healers. This helps us to ensure in-depth knowledge of the practice and management of medicinal plants in the study area.

The sample size for each kebele was subsequently calculated based on the proportion of households in that kebele relative to the total number of households across the selected kebeles following (Siddiqui 2013) as

$$n_i = \frac{Ni \times n}{N}$$

Where ni**=** the sample size selected kebele Ni= the total households of the selected kebele n= the total sample size N= the total households in all kebeles. The participants were categorized into three distinct age groups: young adults (25-45), middle-aged individuals (45-65), and elders (65-85) (Table1).

Table1. Description of the sampled study sites

Name of kebeles	Altitude	GPS coordinates		Gender		Age categories			NH	AE
		Latitude	Longitude	M	F	25-45	46-65	66-85		
Adikas	1975	6º04'41''N	35º33'00''E	48	27	14	39	22	348	Mid highland
Haro	1926	6º12'05''N	35º27'39''E	22	8	9	14	7	109	Mid highland
Kela	1809	6º19'02''N	35º37'13''E	39	26	17	31	17	291	Mid highland
Olkut	2120	6º12'58''N	35º46'04''E	40	21	18	32	11	282	Highland
OR	2220	6º12'53''N	35º37'32''E	61	19	21	45	14	368	Highland
Total				210	101	79	161	71	933	

Key: AE, NH, Number of households; M, Male; F, Female

Ethical clearance

The Maji district administrative office granted permission for field data collection after receiving a cooperative letter from the Department of Biology, Jimma University. Before each interview, the objectives of the study were explained to the informants in the local Dizin language. Verbal informed consent was obtained from all participants, who were assured of the confidentiality and anonymity of their information. All methods were carried out in accordance with relevant guidelines and regulations.

Data collection methods

Semi-structured interviews, focus group discussions, and field observation with informants were used to collect ethnobotanical data in the district as described by Martin (2010). Interview questionnaires were prepared in English and later translated into the Dizin language. Interviews were conducted mainly in the Dizin language, the major language in the study area. Interviews with informants were made to obtain actual information from the informants about the local name of the medicinal plant, parts used, ailment treated, dosage, additive administrative methods, perceived efficacy, habit, habitat, distribution, existing threats, and indigenous knowledge used in the conservation of medicinal plants in the study area. Five focus group discussions, one in each of the selected kebeles, were conducted to obtain additional information on the knowledge, use, and management of traditional medicine plants by the community. Further, the focus group discussion also helps to know how traditional knowledge is transmitted from generation to generation.

Plant voucher specimens collection, identification, and herbarium preparation

During the guided field walk exercise, medicinal plant specimens were collected with the aid of herbalists. Each specimen was labeled indicating the collection number, and the name of the collector, then pressed, air-dried and taken to Jimma University Herbarium. Plant identification was performed with the aid of different published Flora of Ethiopia and Eritrea with the support of taxonomic experts at Jimma University. Visual comparison with authenticated specimens was performed to confirm the identification. Correct scientific names were checked referring to databases such as World Flora Online (WFO),

the Royal Botanic Gardens Kew, and the African Plant Database. Finally the voucher specimens were deposited at Jimma University Herbarium.

Data analysis

Ethnobotanical data documented from the field, which comprises both scientific and local plant names, their respective families, life forms, utilized parts, and habitats were organized and entered into a Microsoft Excel spreadsheet 2013 and analyzed. Quantitative data were analyzed for Informant Consensus Factor (ICF), Preference Ranking, Direct Matrix Ranking, and Index of Fidelity (FL). Analyzed results were presented in tables, bar graphs, and pie charts. A comparison of medicinal knowledge with different social groups of the respondents was done with the R program version 4.2.1. In the statistical analysis, age group, gender, literacy level, and healing experience served as independent variables, while the number of medicinal plants reported was the dependent variable. A one-way ANOVA was conducted to assess the influence of age (categorized as 25-45, 46-65, and >65 years) on traditional medicinal knowledge. Independent t-tests were used to compare the mean number of medicinal plants reported based on gender, literacy level, and healing experience.

Preference ranking

Preference ranking was employed following Martin (2010) to determine the level of the Dizi community's preference for ranking the most preferred medicinal plants in treating malaria (the most cited illness). Accordingly, 10 key informants were selected based on their experience in traditional medicinal plant practice to rank the 10 most frequently cited medicinal plants used to treat the illness. Thus, key informants were given the task of comparing the top 10 medicinal plants. The highest number (10) was given to the medicinal plant that they thought most effective in treating malaria and the lowest number (1) was given to the least effective medicinal plant.

Direct matrix ranking

Some medicinal plants are identified as multipurpose species serving multiple health-related purposes. This helps to highlight their importance and guide future research and conservation efforts to ensure their sustainability (Lu *et al*. 2022; Wubu *et al*. 2023). Based on the relative benefits obtained from each medicinal plant, a selection of eight multipurpose plant species was made and five key informants evaluated the multipurpose medicinal plants across seven use categories (medicine, fodder, food, fencing, firewood and Charcoal).5 = best, 4 = very good, 3 = good, 2 = less used, 1 = least used, and 0 = not used (Martin 2010).

Informant consensus factor

According to Martin (2010), the Informant Consensus Factor (ICF) was calculated for each disease category to assess informant agreement and determine the most important disease categories and potentially effective medicinal plants in the respective disease category. Informant consensus factor values can be obtained by calculating the number of citations of individual species minus the number of selected species as reported.

$$\mathrm{ICF} = \frac{\mathrm{nur} - \mathrm{nt}}{\mathrm{nur} - 1}$$

Where ICF= informant consensus factor, nur= use citations in each disease category, and NT= number of species. The ICF ranges from 0 to 1, where higher values reflect greater consensus among informants regarding the use of specific medicinal plants for treating particular ailments. An ICF value of 0 indicates no agreement, suggesting that informants have diverse opinions or knowledge about the medicinal properties of plants for a given disease (Heinrich *et al*. 1998)

Fidelity level index

Fidelity level (FL) was calculated for each medicinal plant reported to be used against human and livestock diseases to assess its relative healing potential for specific ailments. Fidelity level was used to analyze plant use with the formula

$$\mathrm{FL}\% = \frac{\mathrm{I_p}}{\mathrm{I_u}} \times 100$$

where I_p denotes the number of informants who reported the use of the plant to treat a particular disease and I_u represents the number of informants who used the plants as medicine.

Rahman's Similarity Index (RSI)

Rahman's Similarity Index (RSI%) serves as a crucial metric for assessing the cultural similarities of indigenous knowledge across diverse communities and areas (Rahman *et al*. 2019). RSI facilitates a deeper understanding of how communities interact with their natural environment and the cultural significance they attach to these plants. The RSI in percent is calculated using the formula

$$\mathrm{RSI} = \frac{\mathrm{d}}{\mathrm{a} + \mathrm{b} + \mathrm{c} - \mathrm{d}} \times 100$$

Where "a" is the number of species unique in area A, "b" is the number of species unique in area B, "c" is the number of common species in both areas A and B, and "d" is the number of common species used for a similar ailment in both areas A and B. While a and b should be different from zero, c and d must be greater than or equal to zero, which allows for a meaningful comparison of shared knowledge regarding plant uses for medicinal purposes.

Results and Discussion

Socio-demographic characteristics and traditional medicinal knowledge

The present study examined the influence of socio-demographic characteristics on medicinal knowledge in the Dizi people. Although male individuals reported a higher mean number of medicinal plants (6.5 ± 2.6) than female individuals (3.5 ± 2.1), the difference was not statistically significant (P > 0.05). Therefore, gender did not influence medicinal knowledge scores in the study area. This indicates that both females and males share responsibility for the primary health care within the family. This finding is in agreement with some previous studies (Lulekal *et al*. 2013; Chekole 2017; Kidane *et al*. 2018; Tahir *et al*. 2021). In contrast to this finding, (Alemneh 2021; Usman *et al*. 2022; Sultan *et al*. 2024) reported that males have better knowledge of traditional medicine than females. Furthermore Gnahore *et al*. (2022) reported that females have more medicinal knowledge than males do. This could be due to the result of sociocultural variation in medicinal plant knowledge proficiency between the sexes. The healing experience also played a significant role, with key informants reporting a higher mean number of medicinal plants (10.3 ± 2.6) compared to general informants (3.7 ± 1.4) (p < 0.05) (Table 2). This might be due to their experience with long-term exercise. This result is supported by (Alemneh 2021; Tahir *et al*. 2021; Tadesse *et al*. 2025).

Table 2. Medicinal plant knowledge among informant groups (N=311)

Parameter	Category	N	Mean ±SD	P value
Gender	Male	210	6.5 ± 2.6	0.08
	Female	101	3.5 ± 2.1	
Literacy level	Illiterate	243	5.4 ± 1.8	0.000*
	Literate	68	2.7 ± 0.9	
Healing experience	Key informants	31	10.3 ± 2.6	0.02*
	General informants	280	3.7 ± 1.4	
Age group	>65	71	8.8 ± 4.5	0.001*
	46-65	161	3.4 ± 2.3	
	25-45	79	1.2 ± 0.9	

*Shows a significant difference for the parameters at P < 0.05

Interestingly, illiterate individuals revealed a significantly higher medicinal knowledge score (5.4 ± 1.8) compared to literate individuals (2.7 ± 0.9), *P* < 0.05. This finding indicates a significant negative association between formal literacy and traditional medicinal knowledge, suggesting modern education might unintentionally limit the time available for youth to acquire indigenous knowledge. Literate individuals who attended formal education often recognize the traditional use of medicinal plants as outdated and detrimental, opting instead for modern medical facilities (Awoke *et al*. 2025). This finding agrees with previous ethnobotanical studies in Ethiopia (Abdela *et al*. 2022; Tadesse *et al*. 2024; Tessema *et al*. 2025). Furthermore, the older age group (age > 65) displayed significantly higher mean scores (8.8 ± 4.5, *p* < 0.05) compared to both the middle age groups (3.4 ± 2.3, *p* < 0.05) and the young age group (1.2 ± 0.9, *p* < 0.05). These findings suggest that older informants tend to possess more extensive knowledge of medicinal plants compared to the younger informant group, or the youngsters were not as well-practiced in the healing potential of each and every medicinal plant remedy as the aged informants. This also highlights the need to conserve and pass on the medicinal knowledge. This finding is consistent with the studies conducted in different areas of Ethiopia (Mengesha 2016; Geta *et al*.2020; Lulesa *et al*. 2025).

Distribution and diversity of medicinal plants

A total of 113 medicinal plant species distributed in 102 genera and 51 families were documented for treating 51 different human and livestock ailments by the Dizi people (Table 3). Out of the total 113 medicinal plant species, 100 species were used to treat only human ailments, 8 species were used to treat both human and livestock ailments, and 5 species were used to treat only livestock ailments. This indicated that the majority of inhabitants in the study area still rely on traditional medicinal plants in their healthcare systems.

