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Traditionally used medicinal plants for human ailments and their threats in Guraferda District, Benchi-Sheko zone, Southwest Ethiopia

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Abstract

Background The field of traditional medicine encompasses a wide range of knowledge, skills, and practices that are deeply rooted in the theories, beliefs, and experiences of different cultures. The research aimed to identify traditional medicinal plants used in Guraferda District and assess the threats they face.

Method A total of 96 individuals, 80 males and 16 females, were interviewed to gather ethnobotanical data. Statistical tests like independent *t* tests, ANOVA, correlation, and regression were conducted using R software version 4.3.2 to compare informant groups.

Result The study found 81 medicinal plant species in the district from 71 genera and 38 families, with Asteraceae and Solanaceae families having the most species. Leaves were the most commonly used plant part for medicine. Significant differences in plant knowledge were observed across genders, age groups, education levels, and experiences. The highest ICF value was for Dermal and Cutaneous ailments, and *Cissampelos mucronata* A. Rich and *Bidens pilosa* L. had the highest fidelity levels.

Conclusion The study highlighted the importance of traditional medicinal plants in treating ailments but noted threats like overharvesting, habitat destruction, and climate change. Conservation efforts and sustainable harvesting practices are crucial to ensure the availability of these plants for future generations. Further research is needed to explore their potential for modern medicine and develop sustainable use strategies.

Keywords Guraferda, Ethnobotany, Threats, Human, Traditional medicinal plants

Background

Traditional medicine encompasses a wide range of knowledge, skills, and practices that are based on the theories, beliefs, and experiences of diverse cultures [1]. Traditional medicinal plants have been a fundamental

part of healthcare systems in many societies worldwide, with a history that may span over 4000 years, as noted by [2, 3]. Medicinal plants serve as the primary source of healthcare for around 80% of the population in developing countries globally [4, 5]. In Africa, plants have played a crucial role in treating a wide range of human ailments within indigenous communities, including traditional healers and herbalists [6, 7].

In Ethiopia, traditional herbal remedies have been utilized for generations to address a variety of human health issues. This practice is rooted in cultural acceptance,

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affordability, cost-effectiveness, and accessibility. In many regions where modern healthcare services are scarce, rural communities heavily depend on traditional medicine as their main form of healthcare. The transmission of traditional knowledge typically occurs orally, with practitioners playing a vital role in passing down this valuable medicinal wisdom [8]. It is estimated that the country is home to a diverse array of approximately 6000 to 7000 higher plant species, with around 12% of these species being unique to the region. Over 800 plant species are utilized in Ethiopia for treating diverse ailments. TMPs use is common in both rural and urban areas, with people seeking these remedies alongside modern healthcare. Nearly 80% of the Ethiopian population depends on home remedies, and a significant majority of about 95% is derived from botanical sources [9].

The southwest forests of Ethiopia boast rich plant diversity, with 63% of the region's dense forests dedicated to preserving medicinal plants out of the country's 7000 species. These plants play a vital role in traditional medicine, addressing various health concerns in humans, as noted by [2, 10]. However, the extensive knowledge of medicinal plants is under severe threat due to deforestation, environmental degradation, and population growth. These factors are endangering the country's forests, which are a crucial source of medicinal plants, leading to the loss of traditional knowledge.

Similar to other regions in Ethiopia, the inhabitants of Guraferda District have their own traditional methods for self-care. Moreover, the ecological makeup of Guraferda District encompasses highlands, midlands, and lowlands. Given this diverse ecological landscape, it is expected that the variety and traditional uses of medicinal plant species are more pronounced in this area.

The Guraferda District is encountering challenges to its traditional medicinal plants and indigenous knowledge, including expansion of agriculture, excessive harvesting, deforestation, modernization, and the introduction of invasive alien species. Therefore, conducting a comprehensive ethnobotanical study in Guraferda District is crucial to document and analyze the traditional knowledge and practices of the local people concerning medicinal plants for treating human illnesses, thereby contributing to the conservation and utilization of biodiversity. Furthermore, comparing the findings of this study with the Ethiopian ethnobotanical medicinal plant database will offer valuable insights into the regional distribution and utilization of medicinal plants, enhancing our understanding of Ethiopia's significant traditional plant-based healthcare system. With this in mind, the current study aims to gather, identify, and document medicinal plants and the associated indigenous knowledge used by local people to treat various human ailments in the study area.

Additionally, it seeks to identify threats to medicinal plants and conservation practices while selecting medicinal plant species with high informant consensus and fidelity level values for future phytochemical analyses.

Materials and methods

Description of the study area

The research was conducted in the Guraferda District, situated in the Benchi-Sheko Zone of Southwest Ethiopia, approximately 602 km southwest of Addis Ababa and 42 km from Mizan Teferi. Geographically located between latitude 6°51'24.6''N and longitude 35°20'02.1''E, with an altitude range of 500–2500 m, the district spans 2565.42 km² and includes 32 kebeles and an administrative town named Biftu. The estimated population from 2014 to 2017 is 43,137, with 23,473 males and 19,664 females, predominantly residing in rural areas [11]. The 2023 report from the Guraferda District Health Office highlights several prevalent ailments in the district, including febrile illness, wounds, malaria, tonsillitis, and typhoid. However, the provision of healthcare services in rural areas of the district is insufficient. The report identifies a shortage of healthcare clinics, hospitals, medical equipment, reagents, tablets, skilled healthcare professionals, and logistical support as the main reasons for this deficiency (Fig. 1).

Climate

In the Guraferda District, the agro ecosystems comprise of predominantly lowland (wet qolla) areas, accounting for 78% of the total area, while the midland (Woynadaga) areas make up the remaining 22%. The mean yearly temperature of the region is 21.1 °C, while the average annual precipitation is approximately 1974 mm (Fig. 2).

Research methods

Reconnaissance survey

A preliminary investigation was carried out between September 12 and 29, 2023, in order to acquire data and develop a cognitive representation of the kebeles landscape that would be sampled. The individuals involved were identified, and a suitable timeframe for data collection was established. Approaches for gathering and arranging information relating to the existing TMPK were identified upon.

Research design

The research methodology employed in this study encompassed a cross-sectional design, which effectively combined qualitative data in a non-numerical format, specifically in the form of images, with quantitative data that were presented using descriptive and inferential statistics.

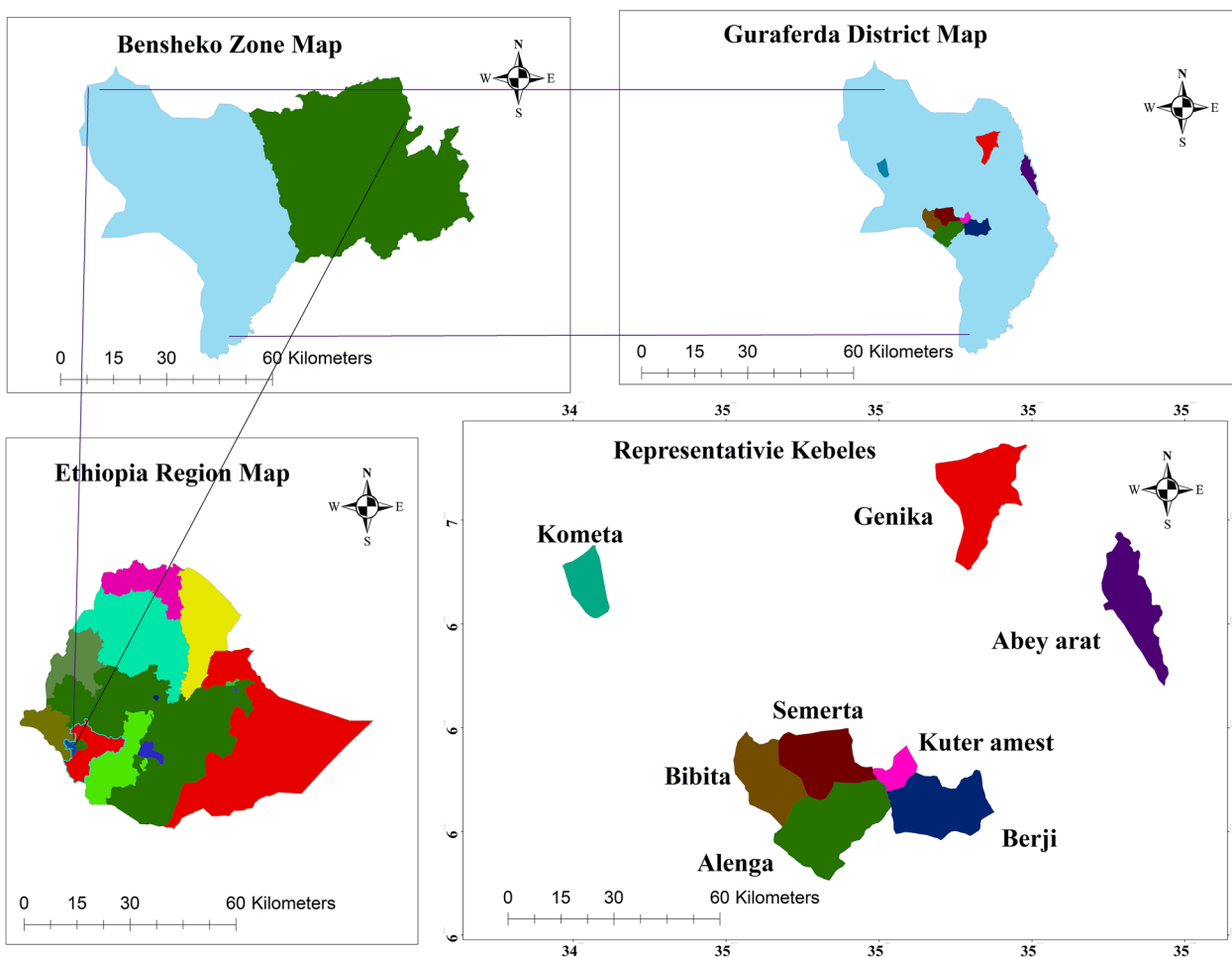


Fig. 1 Map of study site (generated by ArcGIS 10.4.1)

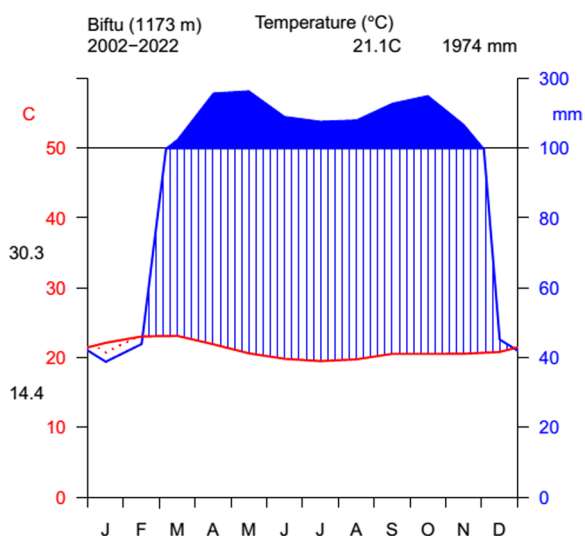


Fig. 2 The climate diagram of Biftu town illustrates the distribution of rainfall and variation in temperature over the period of 2002 to 2022

Study site and informant selection

The study sites and informants were selected through information gathered from various sources like the Guraferda District administration, health, and agricultural offices, as well as local residents. This ensured a comprehensive understanding of the area. Eight kebeles (Table 1) were chosen based on factors like proximity to Biftu, healer presence, infrastructure, and security concerns [2, 11]. A total of 96 informants, aged 18 to 80, were interviewed during the study. Twelve individuals were selected from each of the eight kebeles. Thirty-two key informants were chosen through purposive sampling based on recommendations, while 64 general informants were selected through snowball sampling from the local population in the study area as proposed by [12]. The study included participants aged 18–80, categorized into young adults (18–30), middle-aged (31–55), and elderly (56–80) groups [13]. The focus was on individuals under 30 to investigate knowledge transfer on medicinal plants between generations [14].

Table 1 Altitude, Latitude, Longitude, Easting and Northing of Selected Sample Kebeles

Name of Kebeles	Altitude (m)	Latitude (N,S)	Longitude (E,W)	Decimal degree	Northing & Easting
Abey arat	1030	6°56′20.3″N	35°22′26.3″E	6.938983, 35.373967	762314E 767660N
Semerta	1053	6°50′29.5″N	35°09′30.0″E	6.841533, 35.158332	738525E 756766N
Kometa	1078	6°56′41.9″N	35°04′26.2″E	6.944977, 35.073937	729144E 768168N
Kuter amist	1090	6°49′48.2″N	35°12′10.8″E	6.830047, 35.203011	743470E 755518N
Genika	1244	7°01′05.5″N	35°16′13.9″E	7.018193, 35.270528	720946E, 774219N
Alenga	1340	6°47′57.6″N	35°09′24.8″E	6.799335, 35.156895	738387E 752098N
Berji	1361	6°48′22.6″N	35°13′52.5″E	6.806274, 35.231353	746616E 752903N
Bibita	1688	6°50′19.7″N	35°07′23.0″E	6.838806, 35.123067	734627E 756447N

Source: Google earth map

Methods of ethnobotanical data collection

Ethnobotanical surveys were conducted in selected kebeles within Guraferda District to gather information on traditional medicinal plants. The data collection process continued until no new information on new medicinal plants emerged. In order to obtain the required information, interviews were conducted with local healers, community members, and traditional medicine practitioners using the following methods.

Semi-structured interview

Semi-structured interviews were conducted in the local languages of Sheko, Meinit, Benchi, Wolyita, Amharic, Oromiffa, Kaffa, and Sidamo with the help of a translator. Participants shared personal details and information on medicinal plants, including indigenous names, usage, habitats, availability, preparation, dosage, and administration. Interviews also covered plant conservation, additional ingredients in remedies, side effects, antidotes, knowledge sources, and knowledge transfer methods. Traditional healers were asked about their practice duration and compensation. The goal was to document medicinal plant whereabouts, threats, conservation practices, comprehensive uses, and non-medicinal applications. This approach was influenced by [12, 15].

Group discussion

To gather community-level information on traditional medicinal plants (TMPs), focus group discussions were held in each kebele with an average of five participants per group. Excluding the 96 previously selected

informants, topics covered included TMP knowledge, threats, conservation, modernization impact, and commercialization. Discussions were open and interactive, allowing free expression of opinions.

Field observation

Field observations were carried out to facilitate extensive communication with individual informants, allowing for the identification and collection of medicinal plants that are traditionally utilized in their natural environment.

Guided field walk

Proper field guides were consulted for guided field walks in accessible yet potentially hazardous sites. Selection was based on participants' navigation skills and knowledge of local plant species. During walks, sensory experiences like visual observations and interactions with traditional healers aided in identifying medicinal plants. Voucher specimens were collected using digital photography in various settings.

Market survey

A market survey in the District covered five major markets to assess the marketability of traditional medicinal plants (TMPs). Data on availability, price, and units were collected and analyzed to determine usage and revenue potential. Samples of TMP vouchers were collected with local assistance. Verbal interviews with market stakeholders provided insights on marketing practices, cultivation, availability, threats, prices, and economic value [16].

Plant collection, identification, and herbarium preparation

Data were collected from November 2023 to January 2024 with informant's assistance. Plant species were collected with respondent assistance, and a medicinal plant inventory was compiled with local names and photographs. Information on remedies was gathered from traditional medicine practitioners and informants through semi-structured interviews. Plant collection involved assigning local names, pressing, drying, and mounting specimens as noted by [14]. Fruit and seed preservation involved envelopes and plant presses. Identification was done in the field and at Mizan-Tepi University using taxonomic keys and online tools. Voucher specimens were preserved in the university's herbarium for future reference.

Data analysis

The field data were collected, compiled, categorized, and documented, including local and scientific plant names, families, life forms, parts used, and habitats in Microsoft Word 2019. The analysis utilized frequency tools like pie charts, bar graphs, and tables. Descriptive statistics (mean and standard deviation) were calculated using R program version 4.3.2. Normality was assessed with Shapiro–Wilk test before t test. An independent t test examined gender disparities in TMPK based on reported plants. Another t test explored knowledge variations among education levels and healing experiences. ANOVA assessed knowledge differences by age groups. Linear regression and Pearson correlation analyzed the relationship between age and reported plants [18].

Quantitative analysis of ethnobotanical data

Ethnobotanical data analysis was conducted by employing the R software version 4.3.2, in conjunction with manual formulation.

Plant part value (PPV)

The plant part value calculation presents the percentage of plant parts like stems, leaves, roots, fruits, bark, and flowers used for biopharmaceutical purposes, following the methodology by [17], and it is computed in the following manner:

$$PPV(\%) = \frac{\sum RU_{(\text{plant part})}}{\sum RU} \times 100$$

where $\sum RU_{(\text{plant part})}$ represents the sum of the cited plant parts and $\sum RU$ represents the total number of cited uses for a given plant.

Preference ranking

A study was carried out to determine the preference order of TMPs for treating human and domestic animal ailments, using data collected from ten key informants. Medicinal plants were evaluated and ranked according to their effectiveness using scores. Similarly, a preference ranking of threatening factors impacting TMPs was established by randomly selecting 10 key informants as outlined by [16].

Direct matrix ranking

The direct matrix ranking was conducted in order to compare multipurpose MPs commonly reported by informants following Cotton (1996). Based on the relative benefits obtained from each plant, five multipurpose MPs were selected out of the total medicinal plants and seven use categories of these plants were listed. Five key informants were chosen to assign use values to each attribute (5=best, 4=very good, 3=good, 2=less used, 1=least used, and 0=not used). Using the information provided by the informants, the average value of each use-diversity for a species was calculated, and the values for each species were then summed up and ranked accordingly [12, 16, 18].

Informant consensus factor (ICF)

The ICF study identified key human ailments in the district and potential medicinal plants for treatment. Traditional remedies were categorized into ten groups. The ICF formula is:

$$ICF = \frac{Nur - Nt}{Nur - 1}$$

where Nur = number of use reports from informants for a particular plant-use category; Nt = number of taxa or species that are used for that plant use category for all informants. The index ranges from 0 to 1, with values nearing 1 signifying a strong consensus among informants in the utilization of the same species [19].

Fidelity level (FL)

The relative healing potential of medicinal plants in treating human ailments was assessed by employing a fidelity level (FL), as proposed by [20]. The computation of fidelity level (FL) was carried out using the following formula:

$$FL(\%) = \frac{IP}{IU} \times 100$$

where FL = fidelity level or relative healing potential, IP = the number of informants who independently cited the importance of a species for treating a particular ailment (frequency of citation of a species for a particular

aliment), and **IU**=the total number of informants who reported the medicinal plant for a given disease (total number of citations of that species).

Ethical clearance

The Guraferda District Administration Office collaborated with the Department of Biology at Mizan-Tepi University (MTU) to conduct research in kebeles. District Administrations granted permission for fieldwork after acknowledging cooperation letters. Official authorization letters were sent to various offices and sample kebeles. This collaboration aimed to enhance community involvement, facilitate data collection, and provide guidance during interviews. Chairpersons of kebeles provided cooperation letters, data on households, recommended key informants, and arranged interview meetings. Informants gave oral consent during group discussions before sharing ethnobotanical knowledge willingly during interviews.

Results and discussion

Sociodemographic attributes of informants in the study area

In this study, a total of 96 participants were involved. The majority of the participants were male, accounting for 83.3% ($n=80$), while the remaining 16.7% ($n=16$) were female. When considering the healing experience, the majority of the participants were classified as general informants, making up 66.7% ($n=64$), followed by key informants at 33.3% ($n=32$). The age range of the participants included in the study varied from 18 to 80 years old. Among them, the largest proportion fell within the age group of 56–80, comprising 53.1% ($n=51$), followed by the age group of 31–55, accounting for 30.2% ($n=29$). The education levels of the participants ranged from illiteracy to college level. The majority of the participants were found to be illiterate, representing 70.8% ($n=68$), followed by those who had completed elementary school at 21.8% ($n=21$). In terms of marital status, the majority of the participants were married at 82.2% ($n=79$), followed by single individuals at 13.5% ($n=13$) (Table 2).

Medicinal plant knowledge among different ethnic groups

The information on the dissemination of medicinal knowledge among the most referenced ethnic groups in the Guraferda District provides insight into the diverse traditional healing practices deeply embedded in the cultural heritage of the Sheko, Amhara, Meinit, and Kefa communities. These ethnic groups, with percentages of 33.3%, 20.8%, 14.6%, and 11.5%, respectively, are recognized as preservers of valuable medicinal wisdom transmitted across generations. Their profound connection to local flora and fauna, as well as cultural customs, likely contributes to their higher reported percentages.

Conversely, the Sidama and Wolyita ethnic groups, with percentages of 3.1%, seem to possess lower levels of documented medicinal knowledge, indicating a potential necessity for further investigation and documentation of their traditional healing methods. This contrast underscores the importance of acknowledging and safeguarding the diverse range of medicinal knowledge upheld by various ethnic groups within the Guraferda District to leverage the potential advantages for healthcare practices in the area. The distribution of medicinal knowledge among the most cited ethnic groups in the Guraferda District of Ethiopia reveals a complex interplay between cultural practices, environmental factors, and historical traditions. The significantly higher percentages reported by the Sheko, Amhara, Meinit, and Kefa ethnic groups highlight the deep-rooted connection these communities have with their natural surroundings and traditional healing practices. Their reliance on local flora and fauna for medicinal purposes underscores the intimate relationship between culture and nature, where indigenous knowledge is passed down through generations as a vital part of community identity.

The lower reported percentages of medicinal knowledge among the Sidama and Wolyita ethnic groups suggest a potential divergence in traditional healing practices within the Guraferda district. This could be attributed to a variety of factors, including historical influences, access to resources, and cultural assimilation. Further exploration into the specific medicinal practices of these ethnic groups could provide valuable insights into the diversity of healing traditions present in the region and help bridge gaps in healthcare access and understanding.

Medicinal plants naming related to culture in the study area

The nomenclature of medicinal plants often incorporates meanings that are related to their use or other suggestive information about the plants. This information was uncovered by examining the local names assigned to various medicinal plant species. Among these species, some of the local names directly indicate their medicinal properties, while others describe physical attributes such as growth form, trunk color, leaf shape, toxicity, taste, and smell. It is important to mention that all of the medicinal plant species studied have local names in one or more languages spoken in the districts being investigated. These names are occasionally used interchangeably or with slight variations in pronunciation among different communities. Additionally, there are cases where a single local name is used to refer to multiple species that possess similar medicinal properties.

For instance, the local name “Qey Shnkur” is used to refer to *Allium cepa* L. due to the red color of its bulb.

Table 2 Sociodemographic characteristics of respondents

Parameter	Category		N	%	Total
Gender	Male		80	83.3	96
	Female		16	16.7	
Healing experience	General informants		64	66.7	96
	Key informants		32	33.3	
Age groups	18–30	Male	12	12.5	96
		Female	4	4.2	
	31–55	Male	19	19.8	
		Female	10	10.4	
	56–80	Male	49	51	
		Female	2	2.1	
Marital status	Married		79	82.2	96
	Single		13	13.5	
	Divorced		4	4.2	
Education level	Illiterate		68	70.8	96
	Literate	Elementary	21	21.8	
		High school	5	5.2	
		Diploma and above	2	2.1	
Occupation	Farmer		67	69.8	96
	House wife		14	14.6	
	Student		9	9.4	
	Merchant		6	6.2	
Ethnicity	Sheko		32	33.3	96
	Amhara		20	20.8	
	Sidama		3	3.1	
	Kaffa		11	11.5	
	Benchi		8	8.3	
	Meinit		14	14.6	
	Wolyita		3	3.1	
	Oromo		5	5.2	

Similarly, “Gutichaa” is used for *Acmella caulirhiza* Delile because its leaves resemble the shape of an ear-ring. “Wotetie” is the local name for *Lactuca serriola* L., chosen because of its sap that resembles milk. “Yeayit jero” is used to describe *Centella asiatica* (L.) Urb, as its leaf structure resembles that of a rat’s ear. “Michi-charo” is the local name for *Ocimum lamiifolium* Hochst. ex Benth., as it is known to locally cure febrile illness called “mich.” Lastly, “Shiferaw” is the local name for *Moringa oleifera* Lam., as it is believed to treat various diseases.

Traditional medicinal plants used to treat human ailments Diversity of medicinal plants in Guraferda district

The utilization of medicinal plants by the inhabitants of Guraferda District was investigated, resulting in the identification of a total of 81 species. These species belong to 38 families and 71 genera of plants (Table 12). The local population relies on these plants to address a wide range of human ailments, encompassing approximately

40 different ailments. This finding surpasses the numbers reported in Ethiopia by [21–25], which reported 60, 29, 63, 72, and 12 plant species, respectively. Similarly, compared to reports from other parts of the world by [26–28], which reported 42, 55, and 37 plant species, respectively, the number of medicinal plants found in Guraferda District is higher. The variation in the number of medicinal plants found in different study areas may be attributed to factors such as the area of vegetation type, the number of informants involved in the study, the time of data collection, and the duration and culture of the area, as suggested by [29]. The prevalence of herbal treatments for human ailments in Guraferda District indicates the reliance of the local population on traditional medicines. This reliance may be influenced by factors such as the high cost of modern medications, the limited availability and accessibility of modern health services, and the cultural acceptance of herbal medicines, as also observed in other regions of Ethiopia by [30–32].

Notably, the families Asteraceae and Solanaceae were the most frequently mentioned, with each accounting for 11.1% of the species cited (9 species each). Additionally, the families Euphorbiaceae, Cucurbitaceae, Fabaceae, and Rutaceae were also mentioned, representing 6.2% and 5 species each, and 4.9% and 4 species, respectively (Table 3). This suggests that these plant families were

widely utilized for the treatment of human ailments. This finding aligns with previous reports from Ethiopia [25, 33–37] as well as other countries worldwide [38, 39]. In contrast, the families Fabaceae, Poaceae, Amaranthaceae, and Apocynaceae were frequently reported in Pakistan [40]. This could be attributed to the wider distribution and abundance of these plant families in the flora region, in terms of the number of taxa [29]. This indicates that easily accessible plant species are often preferred by individuals, as long as they are not harmful [41, 42].

Table 3 Total list of families with number of genera, species and rank

Family Name	Genera	%	Species	%
Asteraceae	8	11.4	9	11.1
Solanaceae	6	8.5	9	11.1
Euphorbiaceae	4	5.6	5	6.2
Cucurbitaceae	5	7	5	6.2
Fabaceae	4	5.6	5	6.2
Rutaceae	3	4.3	4	5
Boraginaceae	2	2.8	2	2.4
Brassicaceae	2	2.8	3	3.7
Lamiaceae	2	2.8	3	3.7
Apiaceae	2	2.8	2	2.4
Araceae	2	2.8	2	2.4
Musaceae	2	2.8	2	2.4
Myrtaceae	2	2.8	2	2.4
Alliaceae	2	1.4	2	2.4
Asparagaceae	1	1.4	2	2.4
Polygonaceae	2	1.4	2	2.4
Polygalaceae	1	1.4	1	1.3
Malvaceae	1	1.4	1	1.3
Acanthaceae	1	1.4	1	1.3
Aloaceae	1	1.4	1	1.3
Amaranthaceae	1	1.4	1	1.3
Caricaceae	1	1.4	1	1.3
Celastraceae	1	1.4	1	1.3
Commelinaceae	1	1.4	1	1.3
Crassulaceae	1	1.4	1	1.3
Dryopteridaceae	1	1.4	1	1.3
Lauraceae	1	1.4	1	1.3
Linaceae	1	1.4	1	1.3
Meliaceae	1	1.4	1	1.3
Menispermaceae	1	1.4	1	1.3
Moringaceae	1	1.4	1	1.3
Oleaceae	1	1.4	1	1.3
Phytolaccaceae	1	1.4	1	1.3
Ranunculaceae	1	1.4	1	1.3
Rhamnaceae	1	1.4	1	1.3
Rubiaceae	1	1.4	1	1.3
Vitaceae	1	1.4	1	1.3
Zingiberaceae	1	1.4	1	1.3
Total 38	71	100	81	100

Growth form of medicinal plants

The findings of the study indicate that medicinal plants can be categorized into different groups based on their habits. Among these groups, herbs were found to be the most abundant, comprising 55.5% of the total number of species recorded (45 species). Following herbs, shrubs constituted 22.2% (18 species), while trees accounted for 16% (13 species) (Fig. 3). Climbers, on the other hand, represented the smallest proportion with only 6.2% (5 species). The abundance of herbal species may be due to favorable climate conditions, such as high rainfall. Herbs are preferred for treating ailments due to their availability and effectiveness, as noted by scholars [2, 33], both locally and globally [38, 40, 43]. This trend could be seen as positive for plant conservation, as herbs have shorter growth cycles and require less space for cultivation compared to trees. However, seasonal herbs may not be accessible at certain times, especially if sourced from the wild [8].