Table 3. The number of medicinal plant species and genera in each family

Family	Number of species	% of species	Number of Genera
Asteraceae	14	12.39	12
Fabaceae	9	7.96	6
Malvaceae	8	7.08	6
Lamiaceae	7	6.19	5
Apiaceae	5	4.42	5
Rubiaceae	5	4.42	5
Euphorbiaceae	4	3.54	4
Polygonaceae	4	3.54	3
Capparaceae	3	2.65	3
Other 42 families	54	47.79	53

The number of medicinal plants documented in the present study is relatively higher compared to the previous ethnobotanical studies in different parts of Ethiopia, such as west Shewa community with 108 species (Tadesse *et al*. 2025), Ale district with 72 species (Geta *et al*. 2020), Gera district with 63 species (Gonfa *et al*.2020), Asagirat district with 103 species (Tahir *et al*. 2023), Kebridehar and Shekosh districts with 44 species (Wubu *et al*. 2023), Guraferda district with 81 species (Awoke *et al*. 2024), Anderacha district with100 species (Tessema *et al*. 2025), Tehuledere district with 63 species (Misganaw & Yiblet 2024). Similarly, studies conducted elsewhere in the world have documented 37, 42, and 45 species (Ma *et al*. 2019; Khan *et al*. 2023; Mwingira *et al*. 2023). In contrast, the number of medicinal plant species recorded in the study area is lower than those reported in other parts of Ethiopia. For instance, 127 species in Nensebo district, southeastern Ethiopia (Abdela *et al*. 2022), 134 species in Habru district, northern Ethiopia (Alemu *et al*. 2024), and 164 species in the Fofa and Toaba sub-districts of central Ethiopia (Lulesa *et al*. 2025). The difference of this study from other previous studies in different areas in terms of the number of medicinal plants could be due to the variation in vegetation type of the area, time of data collection, number of informants involved, and cultural differences (Tassew 2019).

The most dominant medicinal plant families used by Dizi people were Asteraceae and Fabaceae, represented by 14 and 9 species, respectively, followed by Malvaceae (8 species), Lamiaceae (7 species), Apiaceae and Rubiaceae (5 species each), Euphorbiaceae and Polygonaceae (4 species each), Capparaceae (3 species), and the remaining 42 families were represented by 2 or fewer medicinal plant species each. This result was supported by (Tahir *et al*. 2021; Anbessa *et al*. 2024; Lulesa *et al*. 2025), who reported Asteraceae and Fabaceae with a greater number of species. This might be because of the wider distribution of Asteraceae and Fabaceae in the floral regions of Ethiopia (Eshete & Molla 2021; Tadesse & Teka 2023). A similar dominance of Asteraceae is observed globally, such as in the Hehe society of Tanzania (Mkenda *et al*. 2025) and the Niño Corin Ayllu of Bolivia (Rocabado Imaña *et al*. 2025). Consistent with these findings, Algeria also recorded Asteraceae as the most represented family, followed by Lamiaceae, reflecting its widespread adaptation and utilization in traditional medicine across different African ecological zones (Radjai *et al*. 2025). The dominance of medicinal plants in the Asteraceae and Fabaceae families could also be due to the accumulation of secondary metabolites in their different parts, success in pollination, and dispersal mechanisms (Rainsford & Alamgir 2018; Reinaldo *et al*. 2020; Asfaw & Abebe 2021).

Growth form of the medicinal plants

The local communities in the study area categorized medicinal plants into different groups based on their habit (herbs, shrubs, trees, and climbers). The most abundant growth habit of the medicinal plants used by the local communities in the study area was herb (54 species, 47.79%), followed by shrub (31 species, 27.43%) (Fig. 3). Year-round use of herbs as a source of traditional medicine in the study area could be due to favorable climate conditions with a long rainy season that contributed to the abundance of herbs over shrubs and trees. This result is supported by the findings of (Megersa & Woldetsadik 2022; Bogale *et al*. 2023; Tamene *et al*. 2023; Teshome *et al*. 2023; Bushra *et al*. 2025; Tessema *et al*. 2025), where herbs are the most commonly utilized growth form in the preparation of traditional medicine in different regions of Ethiopia. A Similar trend was also observed with findings from the Bolivian Andes, where the prevalence of herbaceous plants

is attributed to their higher likelihood of containing bioactive phytochemicals (Rocabado Imaña *et al*. 2025). Moreover, the reliance on herbs is ecologically advantageous since they can replace themselves easily compared to slower-growing woody plants (Tesfahuneygn & Gebreegziabher 2019). However, this contrasts with the findings of (Jima & Megersa 2018; Eshete & Molla 2021; Wubu *et al*. 2023), who reported shrubs as the most abundant growth in different areas of Ethiopia. Besides, in the Hehe community in Tanzania, trees are the most utilized growth form (Mkenda *et al*. 2025). The application and utilization of medicinal plant variations could be due to differences in local communities' composition, agroecology, and seasonal variability (Tadesse *et al*. 2024).

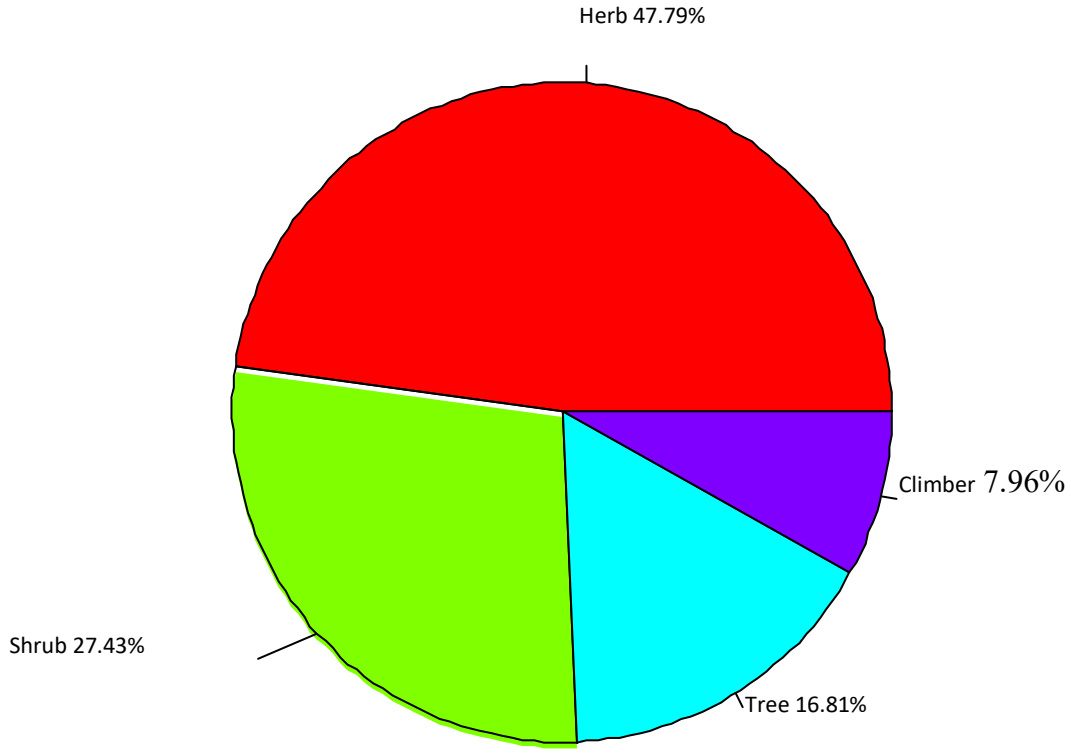

Figure 3. Growth form of the medicinal plants

Habitat of the medicinal plants

The Dizi community collects medicinal plants from different habitats for remedy preparation. The majority of the medicinal plants were collected from the wild (76 species; 67.25%), followed by semi-wild (23 species; 20.35%), and only 14 (12.39%) were from cultivated habitats. This result is consistent with studies conducted by (Mesfin *et al*. 2014; Temam & Dillo 2016; Bogale *et al*. 2023) in other areas of Ethiopia.

Plant parts used

Leaves were the most widely used medicinal plant parts, with 46 species (40.7%), followed by roots and multiple parts with 16 species (14.16%) each (Fig. 4). This finding is in line with the other studies conducted in Ethiopia (Mekonnen *et al*. 2022; Awoke *et al*. 2024; Ayele *et al*. 2024; Beressa *et al*. 2024; Wendimu *et al*. 2024) and globally (Jadid *et al*. 2020; Hani *et al*. 2022; Gang *et al*. 2023; Khan *et al*. 2023; Ralte *et al*. 2024). One possible reason for the greater preference for leaves over other parts of the plant is that leaves are easier to prepare and collect and tend to have higher concentrations of active ingredients that are beneficial for treating diseases (Teshome & Yohannes 2025). Additionally, the preference for leaves over other plant parts may not cause a plant's death (Tesfahuneygn & Gebreegziabher 2019). This is a sustainable practice compared to the high reliance on roots and bark observed in Tanzania, which poses significant threats to species survival (Mkenda *et al*. 2025). Similarly, in Algeria, leaves were the most frequently used part (77%), further supporting the observation that communities often favor parts that are abundant and easily accessible to streamline drug administration (Radjai *et al*. 2025). In contrast to this finding, other studies reported frequent utilization of the whole plant parts (Bai *et al*. 2022; Huang *et al*. 2022) and roots (Mekuanent *et al*. 2015; Ashagre *et al*. 2016). However, extensive use of roots can threaten the medicinal plants (Tessema *et al*. 2025).

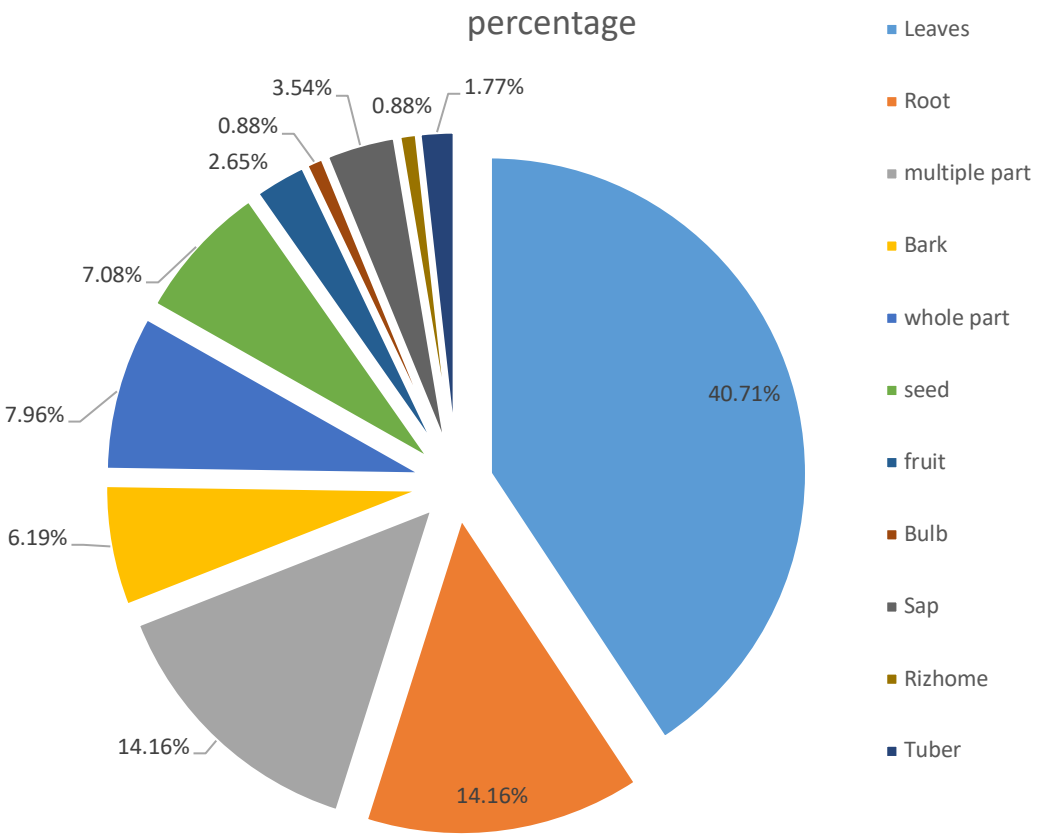

Figure 4**.** Medicinal plant parts used for remedy preparation

Condition of plant parts used

The majority of remedy preparations were fresh plant material (76 species; 67.25%), followed by dry plant material (22 species; 19.47%). A small proportion of medicinal plants were used in both dry and fresh conditions (15 species; 13.27%). This demonstrates that local communities prefer fresh plant materials as more effective because in fresh form they could retain their bioactive compounds (Assen *et al*. 2021; Tahir *et al*. 2021; Gebre *et al*. 2023). This finding is consistent with previous ethnobotanical studies conducted in Ethiopia (Bogale *et al*. 2023; Anbessa *et al*. 2024; Beressa *et al*. 2024; Dessie & Amsalu 2024). Furthermore, similar practices have been observed in the Mizoram region of India (Ralte *et al*. 2024) and Kwara State in Nigeria (Evbuomwan *et al*. 2023). However, the frequent collection of fresh plant parts even during the dry season may endanger the plants because they are not preserved for later use (Megersa *et al*. 2013; Tadesse *et al*. 2024). This highlights the necessity of adopting reliable preservation methods or technologies to ensure the extended shelf life of these herbal remedies (Tesfahuneygn & Gebreegziabher 2019). The present finding also showed that some medicinal plants were also prescribed in dry condition and could be stored for more than a month or a year with efficacy in healing. This could also be due to the fact that dry-remedy preparation increases the shelf life of the medicine (Teshome *et al*. 2023).

Mode of remedy preparation

The Dizi communities used different preparation methods depending on the type and location of the illness. In the study area, herbal remedies were primarily prepared by crushing plant parts, accounting for 54 species (47.79%). Chewing, powdering, concoction, and cooking were represented by 14 (12.39%), 13 (11.5%), 8 (7.08%), and 6 (5.3%) species, respectively. The remaining five methods of preparation were represented by less than 5% of the species (Fig.5).

This finding aligns with previous ethnobotanical studies in the Metema district (Tadesse *et al.* 2025), Mandura district (Mengesha 2016), and Berere district (Jima & Megersa 2018) of Ethiopia and elsewhere in the world (Karki *et al*. 2023), that reported crushing as the most frequently used method of preparation of traditional medicinal plants. In contrast, other authors reported powdering (Alemneh 2021; Kindie *et al*. 2021), squeezing (Chandrodyam 2016), pounding (Zemede *et al*. 2024), and concoction (Dessie & Amsalu 2024) as the dominant methods of preparation of traditional medicinal plants in

different regions of Ethiopia. The remedy preparation methods may vary depending on the nature of the medicinal plant, the type of disease it treats, and the ease of processing (Wubu *et al*. 2023).

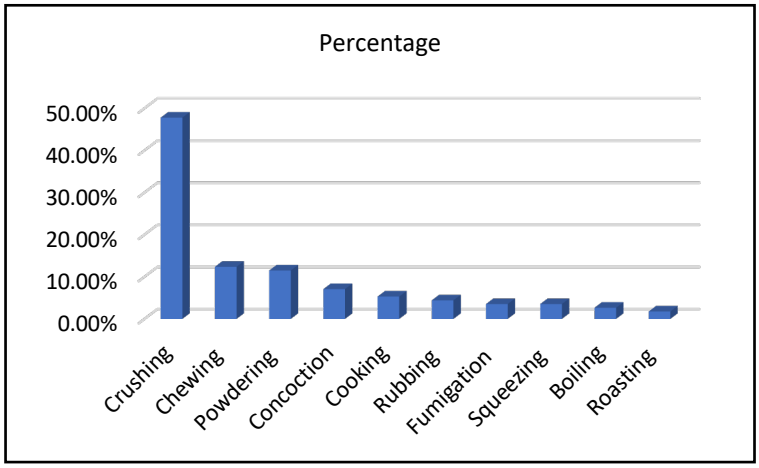

Figure 5. Mode of remedy preparation in the study area

Route of medicinal plant application

The routes of administration reported by the informants in the study area were oral, dermal, topical, nasal, ocular, anal, and auricular. Multiple routes of administration can be taken at the same time. The main route of administration was oral (58 species; 51.32%), followed by multiple ways (19 species; 16.81%) (Fig. 6). Similar findings were reported in various areas of Ethiopia (Mekonnen *et al*. 2022; Wubu *et al*. 2023; Beressa *et al*. 2024; Misganaw & Yiblet 2024), and globally (Lu *et al*. 2022; Hussain *et al*. 2024). The preference for the oral route of administration in the study area might be attributed to the effectiveness of the prepared medicine in reacting quickly with the physiology of the pathogen and increased curative power.

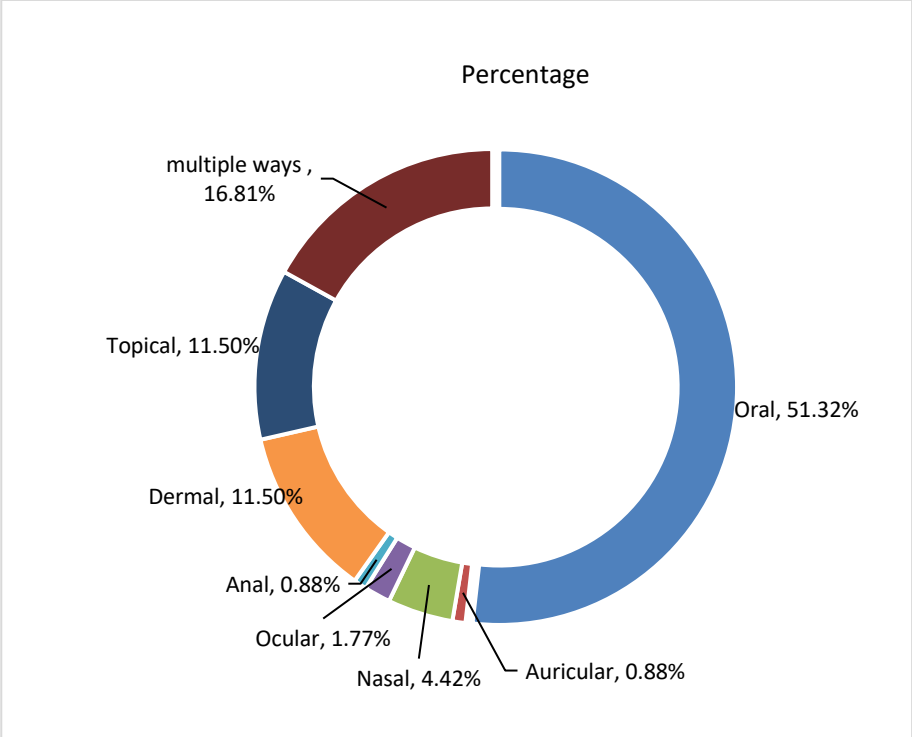

Figure 6. Route of application of the medicinal plants in the study area

Dosage, additive, and diagnostic features of the remedy made from medicinal plants

The dosage of the herbal remedy varied depending on the type of disease, sex, age, pregnancy, and condition of the patient. In the present study the dosage remedies in the study area were measured by different traditional measuring tools such as liters, teacups, coffee cups, teaspoons, water glasses, the palm, fingers, and drops. This observation aligns with other

previous studies in Ethiopia (Amsalu *et al*. 2018; Megersa & Tamrat 2022). However, some prepared medicines were used by guessing depending on the patient's conditions and age. This estimation could also lead to dosing and may result in complications. The lack of consistent precision and standardization is a serious challenge within the traditional medicinal use and acceptance of traditional medicine. This finding is consistent with previous studies (Kassa *et al*. 2020; Awoke *et al*. 2024) that reported the absence of consistent precision and standardization as a challenge to the use and acceptance of traditional medicinal plants. The prepared plant parts were applied with or without additive solvents. In line with previous studies (Tahir *et al*. 2021; Yimam *et al*. 2022; Lulesa *et al.* 2025), the majority (46.02%) of the traditional medicines in the current study were applied without additive solvents, while 43.36%, 3.54%, and 0.88% of them were applied by mixing in water, coffee, tea, honey, butter, and milk to reduce toxicity, improve taste quality, soften the remedy, and increase healing efficacy of the medicinal plants. Similar results were reported in different areas of Ethiopia (Seyoum & Zerihun 2014; Kindie *et al*. 2021; Megersa *et al*. 2023).

Informant consensus factor

Informants' consensus factor values are important guides to identify more efficacious plants, and through that they also tell the level of agreement among the informants regarding potentially effective medicinal plant use for specific disease categories in that area (Kefalew *et al*. 2015; Tahir *et al*. 2023). In the present study, the highest ICF value was obtained from the dermal diseases category (0.88), followed by cultural-related problems (evil eye and spiritual illness) (0.86) (Table 4).