In contrast, a larger number of studies have reported the use of shrubs and trees [9, 13, 44–46], both locally

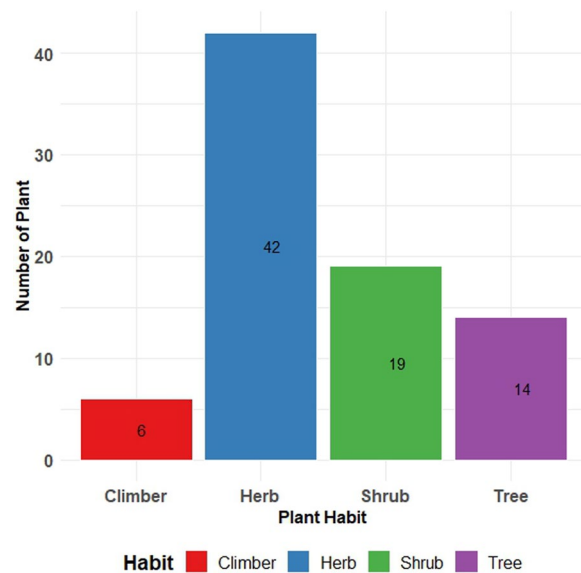


Fig. 3 Growth forms of medicinal plants for human Ailments

and globally [47–53]. This could be due to their annual availability and their ability to withstand drought and invasive alien species, making them suitable for wide-spread use [13]. Furthermore, this suggests a variation in medicinal plant utilization due to differences in culture, agroecologies, topographic features, and the ease of access to the species [54].

Habitat of medicinal plants

The collection of medicinal plants in the study area involved sourcing from diverse outlets, namely the wild, home gardens, and the market. Out of the 81 medicinal plants identified, 38 (47%) were procured from the wild, 19 (23.4%) from home gardens (HG), 15 (18.5%) from the market, and 9 (11.1%) from both the wild and home gardens (Fig. 4). Human activities are shrinking these habitats due to population growth, jeopardizing many wild medicinal plants. This aligns with global reliance on wild habitats for medicinal plants. Efforts to cultivate and sustainably use these plants are needed to reverse the line. This information is supported by the work of [55–58], as well as research conducted by [53, 59, 60].

Medicinal plant parts used for human ailments

The study’s findings indicated that 12 specific parts of medicinal plants were identified as the primary constituents utilized for addressing various health problems. The analysis of plant parts, based on the total frequency of citations by informants, demonstrated that out of a total of 213 reports on plant parts, the most commonly employed components for the preparation of remedies

were leaves (47%, 100), roots (20.1%, 43), seeds (11.1%, 25), bulbs (6.1%, 13), and fruits (5.2%, 11). Furthermore, stem and rhizome (2.3%, 5 each), the whole part (1.4%, 3), as well as flower, latex, bark, and tuber (0.9%, 2 each) were also mentioned by the informants (Fig. 5). This aligns with other studies showing leaves are frequently used in traditional medicine due to their availability, ease of use, and effectiveness due to high concentration of secondary metabolites. However, over-harvesting leaves during dry seasons can be challenging and harmful to plants’ reproductive processes. This information is supported by the work of various researchers, such as [9, 11, 31], and elsewhere in the world [61–63].

Contrary to these findings, other studies have reported the prevalence of roots over other plant parts, as well as stems and whole plants, in traditional medicine. This information was supported by the work of various researchers, such as [2, 23, 44], and elsewhere in the world [45, 59, 65–69]. Year-round accessibility of fresh roots makes them a popular choice for medicine, but over-harvesting threatens medicinal plants like *Securidaca longepedunculata* Fresen and *Echinops kebericho* Mesfin in Guraferda District. Similarly, studies conducted in other parts of Ethiopia and the worlds have indicated that overutilization of root parts poses a threat to medicinal plants such as [2, 59].

Forms of medicinal plant used for human ailments

The analysis results for the condition of the plant used, based on the frequency of citations by informants, revealed that out of the total 226 reports on plant usage,

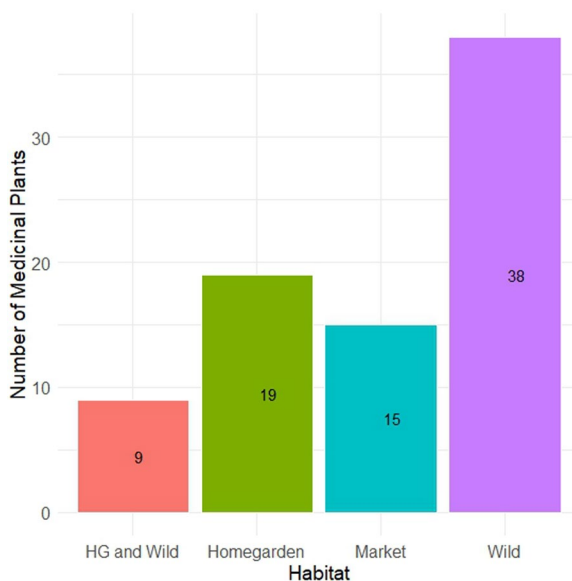


Fig. 4 Sources of medicinal plants for human ailments

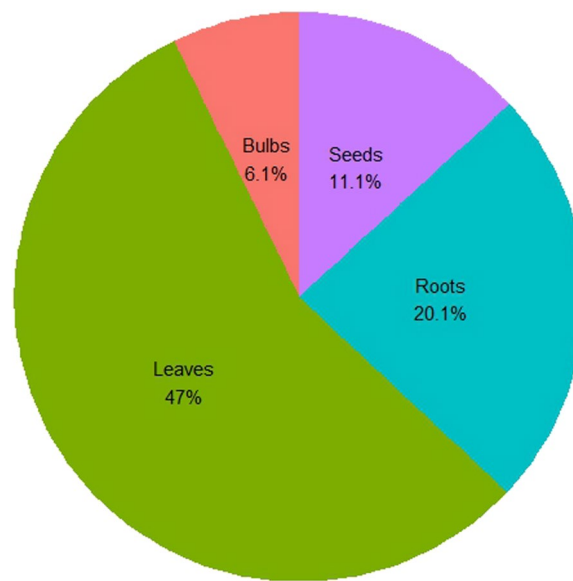


Fig. 5 Most cited medicinal plant parts

the majority of medicinal plants were found to be prepared solely from fresh plant materials (65.4%, 148). Following this, a significant portion of medicinal plants were prepared from dry conditions (31.4%, 71). A small percentage of medicinal plants (3.2%, 7) were prepared exclusively from either fresh or dry plant material (Fig. 6). This finding aligns with previous research conducted by various scholars who also reported the use of freshly collected plant parts for traditional medicine preparation [2, 13, 41, 69]. Furthermore, similar practices have been observed in different parts of the world [47, 51, 62]. Traditional healers argue that the healing potential of certain medicinal plants diminishes if they are not used in their fresh condition. Consequently, there appears to be limited utilization of dry storage for future use, as highlighted by previous studies [2, 70, 71]. Due to the lack of efforts in conserving dried plant matter, the frequent gathering of fresh plant parts may pose a threat to the plants, particularly during dry seasons. The reliance of local communities on fresh plant parts can be attributed to the perceived effectiveness of these species in therapy, as the beneficial ingredients are not lost during the drying process. However, this dependency on fresh plant materials also poses a potential risk for the loss of these valuable medicinal plants [41, 72].

Mode of medicinal plants preparation

Different approaches were utilized to create the traditional remedy, taking into account the nature of the ailments, as well as the condition and components of the medicinal plant. Pounding was the preferred method

for preparing dried plant parts, whereas crushing was employed for fresh ones. The research findings highlighted that informants reported a total of 211 modes of preparation frequency for medicinal plants. Notably, the majority of plants were prepared by crushing (66.4%, 140), followed by powdered (18%, 38), and concoction (15.6%, 33) (Fig. 7). Crushing aids quick bioactive extraction for immediate relief, often using single plant parts or mixtures from different plants. These findings align with similar results reported by [8, 76, 77] both locally and globally [78]. In contrast, other studies have found that powdering was the dominant method of traditional medicine preparation by local people, as observed in the works of [75, 79, 80] as well as in various cultural groups worldwide [37, 64].

Route of medicinal plant administration and application

The study found that informants mentioned route of administration 173 times. Oral administration was most common (54.3%, 94 citations), followed by dermal (34.1%, 59 citations) and nasal (8.1%, 14 citations) routes. Other routes like optical, auricular, vaginal, and anal each accounted for 1.2% (2 citations) and 0.6% (1 citation), respectively (Fig. 8). This trend is in agreement with findings from various studies in Ethiopia [23, 35, 81] and globally [39, 52, 64, 68]. This preference for oral and dermal routes may be attributed to the effectiveness of these methods in rapidly interacting with pathogens' physiology and enhancing curative potency, as well as the prevalence of internal ailment in the study area. Dermal administration is favored due to its lower potential

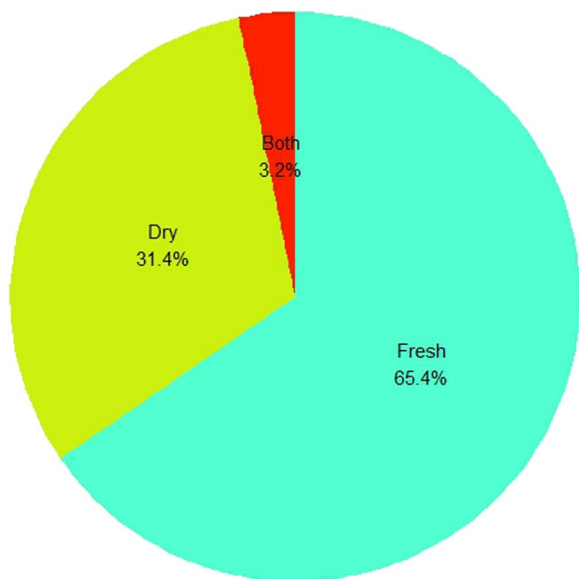


Fig. 6 Forms of medicinal plant used for human ailments

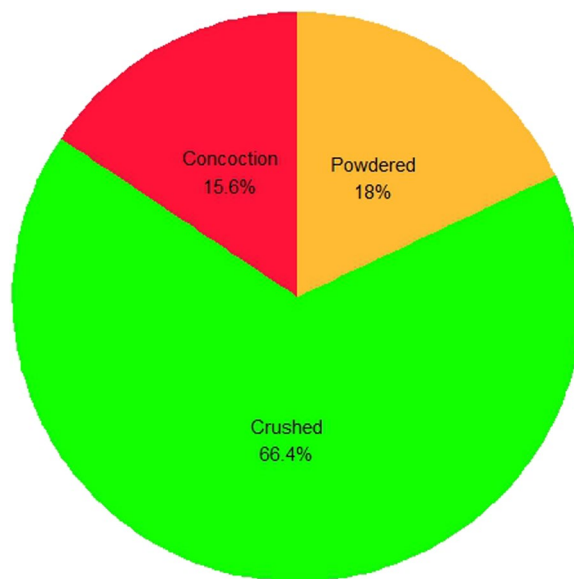


Fig. 7 Mode of medicinal plants preparation for human ailments

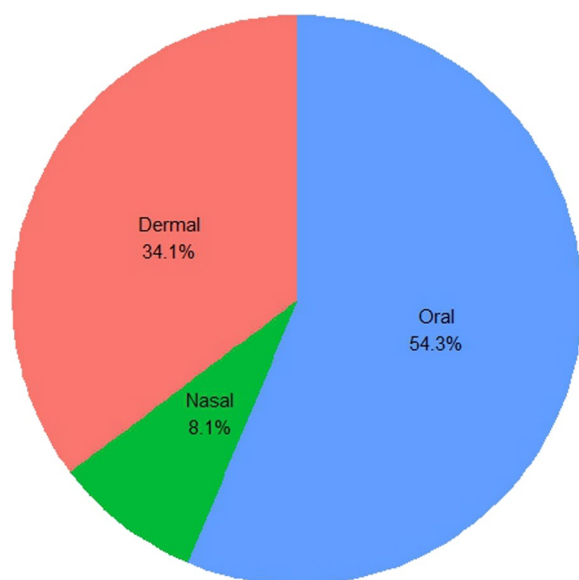


Fig. 8 Most cited route of medicinal plant administration for human ailments

for absorption and toxicity, and its ease of application for patients, as supported by previous reports [23, 44, 82]. The treatment was administered through various methods, including creams and tying for dermal administration, and chewing, eating, and drinking for oral administration. Nasal administration involved fumigating and inhaling, while auricular administration entailed dropping the solution into the ear. Optical administration included the use of ointments or drops, and anal administration involved dropping or creaming. Vaginal administration was carried out by inserting the treatment, consistent with the findings of [33, 36, 83].