Table 4. Informant consensus factor on the medicinal plants used to treat 12 ailment categories in the study area

No	Diseases category	Nt	Nur	ICF
1	Dermatology (Wound, fungal diseases, Dandruff, MICHI, itching rabbis, skin rash, body inflammation, fire burn, warts)	39	308	0.88
2	Internal diseases(liver diseases, stabbing chest pain, Rheumatism, kidney pain, pancreases problems ,bone weakened, swelling of lymph node)	18	87	0.8
3	Sexual and maternal problems (placental retained, Gonorrhea, sexual impotence, maternal bleeding)	9	56	0.85
4	Gastrointestinal problems (Gastritis, abdominal pain, intestinal worms, vomiting, diarrhea, constipation)	15	89	0.84
5	Respiratory problems (cough, Bronchitis, common cold, tonsillitis)	6	28	0.81
6	Cultural related problems (evil eye , spiritual illness)	13	94	0.87
7	Rabies & snake bite	17	105	0.84
8	Malaria	14	83	0.84
9	Poliomyelitis	2	5	0.75
10	Fever, headache and Tetanus	5	12	0.64
11	Sense organ & tooth problems (tooth pain, ear bleeding, cataract, eye diseases)	11	47	0.78
12	Livestock diseases (internal diseases of domestic animals, worms in cattle's feet, leech bites in domestic animals)	3	11	0.8

The lowest ICF value was recorded in the fever, headache, and tetanus disease category (0.64). This finding aligns with previous ethnobotanical studies (Awoke *et al*. 2024; Ayele *et al*. 2024; Dessie & Amsalu 2024), which reported the highest ICF values of 0.92, 0.92, and 0.9 in the Sekela district, West Gojam zone, and Guraferda district, respectively. The highest ICF value indicated the best agreement between informants on the use of medicinal plants for treating certain diseases. However, other ethnobotanical studies reported the highest ICF value (0.91, 0.97) for the respiratory diseases category and the genito-urinary diseases category, respectively (Wendimu *et al*. 2024; Lulesa *et al*. 2025).

Fidelity level index

Fidelity level (FL) was calculated for each medicinal plant reported to be used against human and livestock diseases to assess its relative healing potential for specific ailments. For this study, the 13 most commonly cited medicinal plants were selected to calculate the fidelity level index. In the present study *Embelia schimperi* (FL=100%) for intestinal worms and *Nerophila senegambiensis* (FL=100%) for snake bites had the highest fidelity level value, followed by Allium sativum (FL=88%) for cough (Table 5). The high fidelity level value highlighted that these plants are efficient in treating particular ailments. The finding is consistent with (Anbessa *et al*. 2024), who reported *Embelia schimperi (*100%) efficiency in treating tapeworm in the Metekel zone, Benishangul Gumuz regional state, and (Wendimu *et al*. 2024), who reported *Allium sativum* (100%) efficiency in treating cough in Abala Abaya district, Southern Ethiopia. Conversely, species such as *Urena lobata* (FL=26%) and *Croton macrostachyus* (FL=38%) had lower healing potential for evil eye and malaria, respectively. Medicinal plants with higher fidelity levels should be conserved.

Table 5. Fidelity level index of the 13 most commonly cited medicinal plants in the study area

Medicinal plants	Disease treated	Ip	Iu	FL	FL%	Rank
Croton macrostachyus	Malaria	5	13	0.38	38	11
Embelia schimperi	Intestinal worm	12	12	1	100	1
Ricinus communis	Wound	3	9	0.33	33	10
Piper capense	Stomachache	18	24	0.75	75	4
Allium sativum	Cough	7	8	0.88	88	2
Afrocarduus leptacanthus	Liver diseases	9	11	0.82	82	3
Pentas lanceolata	Sexual impotence	6	9	0.67	67	5
Hibiscus calyphyllus	Placental retained	9	21	0.42	42	9
Nerophila senegambiensis	Snake bite	19	19	1	100	1
Basella alba	Constipation	11	19	0.57	57	6
Cuscuta campestris	hemorrhoids	7	14	0.5	50	7
Gnidia involucrata	Gonorrhea	12	27	0.44	44	8
Urena lobata	Evil eye	8	31	0.26	26	12

Preference ranking

In this study, preference ranking was analyzed with ten medicinal plants commonly used to treat malaria, which is the most frequently reported disease in the study area. The results of this study indicated that *Gardenia ternifolia* was the most preferred medicinal plant in treating malaria, followed by *Mussaenda arcuata* (Table 6). In contrast, *Gardenia ternifolia was* preferred to treat tonsillitis in the Metekel Zone of the Benishangul Gumuz Regional State (Anbessa *et al*. 2024). The variation in choosing a medicinal plant in treating specific diseases may be due to the cultural conditions of the different ethnic groups.

Table 6. Preference ranking of medicinal plants used to treat malaria in the study area

Medicinal plants	Respondents (R1-R10)											
	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	Total Score	Rank
Ekebergia capensis	7	2	3	4	2	2	1	3	4	1	29	7th
Gardenia ternifolia	8	7	6	7	8	5	6	6	8	5	66	1rst
Phytolacca dodecandra	2	4	4	3	1	2	1	2	2	6	27	8th
Croton macrostachyus	2	1	4	1	1	2	3	4	1	1	20	10th
Mussaenda arcuata	7	6	5	4	6	7	5	6	7	7	60	2nd
Abelmoschus esculentus	5	4	3	4	3	5	4	5	3	2	38	5th
Ritchiea albersii	2	4	6	5	3	4	1	3	3	2	33	6th
Olea europaea	5	3	5	6	5	3	4	2	5	3	41	4th
Gymnosporia senegalensis	3	2	1	2	1	2	5	4	2	1	23	9th
Pittosporum viridiflorum	4	5	6	5	6	4	7	3	5	6	51	3rd

Direct matrix ranking

In the present study, the highest multipurpose tree species was *Cordia africana*, followed by *Olea europaea* (Table 7). These plants are locally threatened primarily by their construction use rather than their medicinal value in the Maji district. The finding is consistent with (Megersa *et al*. 2023; Tahir *et al*. 2023; Awoke *et al*. 2024), who reported *Cordia africana* as the most common multipurpose medicinal plant in different regions of Ethiopia. To the contrary, the present finding disagrees with the findings of (Gonfa *et al.* 2020; Mekonnen *et al*. 2022; Wendimu *et al*. 2024), who reported *Eucalyptus globulus*, *Persea americana*, *Olea europaea* subsp. *cuspidata,* and *Croton macrostachyus* as the highest multipurpose tree species. Multipurpose plants with the highest values are under pressure due to overexploitation, leading to reduction of species (Siddique *et al*. 2022). Thus, the study highlighted that practical conservation efforts are required to reduce the risk of extinction of these multipurpose plants.

Table 7. Direct matrix ranking for multipurpose uses of medicinal plants

Medicinal plants	Medicine	Fodder	food	Fencing	Firewood	Construction	Charcoal	Total	Rank
Gardenia ternifolia	3	1	0	2	1	2	2	11	7th
Prunus africana	3	1	0	3	2	3	4	16	4th
Croton macrostachyus	2	2	0	1	2	1	1	9	8 th
Ozoroa insignis	4	3	0	3	3	2	3	18	3rd
Cordia africana	4	2	2	4	3	5	3	23	1rst
Ritchiea albersii	2	1	3	2	2	1	2	13	6 th
Olea europaea	3	1	0	5	3	5	3	20	2nd
Eucalyptus globulus	2	0	0	3	4	4	2	15	5 th

Marketability of the Medicinal Plants

The majority of traditional medicinal plants were not available for sale in markets in the study area. The local people choose either to collect these plants by themselves from the available areas in the district for remedy preparation or to directly go to traditional healers to obtain treatments instead of buying medicinal plants from the market. Healers noted that selling medicinal plants in the market is condemned. They believe that selling medicinal plants could reduce healing potential and lead to a loss of indigenous knowledge. However, some medicinal plant species like *Allium sativum*, *Olea europaea* subsp. cuspidata, *Rhamnus prinoides*, *Carica papaya*, *Zingiber officinale*, *Coffea arabica*, *Eucalyptus globulus*, *Nicotiana tabacum*, *Dioscorea alata*, *Prunus africana, and Ruta chalepensis are* sold for non-medicinal purposes such as spicing, foods, local drinks, firewood, and construction uses and occasionally applied as medicine when required. Similar ethnobotanical studies (Teshome *et al*. 2023; Alemu *et al*. 2024), reported that the majority of traditional medicinal plants in Ethiopia were not marketable for medicinal purposes.

Comparative analysis of medicinal plants in Maji district with other previous reports in Ethiopia

Rahman's Similarity Index (RSI)

The Rahman's Similarity Index (RSI) was used to assess the cultural similarity and use of applications among various communities based on their commonly used medicinal plants for the same ailments. The RSI values ranged from 0.52 to 13.19%, revealing varying but generally low degrees of cultural resemblance in plant use between the Dizi people in the Maji district and the other studied regions (Table 8). Although the highest comparative similarity was observed in the Guraferda district (13.19 %; Awoke *et al*. 2024), Bita district (8.02%; Awoke *et al*. 2025), and Goba district (8%; Gitima *et al*. 2025). Moreover, similarities were observed in the Dawuro zone (7.64%; Agize *et al*. 2022), Ale district (5.96%; Geta *et al*. 2020), and Hamar district (5.66%; Bekele *et al*. 2022). These values suggest that the vast majority of medicinal plants remain localized. These findings suggest that while geographical proximity and cultural exchange partially influence the homogeneity of knowledge, environmental and cultural boundaries maintain significant heterogeneity. The relatively higher similarity among the southern and southwestern regions specifically Guraferda, Bita, Goba, Dawuro Zone, Ale, and Hamar districts; supports the premise that shared cultural practices and environmental conditions strengthen a common understanding and utilization of similar medicinal plants. Moreover, these parallel practices can be attributed to common linguistic affiliations and intersecting customs. Language significantly contributes to the dissemination of ethnobotanical knowledge; communities with shared linguistic backgrounds may have inherited similar customs and practices related to plant utilization (Awoke *et al*. 2025). This linguistic bond can enhance the exchange of ideas and practices, thereby strengthening the similarities in the perception and use of plants. However, the low absolute value underscores the distinctiveness of the Dizi medicinal plant knowledge. Conversely, the lower RSI values observed in the Suro barguda, Tehuledere, Kofale, Jawi, and Mekdela districts may reflect distinct cultural traditions, ecological differences, or limited knowledge exchange among the cultural groups. These areas are primarily situated in the central and northern parts of the country with a dry Afromontane vegetation type and the Cushitic and Semitic language groups that differ significantly from the moist Afromontane vegetation region and the Omotic language group of the study area.

Novel ethnobotanical findings

The present study documented 113 traditional medicinal plants, including 8 species reported for the first time in the ethno-medicinal literature of Ethiopia (Table 9). This contributes to the growing body of ethno-medicinal knowledge in Ethiopia. Similar novel ethnobotanical findings were reported in the Addi Arkay district, northwestern Ethiopia (Misganaw *et al*. 2025); the Quara district, northern Ethiopia (Tadesse *et al*. 2024); the Bensa district, southern Ethiopia (Mekuria *et al*. 2025); and the Metema district, northern Ethiopia (Tadesse *et al*. 2025). Among the newly reported species, *Anthriscus sylvestris* was identified for its application in treating pneumonia. *Synedrella nodiflora* was noted for its efficacy in treating tonsillitis and evil eye. Local communities also reported using *Erigeron bonariensis* to address the evil eye afflictions. *Gutenbergia cordifolia* was newly reported for managing pancreatic problems within local communities. *Basella alba* was used for alleviating constipation. *Peperomia tetraphylla* was reported to treat liver diseases. Additionally, *Oldenlandia corymbosa* was identified for managing evil eye illness. Furthermore, *Cuscuta campestris* was newly employed to treat hemorrhoids in the present study.

In addition to the newly identified species, the study documented 21 novel therapeutic applications for previously known medicinal plants. For instance, *Centella asiatica* is used for hemorrhoids in the study area, contrasting with its documented use for meningitis in the bench ethnic group (Giday *et al*. 2009a), Malaria in the Guraferda district (Awoke *et al*. 2024), and wound healing in Sheka (Kassa *et al*. 2020). *Thunbergia alata* is uniquely applied to treat Gonorrhea in the study area whereas it was traditionally used to treat constipation and ascariasis in the Maale and Ari communities, Southern Ethiopia (Kidane *et al*. 2014); cough in the Ada'a district (Kefalew *et al*. 2022); and abdominal pain and swelling in the neck region in

the Ale special district (Geta *et al*. 2020). Furthermore, *Ozoroa insignis was* newly identified for healing tooth pain, while previous reports highlight its use for topical ulcers in the Babile district and Harari region (Belayneh *et al*. 2012; Bussa & Belayneh 2019). Similarly, a novel application of *Afrocarduus leptacanthus* was used for liver pain treatment, whereas in Kaffa, Gedo, and Guji Oromo, it was used for hemorrhoids and ascariasis (Awas & Demissew 1999; Mesfin *et al*. 2009; Bekele & Reddy 2015). The fruit of *Mussaenda arcuata* was novel for malaria treatment in the study area, whereas the Gamo people traditionally use crushed fresh leaves for earaches (Zemede *et al*. 2024). Additionally, *Periploca linearifolia* was newly recorded for snakebite treatment; previous studies have reported its use to stop bleeding in the Enjaro district (Berihu *et al*. 2017), hemorrhoids in childbirth and venereal diseases in the Fiche district (Enyew *et al*. 2014), diabetes in the Habru district (Alemu *et al*. 2024), and paralysis in the Adwa district (Tahir *et al*. 2021). Finally, *Pentas lanceolata* was newly documented for bone fracture and sexual impotency but was used for lymphadenitis, meningitis, and abdominal cramp in Bench (Giday *et al*. 2009a); ascariasis in Konta ethnic groups (Bekalo *et al*. 2009); and stomachache, diarrhea, and retained placenta in the Meinit ethnic group (Giday *et al*.2009b). The discovery of these new use of already known species and previously unreported medicinal plants in the Maji district highlights the potential for further documentation and pharmacological studies.

Table 8. RSI comparison between the current studies (Maji district) and prior research reports

Study area	NMPR	a	b	c	d	RSI (%)	Reference
Maji	113	-	-	-	-	-	Present study
Abaya	188	74	149	39	13	5.22	(Zemede *et al*. 2024)
Ada'a	112	84	83	29	5	2.62	(Kefalew et al. 2022)
Addi Arkay	112	88	87	25	10	5.26	(Misganaw *et al*. 2025)
Ale	72	88	47	25	9	5.96	(Geta *et al*. 2020)
Anderacha	100	85	72	28	8	4.52	(Tessema *et al*. 2025)
Asagirat	103	94	84	19	9	4.79	(Tahir *et al*. 2023)
Bensa	214	73	174	40	11	3.99	(Mekuria *et al*. 2025)
Bita	122	80	89	33	15	8.02	(Awoke *et al*. 2025)
Dalle	71	90	48	23	6	3.87	(Tuasha *et al*. 2018)
Dawuro	274	64	225	49	24	7.64	(Agize *et al*. 2022)
Dibatie	170	84	141	29	13	5.39	(Anbessa *et al*. 2024)
Ensaro	101	95	83	18	3	1.55	(Teshome *et al*. 2023)
Fofa and Toaba	164	83	134	30	8	3.35	(Lulesa *et al*. 2025)
Goba	115	74	76	39	14	8	(Gitima *et al*. 2025)
Guraferda	81	82	50	31	19	13.19	(Awoke *et al*. 2024)
Habru	134	88	109	25	10	4.72	(Alemu *et al*. 2024)
Hamar	145	79	111	34	12	5.66	(Bekele *et al*. 2022)
Jawi	87	91	65	22	2	1.14	(Derso *et al*. 2024)
Kofale	106	88	81	25	2	1.04	(Nuro *et al*. 2024)
Metema	85	97	69	16	8	4.59	(Tadesse *et al*. 2025)
Nensebo	127	87	101	26	7	3.38	(Abdela *et al*. 2022)
Oda Bultum	161	89	127	24	11	4.8	(Egigu & Mogesse 2024)
Raya kobo	91	93	71	20	6	3.37	(Osman *et al*. 2020)
Sekela	121	92	100	21	8	3.9	(Dessie & Amsalu 2024)
Mekdela	74	98	59	15	2	1.18	(Wondimnew *et al*. 2025)
Suro barguda	98	94	79	19	1	0.52	(Eshete & Molla 2021)
Tehuledere	63	96	46	17	1	0.63	(Misganaw & Yiblet 2024)
Ticho	78	89	54	24	5	3.09	(Bushra *et al*. 2025)
Tulo	104	88	79	25	9	4.92	(Bogale *et al*. 2023)
West Gojam	97	88	72	25	8	4.52	(Ayele *et al*. 2024)

Key**:** NMPR = no of medicinal plants reported, a = no of species only in current study, b = no species only in previous study, and c = no of common species in current study and previous studies, d**=** no of common medicinal plants with similar uses, RSI (%) = Rahman's Similarity Index in percent

Table 9**.** Plants reported to treat ailments in Maji district for the first time as medicinal plants in Ethiopia

Scientific name	Ailments treated in the present study	Medicinal use reports from other parts of the world
Anthriscus sylvestris	Pneumonia	Rheumatism (Gairola *et al*. 2014), headache (Lignans 2015), Chesty colds (Kigen *et al*. 2017).
Synedrella nodiflora	Tonsillitis, evil eye	Anti-depressant (Amoateng *et al.* 2018), Malaria (Debnath *et al*. 2025).
Erigeron bonariensis	Evil eye	Hepatitis (Bari *et al*. 2023).

Gutenbergia cordifolia	Pancreas problem	Fever of cattle (Kama-kama *et al*. 2016), Malaria (Ahmadu and Onanuga 2019).
Basella alba	Constipation	Glastris (Sarjani 2024), Synergistic, abdominal upsets, joint pains, lumbago, anemia and blood cleanser (Kigen *et al*. 2017).
Peperomia tetraphylla	Liver diseases	relieving cough, bone fracture, scabies, swelling and tuberculosis (Nallasamy *et al*. 2025).
Oldenlandia corymbosa	Evil eye	Malaria, Hepatitis, pneumonia, cholecystitis, urinary infection, cellulites, snake bite, skin diseases, ulcers, cough, cold and bronchitis (Lignans 2015; Amoateng *et al*. 2018; Debnath *et al*. 2025).
Cuscuta campestris	Hemorrhoids	Bee sting (Tsioutsiou *et al*. 2019) improves liver and kidney function (Ramezan *et al*. 2023).

Source and Transfer of Traditional Medicinal Plant Knowledge

During the focus group discussion with key informants, traditional healers explained that traditional medical knowledge is transferred from generation to generation orally with maximum secrecy and primarily along family lines, with the giving of advice to care for the knowledge and not transfer it to others or outside of the family members. Some members mentioned that traditional medicinal knowledge is often transferred to the eldest son, who will take the responsibility of keeping the information and passing it to the next generation. Traditional healers maintain the secrecy of traditional medicine because they believe that maintaining the secret of the medicinal plant knowledge maintains its healing power. Furthermore, they rely on traditional medicine as a vital source of income. In the present study, the majority of traditional healers (18; 58.06%) gained traditional medicinal knowledge from their parents, followed by their eldest son (6; 19.35%), relatives (4; 12.9%), and others (3; 9.68%) (Fig. 7). The oral transmission of indigenous knowledge is also a common practice in various cultures of Ethiopia (Assen *et al*. 2021; Abdela *et al*. 2022; Awoke *et al*. 2024; Misganaw *et al*. 2025). Consequently, this rich knowledge held by traditional medical practitioners is at risk of being lost forever when practitioners pass away without adequately sharing the indigenous wisdom with successors (Teshome & Yohannes 2025).

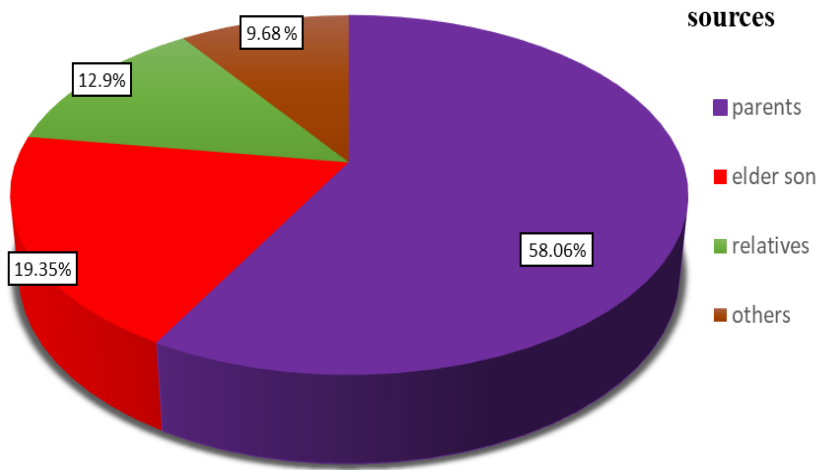

Figure 7. Source of medicinal plant knowledge

Threats and conservation status of the medicinal plants

The most common threats to medicinal plants identified in the study area are agricultural expansion, deforestation, firewood and charcoal, construction, overgrazing, and invasive alien species (Table 10). Ten key informants were selected to rank the threats based on the degree of damage (1-10), in which 1 = the least destructive threat and 10 = the most destructive threat. The results indicated agricultural expansion was considered the primary threat, followed by deforestation, firewood, and charcoal (Table 10). This finding is consistent with previous findings in Ethiopia (Beressa *et al*. 2024; Dessie & Amsalu 2024), yet it contrasts with the results reported by (Tadesse *et al*. 2025), who identified fuelwood collection as the most significant threat to the medicinal plants in the Metema district of Northern Ethiopia. Despite the significant threat, conservation efforts by traditional healers and community members in the Maji district remain limited. Nevertheless, some traditional healers have attempted to conserve medicinal plants such as *Nerophila senegambiensis* and *Mentha pulegium* species by collecting them from the wild to home gardens for cultivation.

Table 10. Threatening factors of the medicinal plants in the study area.