Diagnosis and treatment methods of patients

In Guraferda District, 40 human ailments were reported, with malaria, typhoid, wound, stomachache, diarrhea, tonsillitis, ringworm being most prevalent (Table 12). The community relies more on traditional healers than modern medicine. Common symptoms include diarrhea, fever, itching, sweating, weakness, headaches, and discomfort. Healers diagnose through visual inspection and interviews, assessing symptoms like skin color, throat condition, and body temperature. Treatment involves herbal remedies for swellings, direct application or bandaging for wounds, and chewing medicinal plants for throat and abdominal issues. Economic, cultural, and availability factors drive the community's preference for traditional healthcare over distant centers. Similar trends are seen globally. These factors were highlighted by [2, 13, 55], as well as in studies conducted elsewhere in the world by [39, 59].

Local healers primarily use visual inspection for diagnosis, identifying disorders based on body temperature, skin color, appetite, and appearance. Similar diagnostic methods have been reported by other researchers in Ethiopia [2, 13, 55] as well as in different cultural groups worldwide [73, 74]. Misidentification of ailment due to these methods can lead to incorrect diagnoses and inappropriate prescriptions, potentially resulting in adverse effects on the patients. This issue has been highlighted by [75].

Medicinal plants dosage and antidotes

In the study area, various units of measurement and timeframes were used by the local community for medicinal dosages. These included finger widths, hand sizes, and liquid measuring tools like *fera* and *gini*, as well as numerical approximations for plant parts. This observation aligns with the findings of [82, 84, 85]. The findings indicated that dosages of remedies for various ailments were determined based on factors such as the patient's age, pregnancy status, physical characteristics, and gender, with traditional healers lacking standardized measurements or guidelines. This observation was consistent with the work of [24, 41, 80]. Informants reported minimal side effects from traditional medicines. Overdosing caused issues like vomiting, diarrhea, burning sensations, and fainting, especially with plants like *Phytolacca dodecandra*, *Justicia schimperiana*, and *Datura stramonium*. This outcome is consistent with the findings of [2, 56, 82, 86]. In the study area, traditional healers used antidotes like niger seed, sorghum borde, sugar, honey, coffee, tea, water, butter, milk, yogurt, bulla, teff porridge, barley, and rice broth to stabilize disorders. This finding is consistent with reports from other parts of the country, as documented by [24, 41, 80].

Marketability of medicinal plants

Out of the 15 species of medicinal plants examined, only five were actively sold for medicinal use: *Echinops kebericho* Mesfin, *Securidaca longepedunculata* Fresen, *Olea europaea*, *Clausena anisata*, *Artemisia abyssinica*, and *Withania somnifera*. The rest were sold in bulk for non-medicinal purposes but used as medicine when needed. In local markets like Megenteya, Semerta, Gabika, Meleya, and Bebeke, prices varied: *Echinops kebericho* and *Securidaca longepedunculata* roots cost 10 Ethiopian Birr, while *Artemisia abyssinica*, *Withania somnifera* leaves, *Olea europaea*, and *Clausena anisata* stem slices were priced at 20 Birr. Other plants like *Solanum americanum* and *Brassica nigra* were sold in bulk for non-medicinal uses but also used in traditional medicine.

Efficacy of medicinal plants used for treating human ailments

The ICF results showed higher consensus factors for human ailments in the study area, particularly in the dermal (ICF=0.90), and digestive system (ICF=0.88). Conversely, the musculoskeletal & nervous system category had the lowest ICF value (0.60) (Table 4), suggesting limited sharing of knowledge among traditional healers. This lack of interaction may be due to distance and secrecy. Different habitats may lead healers to use different medicinal plants for the same ailments. Informants shared important knowledge on medicinal plants for common ailments, even though some species had lower use values, indicating their effectiveness despite being known by only a few healers. These findings are consistent with the reports of [87–90].

Relative healing potential of medicinal plants

The fidelity level of medicinal plants reflects their effectiveness for specific ailments. In this study, plants like *Cissampelos mucronata* A. Rich (FL=1, 100%) for stomachaches, *Bidens pilosa* L. (FL=1, 100%) for wounds,

and *Musa accuminata* Colla. (FL=0.73, 73%) for eczema showed high efficacy. Plants with high FL values should be conserved and managed. Conversely, plants like *Ocimum lamiifolium* Hochst.ex Benth (FL=0.42, 42%) had lower healing potential for fevers, as indicated by their lower FL values (Table 5). These findings are consistent with the results reported by [2, 55, 91, 92].

The most preferred plants for treating human ailments

The findings indicated that the local community’s preference for medicinal plants was based on their experiences and their ability to distinguish effective plants for treating their ailments. Among the plants used for treating wounds, *Bidens pilosa* L. was the most favored species, followed by *Datura stramonium* L. and *Commelina benghalensis* L. Conversely, *Sida rhombifolia* and *Croton macrostachyus* were found to be the most preferred plant species for wound treatment (Table 6), contrasting the previous findings [29, 92, 93]. The local community heavily relies on plants for various purposes, including construction, food, and medicine. *Cordia africana* Lam.

Table 4 ICF values of TMPs used for treating human ailments

Ailments category	Nt	Nur	Nur-Nt	Nur-1	ICF	%	Rank
Dermal	17	156	140	155	0.90	90	1st
Digestive system	16	132	116	131	0.88	88	2nd
Sense organs	6	42	36	41	0.87	87	3rd
Respiratory systems	13	88	75	87	0.86	86	4th
Unclear illness	9	58	49	57	0.85	85	5th
Cultural related	10	56	55	55	0.83	83	6th
Circulatory systems	8	42	34	41	0.82	82	7th
Animal and vector cause	14	62	48	61	0.78	78	8th
Excretory and Reproductive system	4	10	6	9	0.66	66	9th
Musculoskeletal & nervous system	3	6	3	5	0.60	60	10th

ICF Informant consensus factor, Nur number of use reports by informants, Nt number of plant taxa or species used

Table 5 Fidelity levels of 10 most cited TMPs for human ailment treatments

Scientific name	Human ailment	IP	IU	FL	%	R
<i>Cissampelos mucronata</i> A. Rich	Stomachache	13	13	1	100	1st
<i>Bidens pilosa</i> L.	Wound	15	15	1	100	1st
<i>Musa accuminata</i> Colla	Eczema	19	26	0.73	73	2nd
<i>Cucurbita pepo</i> L.	Tape worm	8	11	0.72	72	3rd
<i>Commelina benghalensis</i> L.	Ringworm	12	19	0.63	63	4th
<i>Securidaca longepedunculata</i> Fresen	Evil spirit	21	35	0.6	60	5th
<i>Moringa oleifera</i> Lam	Diabetes	19	33	0.57	57	6th
<i>Acmella caulirhiza</i> Delile	Tonsillitis	21	40	0.52	52	7th
<i>Phytolacca dodecandra</i> L’Herit	Malaria	15	33	0.45	45	8th
<i>Ocimum lamiifolium</i> Hochst.ex Benth	Febrile illness	26	61	0.42	42	9th

R Rank, FL fidelity Level, Ip number of informants who independently cited the importance of a species for treating a particular disease, Iu total number of informants who reported the plant for any given disease

Table 6 Preference ranking of TMPs reported for treating wound

Medicinal plants for Wound	Respondents(R ₁ -R ₁₀)										Total	Rank
	R ₁	R ₂	R ₃	R ₄	R ₅	R ₆	R ₇	R ₈	R ₉	R ₁₀		
<i>Bidens pilosa</i> L	7	6	7	5	7	6	7	4	7	6	62	1st
<i>Datura stramonium</i> L	6	5	6	6	5	7	5	7	4	7	58	2nd
<i>Commelina benghalensis</i> L	5	7	5	4	6	4	6	6	5	5	53	3rd
<i>Centella asiatica</i> (L.) Urb	4	5	2	7	1	3	4	2	6	1	35	4th
<i>Nicotiana tabacum</i> L	2	2	4	1	4	5	3	3	2	2	28	5th
<i>Sida acuta</i> Burm.f	1	4	3	2	3	1	2	5	1	4	26	6th
<i>Rumex nepalensis</i> Spreng	3	1	1	4	2	2	1	1	3	3	21	7th

is ranked as the most threatened, while *Securidaca longepedunculata* Fresen and *Olea europaea* (Wall. ex G. Don) Cif are preferred for multiple uses in Guraferda District. Conservation efforts are needed to protect these valuable plant species. This finding aligns with the findings of [30, 55, 56, 77, 83, 94] which indicated that *Cordia africana* Lam. was a multipurpose medicinal plant in their respective study areas. In contrast, the report of [23, 95] revealed that *Croton macrostachyus* Del. was the most multipurpose plant species.

Medicinal plants like *Echinops kebericho* Mesfin in Guraferda District are at risk due to high market demand for their roots, leading to scarcity. This finding aligns with the conclusions drawn in the works of [2, 9, 34, 79, 96–100].

Direct matrix ranking of multipurpose medicinal plants

The output of the direct matrix ranking (DMR) exercise on five multipurpose medicinal plants used for treating human ailments enabled to identify which of the

multipurpose plants is under greater pressure than other species in the area along with the respective factors that threaten the plants. Accordingly, *Cordia africana* Lam. was ranked first (most—threatened) followed by *Securidaca longepedunculata* Fresen and *Olea europaea* (Wall. ex G. Don) Cif (Table 7). Results indicated that these multipurpose medicinal plant species are currently exploited more for construction, firewood and timber production purposes than for their medicinal uses.

Comparison of knowledge among different informant groups

Comparison of knowledge between key and general informants

Key informants scored significantly higher (5.6 ± 1.5) in medicinal plant knowledge than general informants (2.5 ± 1.4), with a *t*-value of 9.6 and *p* < 0.05, indicating a substantial difference. Key informants demonstrate superior understanding of traditional medicinal practices compared to general informants in the

Table 7 DMR score of five TMPs for human ailments

Use categories	Plant Species																									Total	Rank
	<i>Olea europaea</i> (Wall. ex G. Don) Cif					<i>Cordia africana</i> Lam					<i>Croton macrostachyus</i> Del					<i>Eucalyptus globulus</i> Labill					<i>Securidaca longepedunculata</i> Fresen						
	R1	R2	R3	R4	R5	R1	R2	R3	R4	R5	R1	R2	R3	R4	R5	R1	R2	R3	R4	R5	R1	R2	R3	R4	R5		
Construction	3	2	3	3	1	4	5	4	5	5	2	1	1	2	3	5	3	2	1	4	1	4	5	4	2	81	1st
Firewood	1	2	2	2	2	5	4	4	3	3	2	1	1	4	1	4	5	3	5	4	3	3	4	1	5	77	2nd
Agri.tool	3	4	2	5	4	4	3	3	4	3	1	5	5	1	5	2	1	1	2	2	5	2	4	3	1	77	2nd
Furniture	4	3	3	4	2	5	5	5	5	5	2	1	2	1	1	1	2	1	2	3	3	4	4	3	4	77	2nd
Medicine	1	2	2	2	2	4	4	3	4	4	3	1	4	3	3	2	3	1	1	1	5	5	5	5	5	76	3rd
Charcoal	5	1	3	3	5	3	3	4	2	3	1	2	1	1	2	2	4	3	5	1	4	5	3	4	4	74	4th
Food	0	0	0	0	0	3	4	1	2	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21	5th
Subtotal	17	16	17	19	15	28	28	24	25	26	12	11	14	12	15	13	18	11	16	15	21	23	25	20	21		
Grand Total	84					133					68					75					114						
Rank	3rd					1st					5th					4th					2nd						

N.B. R respondent, Agri.tool agricultural tool

study area. This finding is consistent with the conclusions drawn in the works of [11, 31, 77, 83, 101]. In contrast to this finding, the report of [76] indicated that there was no significant difference in medicinal plant knowledge between key informants and general informants. The substantial knowledge gap between key and general informants underscores the value of leveraging key informants' expertise in medicinal plants. Targeted education can bridge this gap, fostering sustainable practices and preserving traditional knowledge.

Comparison of knowledge between gender

Male informants had higher average knowledge scores (3.9 ± 1.9) compared to female informants (1.8 ± 1.2), with a significant difference indicated by a *t*-value of 5.3 ($p < 0.05$) (Table 8). This outcome aligns with the findings of [11, 30, 83, 102, 103]. Contrary to this discovery, [104] found that females possess more knowledge about medicinal plants than males. Moreover, other researchers, such as [77, 101], reported that both males and females have equal knowledge of medicinal plants. Gender disparities in medicinal plant knowledge within the community highlight potential cultural, social, or historical factors influencing knowledge acquisition and transmission between male and female informants. Furthermore, other researchers [11, 102] noted that traditional knowledge on medicine is typically passed down to sons rather than daughters in many parts of Ethiopia through verbal communication. Therefore, such bias may have contributed to the observed difference. Additionally, healers may prefer males to pass on their indigenous medicinal plant knowledge because of the belief that only males can access plant species in distant sites and forests. These findings underscore the need for targeted interventions to address gender disparities in traditional medicinal knowledge. Further research is essential to develop inclusive programs and policies that empower women and promote gender equality in resource management.

Comparison of knowledge among different age groups

A one-way analysis of variance (ANOVA) was performed using R software to investigate the impact of age category (young, middle, and elder) on the scores of medicinal knowledge among informants. The results of the ANOVA indicated a significant main effect of age category ($F(2, 93) = 15.53, p < 0.05$), suggesting that there were notable differences in medicinal knowledge scores across the three age categories. The variance between the groups (age) ($SS = 118.2, MS = 59.08$) was considerably higher than the residual or within-groups variance ($SS = 353.7, MS = 3.80$) (Table 9), indicating that the disparities in medicinal plant knowledge were influenced by the age categories of the participants.