Threatening factors	Respondents (R1-R10)											
	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	Total	Rank
Deforestation	7	6	5	7	6	7	5	6	7	8	64	2
Firewood and charcoal	6	7	5	6	5	7	5	6	6	7	60	3
House construction	2	1	2	1	3	2	3	4	3	2	23	6
Over grazing	6	3	5	6	5	3	4	3	5	3	43	4
Agricultural expansion	7	8	7	6	8	7	7	6	8	7	71	1
Invasive Alien Species	3	4	6	5	3	4	1	3	3	2	34	5

Conclusion and recommendations

The present study confirms that Maji district is endowed with significant medicinal plant diversity and a deep reservoir of associated indigenous knowledge for treating both human and livestock ailments. A total of 113 medicinal plant species belonging to 102 genera and 51 families were documented for treating 51 different human and livestock ailments. Notably, the Asteraceae and Fabaceae families were the most represented among medicinal plants, revealing their wide distribution and adaptability in the region. The predominant use of leaves for medicinal preparations demonstrates a sustainable approach that minimizes the impact on plant populations. Besides, the frequent use of oral administration and the incorporation of additive solvents to enhance efficacy and reduce toxicity suggested deep ethnobotanical knowledge and practices in the Dizi community. The findings revealed that a majority of the medicinal plants are collected from the wild, reflecting limited cultivation efforts and placing substantial pressure on local ecosystems. Furthermore, the study highlighted that traditional knowledge is concentrated among older informants, underscoring the severe risk of its erosion as this generation passes away without adequate transfer to younger community members. The primary threats to medicinal plants in the study area are anthropogenic, led by agricultural expansion, deforestation, and overgrazing. The conservation status of these vital resources is precarious, with current conservation efforts by traditional healers and community members being limited and insufficient to counter the escalating threats. This should include establishing community-managed conservation areas and integrating medicinal plant preservation into local land-use plans. The strong consensus on plants for specific ailments indicates potential efficacy. Therefore, to mitigate the vulnerability of medicinal plants harvested from the wild, governmental and non-governmental organizations should support the cultivation of frequently used and threatened species in home gardens through education, training, and financial resources. Awareness programs should be created to encourage younger generations to learn traditional practices to prevent the loss of indigenous knowledge. Formally recognizing traditional healers would also help validate their expertise and promote knowledge sharing. Additionally, practical conservation interventions are necessary for locally threatened multipurpose medicinal plant trees, specifically *Cordia africana*, *Olea europaea,* and *Prunus africana*. Further phytochemical and pharmacological studies are recommended for the newly identified plants and species with high fidelity and informant consensus, such as *Embelia schimperi* and *Nerophila senegambiensis*, to validate their traditional uses and explore potential for new drug development.

Declarations

List of Abbreviations: Not applicable

Ethical approval and consent to participate: Before data collection, a permission letter was obtained from the Maji district administrative office. Verbal informed consent was obtained from all participants, who were assured of the confidentiality and anonymity of their information. All methods were carried out in accordance with relevant guidelines and regulations.

Consent for publication: Not applicable

Availability of data and material: Not applicable

Competing interests: The authors declare that they have no conflicts of interests

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Appendix 1**.** List of medicinal plants used to treat human and livestock aliments in Maji district

Family	Scientific name	Voucher number	Local name (Dizin)	GF	PU	UC	ROA	Diseases treated	Preparation and application
Acanthaceae	*Dicliptera laxata* C.B.Clarke	GB-001	**xhilzh michi**	H	LF	FS	Topical	Body inflammation	Fresh leaves are crushed and the juice is squeezed on to the affected area or the leaves are boiled to perform fumigation
Acanthaceae	*Thunbergia alata* Bojer ex Sims	GB-002	**shemid**	CL	RT	DR	Oral	Maternal bleeding	Root is crushed dried then ground into powder and mixed with water, then drunk
					RT	DR	Oral	Gonorrhea	Root is crushed dried and ground into powder, then mixed with water drunk.
					Tw	FS	Dermal	wound	Twigs are crushed tied on the wound for 7 days.
Amaryllidaceae	*Allium sativum* L.	GB-003	**shunkurt geydnz**	H	BU	FS	Oral	Stomach ache	The bulb is directly chewed and eaten
					BU	FS	Oral	cough	The bulb is directly chewed and eaten
					BU	FS	Oral	tooth pain	Bulb is chewed and held on teeth for 15 minutes at night until pain relived
Anacardiaceae	*Ozoroa insignis* Delile	GB-004	**gaazn guonu**	T	LF	FS	Dermal	Wound	The fresh leaf is crushed and squeezed or sniff on the wound
					LF	FS	Oral	tooth pain	Fresh leaves is chewed and held between the teeth for 10 minutes at night for 3 days
Apiaceae	*Anthriscus sylvestris* (L.) Hoffm	GB-005	**hiasnsenb**	H	L F	FS	Oral	Pneumonia	Fresh leaf is Crushed then the fluid part is drunk for 3 days
Apiaceae	*Centella asiatica* (L.) Urb.	GB-006	**kintakmat**	H	WP	DR	Anal	Hemorrhoids	The whole plant is crushed and applied on the affected area
Apiaceae	*Coriandrum* sativum L.	GB-007	**silsal**	H	SD	FS	Oral	Pneumonia	The fresh seed is eaten in the morning for 3 consecutive days.
Apiaceae	*Heteromorpha arborescens (*Spreng.) Cham. &Schltdl.	GB-008	**tuginch**	T	BK	FS	Oral	Cough	The bark of root is crushed then mixed with water and drunk before meal
Apiaceae	*Torilis arvensis* (Huds.) Link	GB-009	**qayqaybr**	H	RT	FS	Oral	Tooth pain	Fresh root of this plant is collected chewed and held on teeth for 30 minutes until pain is relived.
Apocynaceae	*Carissa spinarum* L.	GB-010	**niadn**	SH	RT/L F	FS	Oral	Snake bite	Fresh root and leaves are crushed and mixed with water and drunk.
Apocynaceae	*Gomphocarpus physocarpus* E.Mey.	GB-011	**orsdem**	H	LF	FS	Topical	Evil eye	The stem and leaves are collected then boiled in water and undergoing fumigation.
Araceae	*Amorphophallus gallaensis* (Engl.) N. E. Br.	GB-012	**wuunu**	H	TU	FS	Dermal	Wound on cattle foot	The root tuber of the plant is collected and roasted on fire then ground to powder and add on the infected area
Asclepiadaceae	*Periploca linearifolia* Quart.-Dill. & A.Rich.	GB-013	**dabu**	CL	RT	FS	Oral	Snake bite	The fresh root is crushed and mixed with water and drunk

Asparagaceae	*Dracaena steudneri* Engl.	GB-014	**uezi**	T	RT	FS	Oral	Rabies	The root is crushed then dried and ground to powder and mixed with water and drink
					LF	FS	Oral	Leech bites in cattle	The fresh leaves are mixed in with salt and given a cattle to eat.
Asphodelaceae	*Aloe secundiflora* Engl.	GB-015	**botku udu**	H	RT	FS	Topical	Ring worm	Root jelly is applied on the infected part
						FS	Topical	Fire burn	Root jelly is applied on the infected part
Asteraceae	*Acmella caulirhiza* Delile	GB-016	**gutch hhaay**	H	WP	FS	Oral	Tonsillitis	The fresh plant is crushed and the extracted juice is swallowed.
Asteraceae	*Artemisia annua* L.	GB-017	**kerchi**	SH	RT	FS	Oral	Malaria	The root is collected, crushed then dried and soaked in to water and drunk
Asteraceae	*Bidens pilosa* L.	GB-018	**qayqay**	H	LF/SD	DR	Oral	Placental retained	Leaves and seeds are crushed or ground to powder and soaked in water then drunk
Asteraceae	*Synedrella nodiflora* (L.) Gaertn.	GB-019	**hiatdyne**	H	WP	FS	Oral	tonsillitis	The fresh plant is crushed, soaked in water, and drunk.
					WP	FS	Oral	Evil eye	The fresh plant is crushed then soaked in water and drunk.
Asteraceae	*Afrocarduus leptacanthus* (Fresen.) N.Garcia, Moreyra & Susanna.	GB-020	**aru kalku**	H	BK	FS	Oral	Liver disease	Root bark is collected, crushed then simmered in chicken soup and consumed.
Asteraceae	*Erigeron bonariensis* L.	GB-021	**kushrakr**	H	LF	FS/DR	Oral	Evil eye	The Leaves are crushed then dried and mixed with crushed dried leaves of *Plantago lanceolata* then the mixture is steeped in water and drunk for 3-4 days
Asteraceae	*Galinsoga parviflora* Cav.	GB-022	**tobur**	H	WP	FS	Dermal	Wound/cut place	The plant is collected, crushed and the fluid is applied on the cut place/wounded area.
Asteraceae	*Guizotia scabra* (Vis.) Chiov.	GB-023	**kialdu**	H	LF	FS/DR	Oral	Gastritis Bronchitis	Leaves are collected, crushed fresh/dried and mixed with hot tea or coffee then drunk.
Asteraceae	*Gutenbergia cordifolia* Benth. ex Oliv.	GB-024	**zulzuakr**	H	LF	FS	Topical	Pancreas problem	Fresh leaves are crushed and applied topically on the area where pain exists.
Asteraceae	*Pentanema confertiflorum* (A.Rich.) D.Gut.Larr., Santos-Vicente, Anderb., E.Rico & M.M.Mart.Ort.	GB-025	**nuchu dambu**	H	LF	FS	Topical	Body inflammation	Fresh leaves are collected and boiled then undergoing fumigation.
Asteraceae	*Nuriaea engleriana* (O. Hoffm.) Susanna, Calleja & Moreyra	GB-026	**kalku**	H	LF	FS/DR	Oral	Rabies	The Fresh or dried leaves are crushed then soaked with water and drunk.
					LF	FS	Dermal	tetanus	Fresh leaves are crushed and fluid is applied on the affected area

Asteraceae	*Vernonia amygdalina* Del.	GB-027	**kwikŋ**	SH	LF	FS	Oral	Placental retained in livestock	The fresh leaf is boiled in water and given the cattle to drink
Asteraceae	*Vernonia auriculifera* Hiern	GB-028	**gaaru**	SH	RT/LF	FS	Oral	Tooth pain	Fresh root is chewed and hold in teeth
						FS	Oral	internal diseases of cattle	The fresh leaf is boiled in water and given the cattle to drink
Asteraceae	*Vernonia leopoldi* (Sch.Bip. ex Walp.) Vatke	GB-029	**dolgu**	SH	LF	FS	Oral	Malaria	Fresh leaves are collected crushed and soaked with water and drunk for 3 days.
Basellaceae	*Basella alba* L.	GB-030	**aamu**	H	LF	FS	Oral	Constipation	Stem and leaves of this plant is cooked and eaten as cabbage.
Boraginaceae	*Cordia africana* Lam.	GB-031	**abshi**	T	LF	FS	Dermal	Wound	Fresh leaves are crushed and gently applied on the wound
Boraginaceae	*Cynoglossum lanceolatum* Forssk.	GB-032	**zuniqayqay**	H	LF	DR	Oral	Evil eye	Fresh leaves are crushed and mixed with water then drunk
Capparaceae	*Boscia mossambicensis* Klotzsch	GB-033	**akabrich**	SH	BK	DR	Oral	Rabies	The bark is dried and ground to powder then soaked in water and drunk in the morning for 5 days.
Capparaceae	*Ritchiea albersii* Gilg	GB-034	**gorkn**	T	BK/Tw	DR	Oral	Malaria	Root bark and twigs are collected crushed, dried and ground in to powder then mixed with water and drunk at night for three day.
Capparaceae	*Capparis micrantha* A.Rich	GB-035	**zelm**	SH	LF	FS	Ocular	Eye diseases /xsidu	The fresh leaves is crushed and dried then ground powder and the powder is applied on the eye usually at night for 3 consecutive days
Caricaceae	*Carica papaya* L.	GB-036	**papayi**	T	SD	FS	Oral	Malaria	Seed of the plant is dried then ground to powder and powdered is mixed with tea then drunk
Caryophyllaceae	*Drymaria cordata* (L.)Willd ex Schult.	GB-037	**yarmbaabzin**	H	WP	FS	Oral	Pneumonia	The plant is harvested, crushed and mixed with water then drunk
Celastraceae	*Gymnosporia senegalensis* (Lam.) Loes.	GB-038	**tsutsu**	SH	BK	FS	Oral	Stabbing chest pain	The bark of the plant is collected and crushed and mixed with water then drunk.
Commelinaceae	*Commelina benghalensis L.*	GB-039	**zuobu**	H	SP	FS	Topical	Ring worm	The sap/juice is Rubbed directly on the affected area until full recovery is achieved.
Convolvulaceae	*Cuscuta campestris* Yunck.	GB-040	**tsirgn**	H	WP	FS	Anal	Hemorrhoids	The plant is harvested, crushed and tied/attached on the affected area at night
Crassulaceae	*Kalanchoe densiflora* Rolfe	GB-041	**qərdi**	H	SP	FS	Topical	Ring worm	The sap of the plant is applied on the affected part
Cucurbitaceae	*Cucurbita pepo* L.	GB-042	**botu**	H	SD	FS	Oral	Intestinal worm	The seed of the plant is first cooked and chewed then eaten.

Cucurbitaceae	*Momordica Foetida* Schumach.	GB-043	**kildkichks**	CL	WP	FS	Dermal	Wound	Fresh plant is crushed then Squeezed on the affected area.
Dioscoreaceae	*Dioscorea alata* L.	GB-044	**kechi**	H	TU	FS	Oral	Blood pressure	The fresh tuber is cooked and eaten
Dioscoreaceae	*Dioscorea Schimperiana* Hochst. ex Kunth	GB-045	**yagd**	CL	RT	FS	Oral	Liver disease	The fresh root is crushed and mixed with water and drunk
Euphorbiaceae	*Croton macrostachyus* Hochst. ex Delile	GB-046	**weshi**	T	BK	FS	Oral	Malaria	The fresh bark is crushed and mixed with water then drunk
Euphorbiaceae	*Euphorbia ampliphylla* Pax	GB-047	**dangar**	T	SP	FS	Topical	warts	Plant is cut and the sap is directly applied on the warts until the affected area is fully recovered.
Euphorbiaceae	*Euphorbia hirta* L.	GB-048	**kusumbay**	H	LF	FS	Nasal	Stabbing chest pain	Fresh leaf is crushed and smelled
Euphorbiaceae	*Ricinus communis* L.	GB-049	**bolu**	SH	SD	DR	Dermal	Wound	The seed is roasted, ground and mixed with honey and applied on the wound.
Fabaceae	*Crotalaria incana* L.	GB-050	**kuri hheytr**	H	LF	FS	Oral	Rabies	The leaves is crushed then dried, ground into powder and mixed with tea /coffee and then drunk.
Fabaceae	*Erythrina Brucei* Schweinf.	GB-051	**kiebu**	T	BK	FS	Oral	Fever of cattle	Fresh bark of the plant is collected crushed and mixed with salt and given the cattle to eat.
					BK	Dry	Oral	Rabies	The bark is dried then ground into powder and soaked with water then drunk.
Fabaceae	*Indigofera binderi* Kotschy	GB-052	**xhobtaku**	SH	L F	FS	Topical	Warts	Fresh leaves are crushed and tied/attached on the crushed leaf on the affected area.
Fabaceae	*Indigofera spicata* Forssk.	GB-053	**kuchaku**	SH	LF	FS	Topical	Insect bite /kuchkuf/	Fresh leaf is crushed and topically tied on the swelled body part.
Fabaceae	*Indigofera tinctoria* L.	GB-054	**bietsu**	SH	RT/LF	DR	Oral	Liver disease	Roots and leaves are collected crushed dry and ground in to powder then mixed water then drunk
					RT/LF	DR	Oral	Maternal bleeding	Roots, leaves are crushed, dried and ground into powder then mixed with water and drunk at night for 3 days
					RT/LF	DR	oral	Vomiting	Both roots and leaves are harvested, crushed, dried and ground into powder then mixed with water and drunk for 5 days before meal.
					RT/LF	DR	Oral	diarrhea	Roots and leaves are collected, mixed, crushed, dried and ground to powder then mixed with water and drunk for 5 days before meal.
Fabaceae	*Senna occidentalis* (L.) Link	GB-055	**tugiheri**	SH	LF	FS	Oral	Snake bite	The fresh leaves are chewed and the juice is swallowed.

Fabaceae	*Senna septemtrionalis* (Viv.) H.S.Irwin & Barneby.	GB-056	**kiyanuheri**	SH	LF	FS	Topical	Spider poison	The Fresh leaves are crushed and Squeezed on the affected area repeatedly until the affected area is recovered
Fabaceae	*Vachellia farnesiana* (L.) Wight & Arn.	GB-057	**hhaay bietsu**	SH	LF	DR	Ocular	Eye diseases /xsidu	Leaves of this plants are crushed, dried and ground into powdered and the powder is applied on eye at night until the pain recovered.
Fabaceae	*Vicia fava* L.	GB-058	**baqil**	H	SD	FS	Topical	lymphadenitis	The seed of the plant is Grind and the powder paint on swelled part.
Geraniaceae	*Geranium arabicum* Forssk.	GB-059	**matntsubz**	H	LF	FS	Nasal	headache	Fresh leaves are crushed and smelled
Lamiaceae	*Rotheca myricoides (*Hochst.) Steane &Mabb.	GB-060	**mulmuzu**	CL	LF	FS	Dermal	Warts	The fresh leaves are crushed and Squeezed or sniffed on the infected area.
Lamiaceae	*Leucas deflexa* Hook.f.	GB-061	**tsutsubayn**	H	LF	FS/ DR	Oral	Evil eye	Leaves are collected then crushed either fresh dry or dried and soaked in water then drunk.
Lamiaceae	*Mentha aquatica* L.	GB-062	**xsirgibziib**	H	LF	FS	Oral	Diarrhea	Fresh leaves are crushed and mixed with water then drunk
					LF	FS	Nasa	Rheumatism	The fresh leaves are crushes and smelled in the morning for three days.
Lamiaceae	*Mentha pulegium* L.	GB-063	**dadugedn**	H	LF	FS	Topical	Polymyositis/ dadugednkin/	The plant leaves are collected then boiled in water and undergoing fumigation at night for 3 days.
Lamiaceae	*Mentha spicata* L.	GB-064	**gartz ziib**	H	LF	FS	Dermal	Cut place	Fresh leaves are crushed and Squeezed on the cut place.
Lamiaceae	*Ocimum lamiifolium* Hochst. ex Benth.	GB-065	**michi ziibu**	SH	LF	FS	Topical	Febrile illness/ MICHI	The fresh leaves are crushed then Squeezed on the whole body for 2-3 days.
Lamiaceae	*Salvia nilotica* Juss. ex Jacq.	GB-066	**yeltkimichz**	H	LF	FS	Topical	itch scabies	The fresh leaves are harvested, crushed and Squeezed on the affected area.
Malvaceae	*Abelmoschus esculentus* (L.) Moench	GB-067	**shubshuyi**	H	LF	DR	Oral	Malaria	Leaves are collected then crushed dried and mixed with water and drunk
Malvaceae	*Adansonia digitata* L.	GB-068	**alekela**	T	LF	FS	Dermal	Wound	The fresh leaves are crushed and Squeezed on the wound.
Malvaceae	*Hibiscus calyphyllus* Cav.	GB-069	**kasmhareg**	SH	LF	FS	Topical	Placental retained	The fresh leaves are collected then boiled in water to perform fumigation.
					LF	FS	Dermal	wound	Fresh leaves are crushed and Squeezed on the affected area.
Malvaceae	*Pavonia burchellii* (DC.) R.A. Dyer	GB-070	**dawork**	SH	LF	FS	Topical/ Oral	Polymyositis (dadugednkin)	The plant leaves are collected then boiled in water and undergoing fumigation; then the remaining liquid is drunk at night for 3 consecutive days.