Further analysis using Tukey's HSD post hoc tests revealed that the elder group exhibited significantly higher mean scores ($M = 4.3, SD = 2.2, p < 0.05$) compared to both the middle group ($M = 3, SD = 1.6, p < 0.05$) and the young group ($M = 1.3, SD = 0.9, p < 0.05$). These findings imply that older informants tend to possess more extensive knowledge of medicinal plants compared to younger informants. This discrepancy may be attributed to the transmission of cultural traditions and practices across generations, as well as the increased exposure to traditional medicine practices over time. This study aligns with the research of [13, 30, 31, 83, 102], and others in different countries [38], which also found that older individuals cited more medicinal plant species than younger individuals. This may be due to the elders'

Table 9 Age categories with informant medicinal plant knowledge (one-way ANOVA)

Source of Variation	Df	SS	MS = SS/Df	F Ratio	P-value
Between Groups	$k-1$ $3-1=2$	118.2	59.08	15.54	$P < 0.05$
Residual (within)	$n-k$ $96-3=93$	353.7	3.80		
Total	$n-1$ $96-1=95$	471.9	62.88		

K number of level, *n* number of observation, *Df* degree of freedom, *SS* sum of squares, *MS* mean of square, significant codes: 0.05

Table 8 Medicinal plant knowledge among informant groups (independent t test)

Parameters	Informant groups	N	Mean ± SD	t-value	p value
Gender	Male	80	3.9 ± 1.9	5.3	$P < 0.05$
	Female	16	1.8 ± 1.2		
Literacy level	Illiterate	68	4.1 ± 1.9	5.7	$P < 0.05$
	Literate	28	2.1 ± 1.3		
Experience of Informant	Key informant	32	5.6 ± 1.5	9.6	$P < 0.05$
	General informant	64	2.5 ± 1.4		

extensive experience in using local medicinal plants for various ailments in traditional ways, while younger generations are influenced by modernization and globalization, leading to areas interest in traditional practices.

The research highlights the importance of conserving traditional medicinal practices. Age influences knowledge of medicinal plants, informing targeted educational programs. Variation across age groups underscores older generations' expertise. A strong positive correlation ($r=0.722$) confirms age-related knowledge differences, with older individuals possessing greater expertise (Fig. 9). This significant relationship emphasizes the need to preserve and pass on traditional medicinal knowledge. This finding aligns with the findings of [13, 76, 83, 102]. The regression analysis found β_0 and β_1 estimates of -1.43 and 0.1 , respectively, with $p < 0.05$ significance. Age categories show a significant correlation with medicinal plant knowledge. The β_0 of -1.43 indicates the lowest age category's projected knowledge. β_1 of 0.1 shows a positive relationship between age and knowledge (Fig. 10). The R-squared value of 0.523 reveals age explains 52.3% of knowledge variance, emphasizing its impact. Older informants have more medicinal plant knowledge, highlighting traditional wisdom importance. This study underscores the value of older generations' expertise in traditional medicine practices, emphasizing the need to preserve and pass on their knowledge.

Transfer of traditional medicinal knowledge

In the study area, traditional medicinal plant knowledge is orally transmitted within families, often by eldest sons, with some sharing with trusted neighbors and relatives. These findings are consistent with the research of [90, 91, 106]. Older generations hold valuable traditional knowledge on medicinal plants, but this is endangered due to

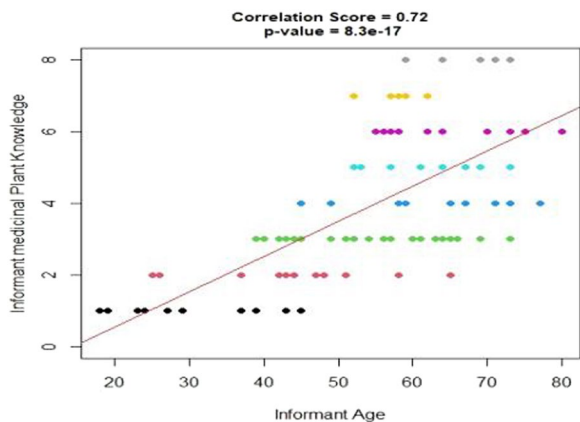


Fig. 9 Correlation model for medicinal plant knowledge by informant age

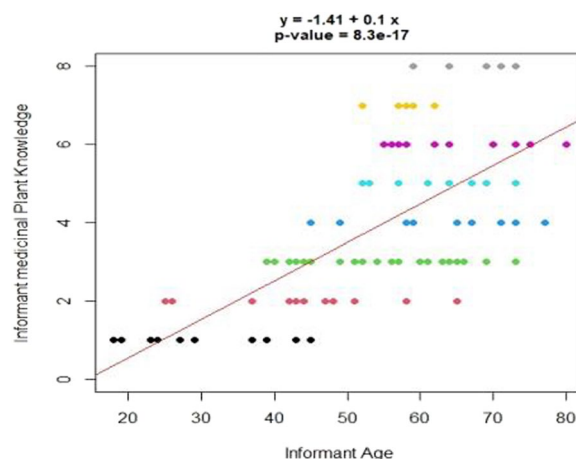


Fig. 10 Regression model for medicinal plant knowledge by informant age

elders' passing. Modern influences like medicine, education, and societal changes contribute to this line. Traditional healers keep their knowledge private to maintain healing power and income. Secrecy is crucial for indigenous healers known as Tenquay (Magician). This finding aligns with the outcomes of numerous additional investigations [29, 41, 82, 90, 98, 106, 107]. Moreover, Younger generation's reluctance to learn traditional medicine threatens loss of valuable information as older healers pass without sharing knowledge [41, 98, 108]

Threats and conservation practices of medicinal plants

The deforestation, overharvesting, invasive species, and lining use of traditional medicine due to modernization are key risks to medicinal plants (Table 10). Excessive harvesting of *Echinops kebericho* root for fumigation and *Securidaca longepedunculata* for treatment of various ailments, along with habitat loss for agriculture, threatens these plants (Table 11). The study highlights deforestation as the main threat to medicinal plants in the districts, consistent with research in other Ethiopian regions. Loss of valuable information is also a concern as younger generations show reluctance to learn traditional medicine from older healers [36, 90, 100, 109, 110].

Invasive species like *Parthenium hysterophorus* and *Lantana camara* threaten medicinal plants in Gurafeda District, outcompeting local species and disrupting the ecosystem balance, potentially leading to extinction [78, 111–114]. This has emerged as a key factor contributing to the line of herbaceous medicinal plants. Furthermore, other researchers have highlighted *Prosopisiflora* as another invasive alien species posing a threat to medicinal plant species [70, 114]. Likewise, the research indicates that multipurpose species are especially at risk, as

Table 10 Preference ranking to find out the most threatening factors of TMPs

Threatening factors TMPs	Respondents(R ₁ -R ₁₀)										Total	Rank
	R ₁	R ₂	R ₃	R ₄	R ₅	R ₆	R ₇	R ₈	R ₉	R ₁₀		
Deforestation	7	6	7	5	7	6	7	4	7	6	62	1st
Material culture	6	5	6	6	5	7	5	7	4	7	58	2nd
Invasive Alien Species	5	7	5	4	6	4	6	6	5	5	53	3rd
Overharvesting	1	5	4	7	1	3	4	2	6	1	34	4th
Fire wood	4	2	2	1	4	5	3	3	2	2	28	5th
Modernization	2	4	3	2	3	1	2	5	1	4	27	6th
Charcoal Making	3	1	1	4	2	2	1	1	3	3	21	7th

Table 11 Preference ranking to find out the most threatened TMPs

Name of plants species	Respondents(R ₁ -R ₁₀)										Total	Rank
	R ₁	R ₂	R ₃	R ₄	R ₅	R ₆	R ₇	R ₈	R ₉	R ₁₀		
<i>Cordia africana</i> Lam	7	6	7	5	6	7	6	5	7	7	63	1st
<i>Securidaca longepedunculata</i> Fresen	5	7	6	6	5	5	7	4	5	6	56	2nd
<i>Echinops kebericho</i> Mesfin	6	5	5	7	4	6	4	7	6	5	55	3rd
<i>Ehretia cymosa</i> Thonn	4	4	4	3	7	4	5	6	3	4	44	4th
<i>Peponium vogelii</i> (Hook. f.) Engl	3	2	1	1	1	3	2	1	2	3	19	5th
<i>Olea europaea</i> (Wall.ex G. Don) Cif	2	1	3	4	2	1	3	2	4	2	24	6th
<i>Eucalyptus globulus</i> Labill	1	3	2	2	3	2	1	3	1	1	19	7th

they encounter various threats. This discovery aligns with earlier studies [34, 90, 91, 107] (Table 12).

These medicinal plant species were not solely grown for medicinal purposes; rather, they were also used for food, spices, commercial value, and other applications. The most commonly employed cultivation methods for medicinal plant species included home gardens (*Ruta chalepensis* L.), coffee shade (*Cordia Africana* Lam.), live fences (*Justicia schimperiana* (Hochst. Ex Nees) T. Anders.), roadsides (*Eucalyptus globulus* Labill.), and agricultural fields mixed with other crops. The findings also suggest a lack of community-based conservation efforts undertaken by the local population in the district. This observation is consistent with previous research [91, 108, 115].

Conclusion and recommendation

Conclusion

The lack of concerted efforts to conserve medicinal plants and indigenous knowledge in the Guraferda District is indeed concerning. Traditional practitioners play a crucial role in preserving this valuable heritage, but their limited cultivation efforts indicate a need for external support. Government intervention is essential to create a comprehensive conservation strategy that includes both the preservation of plant species and the safeguarding

of traditional knowledge. Supporting traditional practitioners in cultivating medicinal plants in homegardens can help ensure a sustainable supply of these valuable resources. By providing training, resources, and incentives, the government can empower local communities to take an active role in preserving their natural and cultural heritage. In addition to cultivation, measures such as establishing protected areas, promoting sustainable harvesting practices, and conducting research on medicinal plants can contribute to their long-term conservation. Collaborative efforts involving government agencies, local communities, and other stakeholders are crucial to effectively address the challenges facing medicinal plant conservation in the district.

Recommendation

Based on the study's findings, it is recommended to avoid uprooting medicinal plant species prematurely and instead focus on utilizing other plant parts like leaves. This will help safeguard the species from extinction. Collaborating with traditional healers to conduct scientific research can validate the efficacy and safety of traditional remedies. In situ and ex situ conservation strategies should be developed, prioritizing plants with remedial roots and high value. Establishing a traditional healers' association with

Table 12 Traditionally used medicinal plants for human ailments in Guraferda District

S.No	Family	Scientific Name	Local Name	Ha	PU	CPU	Method of Preparation and Mode of Application	RoA	Ailment Treated (English)	Source	Voucher Number
	Acanthaceae	<i>Justicia schimperiana</i> (Hochst. Ex Nees) T. Anders	Shersharo (Kf)	Sh	Lf	Fresh/dry	Grind leaves of <i>Allium sativum</i> and <i>Ruta chalepensis</i> seeds together, take a small quantity of the mixture and wrap it in a new cotton cloth that has not been washed with water. Next, wrap the cloth around the head of the sick person three times, starting from the left side, and then tie it on the left elbow for three days. Finally, tie the cloth around the neck using a silk thread	Nasal	Evil eye	Wild	AA01
					Lf	Fresh	To alleviate vomiting, one can cut three leaves, crush them, and inhale the aroma of the fresh leaves	Nasal	Vomiting		
					Lf	Dry	A spoonful fine powder is directly applied on the area	Anal	Hemorrhoids		
					St	Fresh	The stems are gathered, the bark is eliminated, and then they are inserted into the vaginal area	Vaginal	Retained placenta		
					Lf	Fresh	The leaf and shoot undergo crushing and boiling in water along with salt and butter, and a single glassful is consumed for duration of three consecutive days. Antidote: Milk	Oral	Malaria		
					Lf	Fresh	The affected area is treated by crushing, squeezing, and applying a cream made from the leaves	Dermal	Dandruff		
					Lf	Fresh	Take a small quantity of ground leaf and consume one cup of it daily for duration of three days, along with coffee	Oral	Fibril illness		
	Alliaceae	<i>Allium cepa</i> L	Qey Shnkurt (Am)	H	Bu	Fresh	Consume the basal leaf (bulb) of this particular plant	Oral	Headache	Market	AA02

Table 12 (continued)

S.No	Family	Scientific Name	Local Name	Ha	PU	CPU	Method of Preparation and Mode of Application	RoA	Ailment Treated (English)	Source	Voucher Number
				Bu	Fresh		Crush the bulb of <i>Allium cepa</i> L. and utilize two teaspoons of the extracted juice as a remedy for the affected ear	Auricular	Ear disease		
				Bu	Fresh		The bulb of <i>Allium cepa</i> L. is sliced in circular shape and tied on the bottom part of the foot called sole for 30 min	Oral	Cough		
		<i>Allium sativum</i> L.	Turma (Sd)	H	Dry		Grind leaves of <i>Allium sativum</i> and <i>Ruta chalepensis</i> seeds together, take a small quantity of the mixture and wrap it in a new cotton cloth that has not been washed with water. Next, wrap the cloth around the head of the sick person three times, starting from the left side, and then tie it on the left elbow for three days. Finally, tie the cloth around the neck using a silk thread	Oral	Evil eye	Market	AA03
				Bu	Fresh		The head coated with fluid from the bulb	Dermal	Lash		
				Bu	Dry		The bulb of this plant consumed alongside Enjera or Bread for three days	Oral	Typhoid		
				Bu	Dry		The bulb of <i>A. sativum</i> is consumed alongside other meals, typically once or twice daily, over a span of 2–3 days	Oral	Malaria		
				Bu	Dry		Consuming the uncooked bulb of this particular plant alongside enjera.	Oral	Vomiting		
				Bu	Dry		The crushed bulb of <i>Allium sativum</i> L. is combined with lemon juice and consumed in a single coffee cup for duration of three consecutive days	Oral	Hypertension		
				Bu	Dry		For three consecutive days, one tea glass of honey-infused boiled bulb consumed	Oral	Cough		

Table 12 (continued)

S.No	Family	Scientific Name	Local Name	Ha	PU	CPU	Method of Preparation and Mode of Application	RoA	Ailment Treated (English)	Source	Voucher Number
				Bu	Dry		The diseased tooth is treated by applying the bulb of <i>Allium sativum</i> L. for a period of 10 min	Oral	Tooth ache		
				Bu	Dry		The bulb of <i>Allium sativum</i> L. is crushed and combined with butter, subsequently consumed each morning until complete recovery	Oral	Asthma		
				Bu	Dry		The bulb of <i>Allium sativum</i> L. is crushed, combined with honey, and consumed for duration of two days	Oral	Common cold		
	Amaranthaceae	<i>Amaranthus spinosus</i> L	Bukut (Mn)	H	Rt	Fresh	The little finger's size root crushed, and firmly pressed against the tooth	Oral	Toothache	Wild	AA04
	Asparagaceae	<i>Asparagus africanus</i> Lam	Daru (Sh)	Sh	Rt	Fresh	The little finger's size roots are tied in the neck of the patient till bleeding stops	Dermal	Bleeding	Wild	AA05
				St	Fresh		The damaged portion is tightly fastened to the stem and undergoes irregular alterations until it obtains relief	Dermal	Bone fracture		
				Rt	Dry		The roots, seeds, and leaves of <i>Ruta chalepensis</i> and <i>Allium sativum</i> are ground into a fine powder and mixed with water for inhalation. The size of the roots used is comparable to that of a little finger	Nasal	Evil eye		
				Rt	Fresh		Chewing on small strips of root near the little finger and extracting its juices	Oral	Toothache		
				St	Fresh		Bind the stem of this plant by the thread of fiber by left hand and wear around the head	Dermal	Migraine		
				Rt	Dry		The little finger size root powdered and taken with honey	Oral	Diabetes		
				Lf	Fresh		Leaves squeezed with lemon then half coffee cup is given for 3 consecutive days	Oral	Snake bite		

Table 12 (continued)

S.No	Family	Scientific Name	Local Name	Ha	PU	CPU	Method of Preparation and Mode of Application	RoA	Ailment Treated (English)	Source	Voucher Number
				Rt	Dry		The dry roots undergo combustion and are subjected to fumigation	Nasal	Epilepsy		
				St	Fresh		The leaves and stems undergo grinding, followed by ingestion of the resulting fluid	Oral	Stomach ache		
				Rt	Fresh		The roots' finger size is chewed and the resulting fluid is ingested	Oral	Febrile illness		
		<i>Asparagus racemosus</i> Willd	Daru (Sh)	Sh	Wh	Fresh	During child circumcision, the entire <i>Asparagus racemosus</i> plant is hung over the house's gate to ward off evil spirits	Dermal	Evil spirits	Wild	AA06
	Asteraceae	<i>Acmella caulirhiza</i> Delile	Gutichaa (Or)	H	Lf	Fresh	The healer chews the young leaves and allows them to fall onto the chest	Dermal	Breast cancer	Wild	AA07
				Flw	Fresh		Consume and digest a small portion of the flower until recuperation	Oral	Tonsillitis		
				Flw	Fresh		During the period of discomfort, it is advisable to chew the flower and firmly grasp the affected area for five minutes duration before expelling it	Oral	Toothache		
		<i>Artemisia abyssinica</i> Sch. Bip. ex A. Rich	Sukundee (Or)	H	Lf	Fresh	The leaves of <i>Allium sativum</i> and <i>Ruta chalepensis</i> are combined with seeds and crushed. The resulting powder is then soaked in water and inhaled. Additionally, the powder can be burned on fire to create a fumigation effect. Furthermore, the crushed mixture can be tied within a piece of cotton cloth and placed around the neck.	Nasal/ Dermal	Evil eye	HG	AA08
				Lf	Fresh		Inhalation of the fragrant foliage through the nasal passage	Nasal	Common cold		

Table 12 (continued)

S.No	Family	Scientific Name	Local Name	Ha	PU	CPU	Method of Preparation and Mode of Application	RoA	Ailment Treated (English)	Source	Voucher Number
				Lf	Fresh	Fresh	Prepare a cup of tea by crushing and pounding fresh leaves, mixing them with water, and filtering the mixture before consumption	Oral	Malaria		
				Lf	Fresh	Fresh	During times of discomfort, a single coffee cup is provided by crushing and blending it with water	Oral	Abdominal cramp		
		<i>Artemisia afra</i> Jacq. ex Willd	Aguppiyaa(Wol)	H	Rt	Fresh	The juice obtained from chewing the root is ingested	Oral	Stomach ache	HG	AA09
				Lf	Dry	Dry	The plant's aerial section is crushed, powdered, and blended with a small amount of water. A single coffee cup (sini) of this mixture is consumed each morning for a duration of three days	Oral	Syphilis		
		<i>Bidens pilosa</i> L	Gurday (Ben)	H	Lf	Fresh	The leaves of <i>Bidens pilosa</i> L. are crushed and applied to the patient the affected skin	Dermal	Wound	Wild	AA10
		<i>Echinops kebericho</i> Mesfn	Boorisaa (Wol)	H	Rt	Dry	The oral consumption involves the ingestion of a solution comprising crushed <i>Guizotia abyssinica</i> seeds and a small amount of roots, which are finely ground to the size of a little finger	Oral	Malaria	Market	AA11
				Rt	Dry	Dry	The dry root should be burned and fumigated during the nighttime prior to going to sleep	Dermal	Mitch		
				Rt	Dry	Dry	The root burned, and its smoke should be inhaled inside house	Nasal	Common cold		
				Rt	Dry	Dry	The root burned, and its smoke should be inhaled inside house	Nasal	Evil eye		

Table 12 (continued)

S.No	Family	Scientific Name	Local Name	Ha	PU	CPU	Method of Preparation and Mode of Application	RoA	Ailment Treated (English)	Source	Voucher Number
				Rt	Dry		To prepare a remedy, the bark of <i>Croton macrostachys</i> is crushed along with its small root, which is about the size of a little finger. The resulting powder is then combined with honey and consumed in one cup servings for a period of three days	Oral	Tetanus		
		<i>Guizotia abyssinica</i> (L.f.) Cass	Nuugii (Or)	H	Sd	Dry	The ground roasted seed of this plant is combined with water and subjected to boiling. Subsequently, one tea cup of the resulting filtrate is consumed on a daily basis for duration of one week	Oral	Cough	Market	AA12
		<i>Helianthus annuus</i> L	Suff (Am)	H	Sd	Dry	Crush the seed thoroughly, then combine its oil with the latex of <i>Euphorbia abyssinica</i> and consume the mixture in a cup using only one finger joint	Oral	Rabies	Market	AA13
		<i>Lactuca serriola</i> L	Wotetie (Am)	H	Lf	Fresh	The leaf undergoes crushing, immersion in water, and a single coffee cup is consumed for two days	Oral	Intestinal problem	Wild	AA14
		<i>Vernonia amygdalina</i> Del	Baka (Sh)	Sh	Lf	Fresh	The fluid is consumed by squeezing the leaves	Oral	Stomachache	HGAW	AA15
				Lf	Fresh		One cup of coffee is filled with freshly squeezed leaves and consumed	Oral	Malaria		
				Lf	Dry		The leaves of <i>Vernonia amygdalina</i> are crushed and applied to the patient's body for cleaning purposes, or alternatively, the leaves can be utilized as a natural soap to cleanse the affected area	Dermal	Wound		
				Lf	Fresh		The leaf undergoes crushing, immersion in honey, and a single cup is consumed persistently until complete recuperation	Oral	Ameba		

Table 12 (continued)

S.No	Family	Scientific Name	Local Name	Ha	PU	CPU	Method of Preparation and Mode of Application	RoA	Ailment Treated (English)	Source	Voucher Number
				Lf	Fresh		The leaf is chewed and the juice is ingested over a span of three days	Oral	Gastritis		
				Lf	Fresh		The <i>Vernonia amygdalina</i> Del. leaf is crushed, combined with water, boiled, and subsequently consumed	Oral	Ascariasis		
	Apiaceae	<i>Coriandrum sativum</i> L.	Dimbial (Am)	H	Sd	Dry	The process involves grinding the roasted seeds, blending them with water, and consuming the resulting solution orally	Oral	Cough	Market	AA16
				Sd	Dry		The seeds undergo the process of roasting and boiling in water before being consumed	Oral	Nausea		
				Lf	Fresh		Boil the juice with water and consume it	Oral	Kidney problem		
		<i>Centella asiatica</i> (L.) Urb	Yeayit jero(Am)	H	Lf	Fresh	The crushed leaf is combined with butter and creamed wounds, and then exposed to sunlight for 15 min	Dermal	Wound	Wild	AA17
	Araceae	<i>Amorphophallus abyssinicus</i> (A.Rich.) N.E.Br	Bagana (Sd)	H	Lf	Fresh	Rubbing the <i>Amorphophallus abyssinicus</i> leaf onto the affected area of a snake bite is a common practice	Dermal	Snake bite	Wild	AA18
		<i>Colocasia esculenta</i> (L.) Schott	Baka (Sh)	H	Lf	Fresh	The snake-bitten area is treated by wiping it with the leaf of <i>Colocasia esculenta</i> (L.) Schott	Dermal	Snake bite	HGAW	AA19
				Lf	Fresh		The food was consumed after being boiled for duration of three days	Oral	Constipation		
				Lf	Fresh		The juice is taken in the morning for 3 consecutive days after boiling, cooling, and allowing it to stay overnight	Oral	Gastritis		
	Bignoniaceae	<i>Spathodea campanulata</i> P.Beauv	Nebelbal (Am)	T	Lf	Fresh	The leaf crushed and mixes with water then drunken one coffee cup for three days. Take milk as an antidote	Oral	Malaria	Wild	AA20

Table 12 (continued)

S.No	Family	Scientific Name	Local Name	Ha	PU	CPU	Method of Preparation and Mode of Application	RoA	Ailment Treated (English)	Source	Voucher Number
	Boraginaceae	<i>Cordia Africana</i> Lam	Giga (Sh)	Sh	Lf	Fresh	A concoction made by grinding the leaves of <i>Ruta chalepensis</i> with its own leaves, adding a drop of Citrus limon, boiling the mixture, and consuming one cup of it (sin) is recommended	Oral	Tonsillitis	HG	AA21
					Lf	Fresh	The infected body is treated by applying the squeezed leaf of <i>Cordia Africana</i> Lam. in combination with <i>Rhamnus prinoides</i> L.Herit	Dermal	Spider venom		
					Lf	Fresh	The crushed leaf is combined with butter and creamed wounds, and then exposed to sunlight for 40 min	Dermal	Wound		
					Rt	Fresh	The fresh root is pulverized and blended with water, then consumed in a single glass of tea	Oral	Liver		
		<i>Cynoglossum lanceolatum</i> Forssk	Ketibaro (Mn)	H	Rt	Fresh	Crush the root; combine it with water, and drunk in a single coffee cup	Oral	Abdominal Pain	Wild	AA22
					Lf	Fresh	The leaf crushed and then applied to the face	Dermal	Mich		
					Lf	Fresh	The leaf of this plant is crushed and added to wound until recovery	dermal	Wound		
	Brassicaceae	<i>Lepidium sativum</i> L	Silfa (Mn)	H	Sd	Dry	The process involves grinding dry seeds, mixing the resulting powder with water, and consuming the solution orally	Oral	Dysentery	Market	AA23
					Sd	Dry	Create a mixture by combining <i>Echinops kebericho</i> powder with <i>Croton macrostachyus</i> leaves, and then consume the resulting solution	Oral	Malaria		
		<i>Brassica carinata</i> A. Braun	Koza (Sh)	H	Sd	Dry	Roast the dry seeds in a dish without water and apply the resulting paste onto the affected area	Dermal	Eczeema	Market	AA24

Table 12 (continued)

S.No	Family	Scientific Name	Local Name	Ha	PU	CPU	Method of Preparation and Mode of Application	RoA	Ailment Treated (English)	Source	Voucher Number
		<i>Brassica nigra</i> L	Sinafich (Am)	H	Sd	Dry	The affected part can be treated by applying a mixture of vaseline and the powder	Dermal	Wound	Market	AA25
	Caricaceae	<i>Carica papaya</i> L	Papaya (Am)	T	Lf	Dry	The leaf of this plant should be dried, boiled in water, and drunk in the form of one cup of coffee per day	Oral	Diabetes	HG	AA26
					Sd	Dry	The dried and powdered seed of <i>Carica papaya</i> L. is blended with tea, creating a mixture that can be consumed	Oral	Gastritis		
					Lf	Dry	The <i>carica papaya</i> leaves are combined with the <i>Allium sativum</i> bulbs, ground, and powdered. The mixture is then boiled and blended with honey. A single coffee cup of this concoction is consumed every morning for duration of three days. Antidote: Bulla which made from <i>Erset ventricosum</i>	Oral	Malaria		
	Celastraceae	<i>Catha edulis</i> (Vahl) Forssk. Ex Endl	Chat (Am)	Sh	Lf	Fresh	The consumption of fluids is preceded by the chewing of leaves	Oral	Snakebite	HG	AA27
					Lf	Dry	The crushed dry leaf of <i>Catha edulis</i> is combined with coffee or tea and consumed	Oral	Common cold		
					Lf	Fresh	The infusion is prepared by boiling <i>Catha edulis</i> and <i>Coffea arabica</i> leaves with honey and consumed	Oral	Asthma		
	Commelinaceae	<i>Commelina benghalensis</i> L	Zobut (Mn)	H	Lf	Fresh	The leaf carefully crushed and firmly fastened with cloth until it regained its original state	Dermal	Wound(Gormit, Hata or Liffe)	Wild	AA28
					St	Fresh	Apply the stem sap to the affected region until complete healing occurs	Dermal	Ringworm		

Table 12 (continued)