Malvaceae	*Pavonia urens* Cav.	GB-071	**kasmiakz**	SH	RT/ TW	FS/ DR	Oral	Kidney pain	Roots and twigs are collected crushed then dried then mixed with water and drunk
					RT/ Tw	FS	Dermal	Wound	Fresh leaves are crushed and applied directly on the wound.
Malvaceae	*Sida acuta* Burm.f.	GB0-72	**xhurshin**	SH	WP	FS	Oral	Constipation in livestock	The plant is harvested, crushed then mixed with salt and water given the cattle to eat.
					WP		Derma	wound	The wound is washed with the crushed plant part.
Malvaceae	*Sida cordifolia* L.	GB0-73	**kasmyaasz**	H	LF	FS	Oral	Constipation	Fresh leaves are crushed and mixed with little water and drunk
					SP	FS	Topical	Ring worm	The sap is gently applied on the infected area.
Malvaceae	*Urena lobata* L.	GB-074	**kassm iakz**	SH	LF	FS	Oral	Evil eye	Fresh Leaf is crushed then and mixed with water and drunk
					LF	FS	Dermal	dandruff	Fresh leaves are crushed and squeezed on the infected area.
Melastomataceae	*Nerophila senegambiensis* (Guill. & Perr.) Ver.-Lib. & R.D.Stone	GB-075	**tsukunudzii**	H	LF	DR	Oral	Snake bite	Fresh or dried leaves of the plant is crushed and mixed with water and drunk.
					LF	FR	Dermal	wound	Fresh leaves are crushed then Squeezed on the wound.
					LF	FR	Oral	Evil eye	Fresh leaves of the plant is crushed and mixed with water and drunk
Meliaceae	*Ekebergia capensis* Sparrm.	GB-076	**diemu**	T	BK	DR	Oral	Gastritis	The bark is harvested, dried, ground into tiny powder and soaked in water and drunk.
Meliaceae	*Lepidotrichilia volkensii (*Gürke) J.-F.Leroy	GB-077	**diequ**	T	FT	FS	Oral	Stomach ache	The fresh fruit is collected and eaten
Menispermaceae	*Cissampelos pareira* L.	GB-078	**guytki shemd**	CL	RT	DR	Oral	12 types Snake bite	The root is collected, crushed either fresh or dried and mixed with coffee and drunk.
Moraceae	*Ficus laurifolia Lam.*	GB-079	**oshku**	T	LF	FS	Topical	Warts	The sap is gently applied to the affected area until the wart is completely removed.
Moringaceae	*Moringa stenopetala* (Baker f.) Cufod.	GB-080	**alaqo**	T	LF	FS	Oral	Diabetes	Fresh leaves are cooked and eaten.
Myrtaceae	*Eucalyptus globulus* Labill.	GB-081	**barziabgeyd n**	T	LF/S D	FS	Nasal	Common cold	Fresh leaves are crushed then smelled.
					LF/S D		Oral	stomachache	Seeds are ground into powder, then added in to hot coffee or tea and drunk
Oleaceae	*Olea europaea* subsp. *cuspidata* (Wall. ex G.Don) Cif.	GB-082	**orsu**	T	BK	FS/ DR	Ora	Malaria	The fresh or dry bark part is crushed or ground and mixed with water and drunk
					BK	FS/ DR	Oral	abdominal pain	Fresh bark is crushed and mixed with water then drunk

						FS/ DR	Ora	Bone fracture	Fresh bark is crushed and mixed with water then drunk at night for consecutive days until pain recovered
Peraceae	*Clutia abyssinica* Jaub. & Spach	GB-083	**tiartiar**	SH	LF	FS	Topical	Lymphadenitis	Fresh leaves are crushed and Squeezed or sniffed on the affected area.
					LF	DR	Oral	Intestinal worms	Fresh leaves are crushed then mixed with water and drunk or it can be dried ground into powder then mixed with water and drunk.
Phyllanthaceae	*Bridelia micrantha* (Hochst.) Baill.	GB-084	**echim**	T	LF	FS	Auricular	Ear bleeding	Fresh leaf is crushed and the fluid is gently applied on to the infected part
Phytolaccaceae	*Phytolacca dodecandra* L'Hér.	GB-085	**sholshn**	SH	RT	DR	Oral	Gonorrhea	The root is collected ,dried, ground into powder then mixed with water and drunk
					BK	DR	Oral	malaria	The root is collected ,dried, ground in to powder then mixed with water and drunk
					RT	DR	Oral	liver diseases	The root is collected ,dried ,ground into powder then mixed with water and drunk
Piperaceae	*Peperomia tetraphylla* (G.Forst.) Hook. & Arn.	GB-086	**Qerdi**	H	WP	FS	Oral	Liver diseases	Fresh of this plant is crushed and mixed with water and drunk in the morning for 3-4 days.
Piperaceae	*Piper capense* L.f.	GB-087	**kolbuxhialu**	CL	SD	FS	Oral	Stomach ache	The seed are chewed and eaten
Pittosporaceae	*Pittosporum viridiflorum* Sims	GB-088	**botkuxhiali**	T	BK		Oral	Malaria	The bark of the stem part is removed, crushed, and then mixed with water and drunk.
Plantaginaceae	*Plantago lanceolata* L.	GB-089	**aabziibu**	H	LF	DR	Oral	Evil eye	Leaves are crushed, dried then mixed with water drunk for 3-4 days
Polygonaceae	*Persicaria lapathifolia* (L.) Delarbre	GB-090	**wurgitsikiaki maamu**	H	RT	DR	Oral	Evil eye	The root bark is collected the crushed then mixed with coffee and drunk.
Polygonaceae	*Polygonum aviculare* L.	GB-091	**xhuadnziib**	H	WP	FS	Oral	Stabbing chest	The plant is collected, crushed and smelled for consecutive days until the stabbing stop.
Polygonaceae	*Rumex abyssinicus* Jacq.	GB-092	**cholu**	H	RT	FS	Oral	Liver diseases	Fresh root is collected and chewed in the morning for 2-3 days.
Polygonaceae	*Rumex nepalensis* Spreng.	GB-093	**qayqatsub**	H	LF	FS	Oral	Rheumatism	Fresh leaves are crushed and mixed with tea and drunk
					LF	FS	Oral	tonsillitis	Fresh leaves are crushed and mixed with tea and drunk.
					LF	FS	Oral	tooth pain	Fresh leaves are chewed and hold on tooth.
Primulaceae	*Embelia schimperi* Vatke	GB-094	**meding**	CL	FT	FS	Oral	Intestinal worms	The fruit is directly eaten.
Ranunculaceae	*Clematis hirsuta* Guill. & Perr.	GB- 095	**gutkimul**	CL	LF	FS	Topical	Warts	Fresh leaves are crushed and Squeezed on the wart area.
Ranunculaceae	*Ranunculus multifidus* Forssk.	GB-096	**hiasnziibu**	H	WP	FS	Nasal	Cough	The plant is harvested, crushed and smelled.

Rhamnaceae	*Rhamnus prinoides* L'Hér.	GB-097	**belbonku**	SH	LF	FS	Oral	Tonsillitis	Fresh leaves are collected chewed and Swallowed until the tonsillitis is healed.
Rosaceae	*Prunus africana* (Hook.f.) Kalkman	GB-098	**okum**	T	LF	FS/ DR	Oral	Snake bite	Fresh leaves are crushed or leaves can be dried and ground into powder then mixed with water and drunk.
					LF	FR/ DR	Oral	Rabies	Fresh leaves are crushed or leaves can be dried and ground into powder then mixed with water and drunk
Rubiaceae	*Coffea arabica* L.	GB-099	**giyanu**	SH	SD	DR	Dermal	Wound	The seed of coffee is roast and ground mix with honey then attached on the wound.
Rubiaceae	*Gardenia ternifolia Schumach. & Thonn.*	GB-100	**gembl**	T	FT / BK	FS	Oral	Malaria	Both the fruit and root bark are crushed and soaked in water then the fluid is filtered and drunk.
Rubiaceae	*Mussaenda arcuata* Poir.	GB-101	**qal hurxsi**	T T SH	FT	FS	Oral	Malaria	The fruit is cooked then crushed and mixed with water and consumed.
					FT	FS	Oral	abdominal pain	The fruit is cooked and directly eaten.
Rubiaceae	*Oldenlandia corymbosa* L.	GB-102	**Zingnazing**	H	WP	FS	Topical	Evil eye	The plant is crushed and Squeezed or sniffed on all body parts at night for 3 consecutive days.
Rubiaceae	*Pentas lanceolata* (Forssk.) Deflers	GB-103	**tsodgakr**	SH	RT/	FS/	Oral	Snake bites	Fresh or dried root and leaf are crushed or ground into powder and mixed with water and drunk.
					LF/RT	FS	Oral	sexual impotence	Fresh roots and leaves are crushed and mixed with water and drunk for consecutive days at night until recovered.
					LF/RT	FS	Oral	bone fracture	Fresh root and leaves are crushed and mixed with water and drunk for consecutive days at night until recover.
					LF	FS	Oral	Diarrhea	Fresh leaves are crushed then mixed with water and drunk before breakfast.
Rutaceae	. *Ruta graveolens* L.	GB-104	**xededem**	SH	LF/ SD	FS	Oral/ Topical	Stomachache	Fresh leaves and seeds are chewed and eaten
					LF/ SD	FS	Topical	Evil eye	Fresh leaves and seeds are crushed then Squeezed on children's face to protect from evil eye
Solanaceae	*Datura stramonium* L. .	GB-105	**yəltkibolu**	H	RT	DR	Oral	Tooth pain	Fresh root is chewed and held on teeth in the morning for 3 days
Solanaceae	*Nicotiana tabacum* L. .	GB-106	**dambu**	H	LF	FS	Dermal	wound in cattle	Fresh leaves is crushed then squeezed on the wound.
					LF	FS	Oral	Fever in cattle	Fresh leaves are crushed then mixed with water and given for cattle to drink

Thymelaeaceae	*Lasiosiphon involucratus (*Steud. ex A.Rich.) Olaniyan	GB-107	**kebi bialsu**	SH	RT	FS	Oral	Gonorrhea	The root bark is collected ,then crushed both dry and fresh can be mixed with water and drunk for 2-3 days at night
Urticaceae	*Girardinia diversifolia* (Link) Friis. .	GB-108	**diəmadəm**	H	RT	DR	Oral	Rabies	The root is crushed, dried, ground to powder then mixed with water and drunk in the morning before brake fast for 7 days
Urticaceae	*Pouzolzia parasitica* (Forssk.) Schweinf.	GB-109	**kayziakr**	H	RT	FS	Oral	Diarrhea	Fresh or dry root part is crushed mixed with water then drink or the fresh root can be chewed and eaten
Verbenaceae	*Premna schimperi* Engl.	GB-110	**xiads**	SH	LF	DR	Dermal	Wound	The leaves are collected, dried, ground in to powder then applied on the wound or infected part
					LF	DR	Dermal	Worm on cattle foot	The leaves are collected, dried, ground in to powder then applied on the infected part of the foot
					LF	DR	Ocular	eye diseases	The leaves are collected, dried, ground in to powder then applied on the eye at night for 2-3 days
Verbenaceae	*Verbena officinalis* L	GB-111	**demsqayqay**	H	RT	FS	Oral	Stomachache	Fresh root is Chewed and swallowed
Zingiberaceae	*Aframomum corrorima* (A.Braun) P.C.M.Jansen	GB-112	**korerem**	H	SD	FS	Oral	Stomachache	The fresh seed is chewed and eaten/swallowed.
Zingiberaceae	*Zingiber officinale* Roscoe	GB-113	**golxhialu**	H	RZ	FS	Oral	Stomach ache	Fresh rhizome is chewed and eaten
					RZ	FS	oral	tooth pain	Fresh rhizome is chewed and hold on teeth.

Key: GB =Girma Boz, **GF**= Growth form (**T**=Tree, **SH**=Shrub, **H**=Herb, **Cl**=Climber), **PU**=Parts Used (**LF**=Leaf, **RT**=Root, **BK**=Bark, **FR**=Fruit, **SD**=Seed, **TW**=Twigs, **SP**=Sap, **BU**=Bulb, **WP**=Whole part, **RZ**=Rhizome, **TB**=Tuber) **RoA**=Route of Administration, **UC**= Use Condition (**FS**=Fresh, **DR**=Dry)