S.No	Family	Scientific Name	Local Name	Ha	PU	CPU	Method of Preparation and Mode of Application	RoA	Ailment Treated (English)	Source	Voucher Number
	Crassulaceae	<i>Kalanchoe densiflora</i> Rolfe	Oshka-charo (Sh)	H	Rt	Dry	The roots are dehydrated and combined with <i>Allium sativum</i> bulbs and <i>Ruta chalepensis</i> leaves. The resulting powder is immersed in water and inhaled, followed by tie it around the neck using a cotton cloth fastened with a thread made of silk	Nasal	Evil eye	HG/AW	AA29
					Lf	Fresh	Upon squeezing the leaf of this plant, half a cup of coffee is administered on an empty stomach	Oral	Ascaries		
					St	Fresh	The stem is heated until it reaches a high temperature, and subsequently applied to the infected area	Dermal	Hemorrhoids		
					Rt	Fresh	The nasal fumigation is performed using fresh root	Nasal	Common cold		
					Rt	Fresh	The squeezed roots of <i>Kalanchoe densiflora</i> Rolfe are then applied with a few drops into the ear	Dermal	Ear pain		
					Rt	Fresh	The crushed root is mixed with water and applied to the affected areas of the teeth to alleviate pain	Oral	Toothache		
					Wp	Dry	Crush the entire portion, combine it with honey, and administer it to the impacted region	Dermal	Scabies		
					Rt	Fresh	To consume, crush the root and add water to extract its juice. Take one cup of the resulting liquid orally	Oral	Tonsillitis		
					Lf	Fresh	The heated fresh leaf is applied onto the swollen area of the body	Dermal	Swelling		
					Lf	Fresh	The oral consumption of the juice obtained by crushing the leaf is recommended	Oral	Snakebite		

Table 12 (continued)

S.No	Family	Scientific Name	Local Name	Ha	PU	CPU	Method of Preparation and Mode of Application	RoA	Ailment Treated (English)	Source	Voucher Number
	Cucurbitaceae	<i>Cucurbita pepo</i> L	Buqee (Or)	Cl	Fr	Dry	In the morning, the chopped fruit and boiled flesh were consumed without any other food beforehand	Oral	Gastritis	HG	AA30
					Sd	Dry	The crushed and boiled seed of this plant is administered as aocion, with a recommended dosage of 2 coffee cups per day, for a period of one week	Oral	Tape worm		
		<i>Coccinia abyssinica</i> (Lam.) Cogn	Anchote (Am)	Cl	Tub	Fresh	The tuber of this plant is given for injured person to recovery from their broken bone	Oral	Broken bone	Wild	AA31
		<i>Momordica foetida</i> Schumach	Bererit (Mn)	Cl	Lf	Fresh	To heal wound, extract the juice from the leaf of this plant and apply it to the affected area.	Dermal	Wound	Wild	AA32
		<i>Laggera siceraria</i> (Molina) Standley	Qil (Am)	H	Fr	Dry	Pour water into a bitter <i>Laggera siceraria</i> (Molina) Standley, vigorously shake the concoction, and drunk it	Oral	Stomachache	HG	AA33
					Lf	Fresh	Gently squeeze the foliage and transfer the fluid component into the ear canal	Dermal	Ear pain		
		<i>Zehneria scabra</i> (L.f) Sond	Harg ressa (Am)	Cl	Rt	Fresh	The root of this plant, which is the size of a finger, was crushed and consumed two cups of coffee daily for duration of three days. Antidote: Milk and coffee	Oral	Malaria	Wild	AA34
					Lf	Fresh	The leaves undergo boiling and fumigation during the night, followed by a morning bath	Dermal	Mitch		
	Dryopteridaceae	<i>Dryopteris filix-mas</i> (L.) Schott	Fern (Am)	H	Lf	Fresh	The frond of this plant crushed and administered to the impacted skin once daily until the skin infection is healed	Dermal	Wound	Wild	AA35

Table 12 (continued)

S.No	Family	Scientific Name	Local Name	Ha	PU	CPU	Method of Preparation and Mode of Application	RoA	Ailment Treated (English)	Source	Voucher Number
105.	Euphorbiaceae	<i>Croton macrostachyus</i> Del	Kombelit (Mn)	T	Ba	Dry	The crushed bark, which is of a size comparable to that of a hand palm, is pulverized and then combined with water. The resulting mixture is subsequently filtered, and the resulting solution is ingested orally for three days	Oral	Snakebite	Wild	AA36
					Lf	Dry	The powdered dry leaf of this plant is soaked in water overnight, filtered, and consumed in a coffee cup for two consecutive days. Additionally, it is advised to avoid exposure to direct sunlight for one day. As an antidote, one can consume red teff porridge	Oral	Gonorrhea		
					Lax	Fresh	Apply the latex or crush the leaf and administer it to the impacted skin once daily until the skin infection is healed	Dermal	Wound		
					Lf	Fresh	The crushed shoot portion of the plant leaf is incorporated into the affected region	Dermal	Tetanus		
					Ba	Fresh/Dry	Powder the bark and blend them with water. Consume a cup of the mixture for two days. Milk and red Tef porridge can be used as an antidote	Oral	Malaria		
					St	Fresh	The soft part of the stem can be harvested and consumed alongside the local beverage known as "Borde"	Oral	Constipation		
					Lax	Fresh	The shoot is cut and the sap is applied smoothly	Dermal	Ring worm		
					Lf	Fresh	The shoots are pulverized with water, filtered, and subsequently drunk as a solution	Oral	Hepatitis		

Table 12 (continued)

S.No	Family	Scientific Name	Local Name	Ha	PU	CPU	Method of Preparation and Mode of Application	RoA	Ailment Treated (English)	Source	Voucher Number
				Lf	Fresh		Consume a leaf shoot that is cut into a small strip size and cooked, along with red teff flour Enjera (as antidote), for a period of 2–3 days	Oral	Ascaries		
				Lf	Fresh		The shoots' leaves undergo boiling with water, followed byanting of the toxic water and drying. The resultant fine powder is blended with spice powder and water. A quantity of approximately half a coffee cup is administered daily for duration of one month	Oral	Tuberculosis		
		<i>Croton megalocarpus</i> Hutch		T	Lf	Fresh	<i>C. megalocarpus</i> leaves produce sap that is used externally to treat wounds that are bleeding	Dermal	Wound	Wild	AA37
		<i>Euphorbia abyssinica</i> G.F.Gmel	Arekach (Mn)	T	St	Dry	Powder the stems and blend them with water. Consume a cup of the mixture daily for a week. Milk can be used as an antidote	Oral	Malaria	Wild	AA38
					Rt	Dry	The affected area is treated by applying a mixture of crushed roots, filtered and combined with juice from <i>Citrus aurantifolium</i> , along with cream	Dermal	Eczema		
					Rt	Dry	The roots are pulverized and applied to the inflamed area	Dermal	Swelling		
		<i>Manihot esculenta</i> Cranz	Kech(Am)	Sh	Tub	Fresh	The tuber of this plant is cooking and eats to reduce high blood pressure	Oral	Hypertension	Wild	AA39
		<i>Ricinus communis</i> L	Bolut (Mn)	Sh	Sd	Dry	The seeds undergo a process of roasting, grinding, and blending with butter before being delicately spread as a cream onto the affected area	Dermal	Eczema	HGAW	AA40
					Lf	Fresh	The crushed leaves are utilized remedy for wounds	Dermal	Wound		

Table 12 (continued)

S.No	Family	Scientific Name	Local Name	Ha	PU	CPU	Method of Preparation and Mode of Application	RoA	Ailment Treated (English)	Source	Voucher Number
				Lf	Fresh		The solution involves immersing freshly crushed leaves in water, incorporating safflower powder, and consuming a single glassful at once	Oral	Appendicitis		
	Fabaceae	<i>Milletia ferruginea</i> (Hoscht.) Bak	Ziyagu (Sh)	T	Sd	Dry	The affected area can be treated by applying a mixture of roasted and ground seeds, combined with butter and cream, for duration of three days	Dermal	Eczema	Wild	AA41
				Ba	Fresh		The bark of this plant peels and put on the bleeding skin to stop the bleeding	Dermal	Bleeding skin		
		<i>Indigofera spicata</i> Forssk	Gimay (Mn)	H	Lf	Fresh	In the morning, on an empty stomach, ingest pounded leaf	Oral	Stomachache	Wild	AA42
		<i>Trigonella foenumgraecum</i> L	Abishii (Or)	H	Sd	Dry	Chewed the root of this plant during pain time	Oral	Toothache	Market	AA43
		<i>Senna didymobotrya</i> (Fresen.) H.S.Irwin & Bameby	Hamashaka(Sd)	Sh	Lf	Fresh/dry	Consume the boiled and pounded seed as a morning broth on an empty stomach	Oral	Gastric	Wild	AA44
		<i>Senna hirsuta</i> (L.) H.S.Irwin & Bameby	NA	Sh	Rt	Fresh/dry	Action made from leaves can be consumed to treat abdominal ailments.	Oral	Abdominal pain	Wild	AA45
	Lamiaceae	<i>Ocimum lamifolium</i> Hochst.ex Benth	michi-charo (Sh)	Sh	Lf	Fresh	Blend the powder derived from the root of this plant with water and consume twice daily for a minimum duration of 3 consecutive days	Oral	Snakebite	HG	AA46
				Sh	Lf	Fresh	The leaves are first crushed and mixed with water, followed by filtration. Subsequently, the resulting mixture is consumed with honey for a period of 2–4 days, with the quantity varying based on the age and gender of individuals. Children are advised to consume one teaspoon, females and elders are recommended to have one coffee cup, while adults are instructed to drink one tea glass	Oral	Dysentery		

Table 12 (continued)

S.No	Family	Scientific Name	Local Name	Ha	PU	CPU	Method of Preparation and Mode of Application	RoA	Ailment Treated (English)	Source	Voucher Number
				Lf		Fresh	Boiling the <i>Ocimum lamiifolium</i> Hochst. ex Benth. leaf in water, followed by filtration and consumption of the filtered water is recommended	Oral	Diabetes		
				Wp		Fresh	A cream is prepared by grinding leaves, stems, and seeds together, which is then applied to the affected area of swelling	Dermal	Wound		
				Lf		Fresh	The plant's leaf is subjected to boiling, and a daily dosage of 2–3 tea cups of the result is administered to individuals over a period of 3 consecutive days	Dermal	Febrile illness		
				Lf		Fresh	The vapor is produced by boiling the fresh leaf and stem in water, which is then inhaled	Dermal	Mitch		
				Lf		Fresh	Fresh leaf and stem are boiled in water and inhaled by vapor	Nasal	Headache		
				Lf		Fresh	The tea or coffee is enhanced by incorporating the squeezed fresh leaf of <i>Ocimum lamiifolium</i> Hochst. ex Benth. and consumed		Common cold		
		<i>Ocimum americanum</i> L	Besobila (Am)	H	Sd	Fresh	Prior to consumption, submerge both the fruit and leaf of this plant in either milk or water, and subsequently ingest on an empty stomach	Oral	Intestinal ailment (Diarrhea)	HG	AA47
		<i>Rosmarinus officinalis</i> L	Rosmeri (Am)	H	Lf	Dry	The leaf that has been crushed is mixed with water and consumed in a coffee cup over a span of three days	Oral	Stomachache	HG	AA48
	Lauraceae	<i>Persea americana</i> Mill	Avocado (Am)	H	Lf	Fresh	Boil one glass of tea made from the leaf of this plant daily until the ailment is prevented	Oral	Diabetes	HG	AA49

Table 12 (continued)

S.No	Family	Scientific Name	Local Name	Ha	PU	CPU	Method of Preparation and Mode of Application	RoA	Ailment Treated (English)	Source	Voucher Number
					Fr	Fresh	The affected skin or hair can be treated by peeling and applying the fruit of this plant, leaving it on for two hours before washing it off with soap and clean water. This process should be repeated for a week	Dermal	Dandruff		
	Linaceae	<i>Linum usitatissimum</i> L.	Telba (Am)	H	Sd	Dry	The affected area is treated by applying a mixture of ground dry seeds, honey, and cream	Dermal	Eczeema	Market	AA50
					Sd	Dry	Boil the seed and consume the resulting infusion, in the quantity of 1–2 water glasses, once cooled, to alleviate discomfort	Oral	Constipation		
					Sd	Dry	Place the seeds inside the eye and tie it with a piece of cloth, subsequently releasing it after duration of 5 min	Optical	Eye disease		
	Malvaceae	<i>Sida acuta</i> Burm.f	Keravat (Am)	H	Lf	Fresh	The juice obtained from soaking the seeds in water is consumed	Oral	Diarrhea	Wild	AA51
	Meliaceae	<i>Melia azedarach</i> L.	Mimi (Am)	T	Lf	Fresh	The wound area is treated by applying the solution derived from the leaf	Oral	Malaria	HG	AA52
	Menispermaceae	<i>Cissampelos mucronata</i> A. Rich	Nech hareg (Am)	Cl	Rt	Fresh	Crush the leaf of this plant with <i>Vernonia amygdalina</i> leaf, then grate the liquid portion and consume it along with a dose equivalent to a small strip of a cup's little finger	Dermal	Dandruff	Wild	AA53
	Moringaceae	<i>Moringa oleifera</i> Lam	Shiferaw (Am)	T	Lf	Fresh/Dry	The hair exposed to crushing and washing for a period of 7 consecutive days The root is chewed and the fluid is consumed, then smear the abdomen	Oral	Stomachache	HG	AA54
					Lf	Fresh/Dry	Prepare a morning beverage by crushing and boiling the leaf, and consume it on an empty stomach	Oral	Blood pressure		

Table 12 (continued)

S.No	Family	Scientific Name	Local Name	Ha	PU	CPU	Method of Preparation and Mode of Application	RoA	Ailment Treated (English)	Source	Voucher Number
				Lf	Fresh		The Moringa's fresh leaf is crushed and boiled in water before consumption	Oral	Diabetes		
				Lf	Dry		The Moringa leaf is first dried, then pulverized and blended with coffee before consumption	Oral	Gastritis		
	Musaceae	<i>Ensete ventricosum</i> (Welw) Cheesman	Odu (Sh)	H	St	Dry	Bulla, a starchy powder commonly found in the local area, is typically consumed with milk	Oral	Broken bone	HG	AA55
				Rt	Dry		The root is typically consumed after being roasted and mixed with salt for a period of three days	Oral	Diarrhea		
				H	Fr	Fresh	Peel the fruit outer part and paint the affected skin	Dermal	Eczema	HG	AA56
		<i>Musa accuminata</i> Colla	Muz (Am)	Lax	Fresh		The latex of this plant added to cut skin to stop bleeding	Dermal	skin Bleeding		
	Myrtaceae	<i>Eucalyptus globulus</i> Labill	Bootta zaafiya (Wol)	T	Lf	Dry	To prevent the common cold, one can inhale or smell the boiled leaf of this plant	Nasal	Common cold	HG/AW	AA57
				Lf	Fresh		Fresh leaves should be boiled in water and the resulting water vapor should be inhaled repeatedly	Nasal	Mich		
				T	Lf	Dry	The affected body is treated by applying a mixture of finely powdered plant part and fresh butter until complete recovery	Dermal	Skin rash	HG	AA58
	Oleaceae	<i>Psidium guajava</i> L	Zeytuna (Am)	T	Lf	Fresh	The leaves are crushed, blended with water, and then consumed as a solution	Oral	Stomach ache	HG/AW	AA59
		<i>Olea europaea</i> (Wall. ex G. Don) Cif	Ejersa (Sd)	Lf	Fresh		The affected area can be treated by applying the juice extracted from pounding the leaf of <i>Olea europaea</i>	Dermal	Dandruff		
				Lf	Fresh		The wound area is treated by applying oil derived from the leaf	Dermal	Wound		

Table 12 (continued)

S.No	Family	Scientific Name	Local Name	Ha	PU	CPU	Method of Preparation and Mode of Application	RoA	Ailment Treated (English)	Source	Voucher Number
	Phytolaccaceae	<i>Phytolacca dodecandra</i> L'Herit	Shorshu (Sh)	Sh	Rt	Fresh	The ingestion of chewed roots and the subsequent swallowing of the fluid are followed by the oral consumption of <i>Guizotia abyssinica</i> solution, which serves as an antidote. The second round of medication is given in the 28th day counting from the first day of medication. Milk or Bordele (locally made from sorghum) also used as antidote	Oral	Rabies	Wild	AA60
				St		Fresh	To alleviate tooth pain, warm a section of the plant's stem and apply it to the affected area for a few seconds	Dermal	Toothache		
				Lf		Fresh	The affected area should be washed after mixing pounded leaves of <i>Vernonia amygdalina</i> with it	Dermal	Scabies/Itching		
				Rt		Fresh	The pounded root of <i>Phytolacca dodecandra</i> L. Herit is blended with water and consumed in a filtered solution, equivalent to a single cup of coffee, for duration of 7 days	Oral	Liver disease		
				Rt		Fresh	To prepare a remedy, crush a small quantity of the plant's root along with a bulb of <i>A. sativum</i> and blend it with water. Consume one cup of this mixture daily for a duration of three days.	Oral	Malaria		
				Lf		Fresh	The leaf undergoes squeezed, and subsequently, the extracted juice is blended with fresh milk before being consumed in a coffee cup of half the size of a fingernail	Oral	Jaundice		
	Polygalaceae	<i>Securidaca longepedunculata</i> Fresen	Temenay (Am)	T	Rt	Dry	The root burned, and its smoke should be inhaled inside house	Nasal	Evil spirit	Wild	AA61

Table 12 (continued)

S.No	Family	Scientific Name	Local Name	Ha	PU	CPU	Method of Preparation and Mode of Application	RoA	Ailment Treated (English)	Source	Voucher Number
					Rt	Dry	The index finger size of root powder mixed with water and salt used as snake bites	Oral	Snake bites		
					Rt	Dry	Chewing the little finger stripe size root of this plant used to treat the toothache pain	Oral	Toothache		
					Rt	Dry	The root of this plant powder mix with sorghum powder eats to enhance the erectile function	Oral	Impotency		
	Polygonaceae	<i>Rumex nepalensis</i> Spreng	Germach (Ben)	H	Rt	Fresh	Roots are chewed and fluid swallowed	Oral	Febrile illness	Wild	AA62
					Rt	Fresh	The root of this plant should be crushed, mixed with water, and consumed	Oral	Abdominal pain		
					Rt	Fresh	Crush the root of this plant then give in a cup with a depth of about little finger strip to reduce the fall down of epiglottis	Oral	Tonsillitis		
					Lf	Fresh	Leaves are crushed and tied on the placenta; fluid is taken orally	vaginal	Retained placenta		
					Rt	Fresh	The <i>Rumex nepalensis</i> root is dug up using a silver ring knife, subsequently crushed, pressed, mixed with a small amount of water, and consumed in a single coffee cup prior to Friday morning's meal	Oral	Ascariasis		
		<i>Rumex abyssinicus</i> Jack	Ambatto (Kf)	H	Rt	Fresh	The crushed root of <i>Rumex abyssinicus</i> is combined with water, boiled, sweetened with sugar, and subsequently consumed	Oral	Hypertension	Wild	AA63
					Lf	Fresh	The leaf of <i>Rumex abyssinicus</i> undergoes a process of pounding, squeezing, and following application onto the injured area	Dermal	Wound		

Table 12 (continued)

S.No	Family	Scientific Name	Local Name	Ha	PU	CPU	Method of Preparation and Mode of Application	RoA	Ailment Treated (English)	Source	Voucher Number
				Rt	Dry		The affected part can be treated by pounding and powdering the root of <i>Rumex abyssinicus</i> , mixing it with a solution of <i>Citrus limon</i> , and applying it along with the root of <i>Rumex nepalensis</i>	Dermal	Ring worms		
				Rt	Dry		The root, when crushed, boiled, and consumed in a single cup of coffee daily for a month, is believed to have beneficial effects	Oral	Cancer		
				Rt	Dry		After drying the root of this plant and crushing it, combine a tablespoon of the resulting powder with half a cup of water and consume alongside Injera	Oral	Diabetes		
	Ranunculaceae	<i>Nigella sativa</i> L.	Tikur Azmud (Am)	H	Sd	Dry	Mix the seeds of the plant with <i>Allium sativum</i> , pound them together, and combine with honey. Boil the mixture and consume it in a cup to alleviate cough symptoms	Oral	Cough	Market	AA64
				Sd	Dry		The <i>Nigella sativa</i> L. seed is pulverized and inhaled nasally	Nasal	Common cold		
	Rhamnaceae	<i>Rhamnus prinoides</i> L'Her	Xaddo (Sd)	Sh	Lf	Fresh	The mixture of <i>Ruta chalapensis</i> leaves and <i>Citrus limon</i> , ground together and boiled, is consumed in the form of one coffee cup (sini)	Oral	Tonsillitis	HG	AA65
				Lf	Fresh		Apply the squeezed leaf of <i>Rhamnus prinoides</i> L. Herit onto the affected area for duration of 7 days	Dermal	Spider venom		
				Lf	Fresh		The crushed leaf is combined with butter and creamed wounds, and then exposed to sunlight for a few minutes.	Dermal	Wound		

Table 12 (continued)

S.No	Family	Scientific Name	Local Name	Ha	PU	CPU	Method of Preparation and Mode of Application	RoA	Ailment Treated (English)	Source	Voucher Number
				Rt		Fresh	The fresh root should be pulverized and combined with water, then consumed in a single tea glass daily for a duration of 7 days	Oral	Liver		
	Rubiaceae	<i>Coffea arabica</i> L.	Jianu (Sh)	Sh	Sd	Dry	Upon roasting the seeds of this plant, one can inhale or detect the aroma of the smoke	Nasal	Headache	HG/W	AA66
					Sd	Dry	Ground roasted seeds should be applied to the affected skin once a day for a period of three consecutive days	Dermal	Wound		
					Sd	Dry	After being roasted, powdered, and mixed with butter, it was then painted	Dermal	Spider poison		
					Sd	Dry	Ingesting a mixture of powdered, roasted dry seeds, and honey during the morning hours is a recommended practice	Oral	Diarrhea		
					Lf	Dry	Crush the leaf of <i>C. arabica</i> , bulb of <i>A. sativum</i> , and shoot of <i>A. absinthium</i> , mix them with water, boil the mixture, and add salt and butter. Consume 3–5 cups of this concoction daily for a period of 3 days	Oral	Common cold		
	Rutaceae	<i>Citrus sinensis</i> (L.) Osbeck	Birtukan (Am)	T	Fr	Fresh	The solution should be chewed and swallowed for a duration of 3–5 days	Oral	Cough	HG	AA67
		<i>Ruta chalepensis</i> L.	Tserti (Sh)	H	Lf	Fresh	The young branch leaf is used as the main component of a mixture of the traditional medicine of evil eye	Oral	Evil eye	HG	AA68
					Lf	Fresh	The leaf of <i>Ruta chalepensis</i> L. needs to be crushed and combined with the seed of <i>Lepidium sativum</i> L. and crushed <i>Allium sativum</i> L. Subsequently, it should be mixed with milk and consumed	Oral	Gonorrhea		

Table 12 (continued)

S.No	Family	Scientific Name	Local Name	Ha	PU	CPU	Method of Preparation and Mode of Application	RoA	Ailment Treated (English)	Source	Voucher Number
				Lf	Fresh		Extract the juice from the leaf and dilute it with water before administering a cup of the solution to the patients	Oral	abdominal pain		
				Lf	Fresh		The leaf should be crushed with water and administered to the patients in a cup	Oral	Vomiting		
				Fr	Dry		The fruit of <i>Ruta chalepensis</i> with bulb of <i>Allium sativum</i> and seed of <i>Lepidium sativum</i> are pounded soaked for one days, then take with Enjera for three consecutive days	Oral	Ascariasis		
				Fr	Dry		For duration of 10 days, a solution made by boiling a handful of fruit with water and consuming it in a coffee cup is recommended	Oral	Diabetes		
				Lf	Fresh		For a period of three days, <i>Ruta chalepensis</i> leaves are soaked in tea and subsequently consumed	Oral	Common cold		
				Lf	Fresh		The tea is prepared by boiling the branches along with the rhizome of zinger and bulb of garlic, and it is recommended to consume one cup daily for a period of 7 days	Oral	Malaria		
				Lf	Dry		The crushed seed and leaf were mixed into a fine powder, which was then applied to the bleeding nose and inhaled every morning for duration of three days	Nasal	Nasal bleeding		
				Lf	Fresh		For a period of 5 days, it is recommended to consume a mixture of pounded and powdered <i>Ruta chalepensis</i> leaf, <i>Allium sativum</i> bulbs, coffee, and sugar. The infusion should be consumed twice a day, in the morning and evening, in a tea cup	Oral	Cough		

Table 12 (continued)

S.No	Family	Scientific Name	Local Name	Ha	PU	CPU	Method of Preparation and Mode of Application	RoA	Ailment Treated (English)	Source	Voucher Number
		<i>Citrus aurantifolia</i> (Christm.) Swingle	Lomi (Am)	T	Fr	Fresh	A concoction comprising of juice, egg yolk, and honey is prepared and consumed in a tea glass for duration of one week	Oral	Cough	HG/W	AA69
		<i>Clausena anisata</i> (Willd.) Hook.f. ex Benth	Durbay (Sh)	Sh	St	Fresh	To remove bacteria from human teeth, cut a piece of <i>Clausena anisata</i> stem about the size of a finger and use it to clean the teeth	Oral	Toothache	Wild	AA70
	Solanaceae	<i>Capsicum frutescens</i> L	Mitmita (Sh)	H	Fr	Fresh	During times of discomfort, the consumption of <i>Capsicum frutescens</i> L. ripe produce alongside enjera is a recommended	Oral	Intestinal problem	Wild	AA71
		<i>Datura stramonium</i> L	Bolute-rosun(Mn)	H	Lf	Fresh	The affected area is treated by applying the solution extracted from squeezed leaves	Dermal	Wound	Wild	AA72
					Sd	Dry	The powdered seed of this plant, when combined with butter, should be consumed orally, one spoonful per day, for a duration of 7 days. Antidote: Milk or Yoghurt	Oral	Gonorrhea		
					Sd	Dry	To alleviate pain, the affected area is fumigated with the roasted seed of <i>Datura stramonium</i>	Dermal	Toothache		
					Lf	Fresh	The squeezed leaf of <i>Datura stramonium</i> is combined with the leaf of <i>Nicotiana tobacum</i> , and subsequently, a few drops of solution are introduced through the ear	Auricular	Ear parasites		
					Lf	Fresh	Crush the leaf of this plant and apply the paint to the infected area of the head daily for a duration of one week	Dermal	Dandruff		
		<i>Lycopersicon esculentum</i> Mill	Timatim (Am)	H	Lf	Fresh	The solution for two consecutive days can be obtained by filtering the crushed leaves and consuming a single cup of it daily	Oral	Urine retention	HG	AA73

Table 12 (continued)

S.No	Family	Scientific Name	Local Name	Ha	PU	CPU	Method of Preparation and Mode of Application	RoA	Ailment Treated (English)	Source	Voucher Number
				Lf	Fresh		Apply the chewed leaf onto the affected region and keep it there until complete healing	Dermal	Spider poison		
		<i>Nicotiana tabacum</i> L	Tinbaho (Am)	H	Lf	Fresh	The affected area is covered with crushed leaves and tightly fastened for a duration of three days	Dermal	Wound(Life)	Wild	AA74
				Lf	Fresh		The affected area is painted with crushed leaves during the problem occurred	Dermal	Snake bite		
		<i>Solanum incanum</i> L	Hidi (Or)	H	Fr	Fresh	The crushed fruit of <i>Solanum incanum</i> L is combined with water, applied onto the scalp, and left for a duration of 20 min before being rinsed off using soap on a daily basis for a week	Dermal	Dandruff	Wild	AA75
				H	Lf	Fresh	The leaves were finely chopped, the juice was extracted, and a daily consumption of one cup of the solution was maintained for a duration of two days	Oral	Abdominal problem	Wild	AA76
		<i>Solanum anguivi</i> Lam. Hochst ex A. Rich	Ambu (Ben)	Sh	Fr	Fresh	The fruits undergo a process of crushing, blending with butter, and undergoing staining for a continuous period of 3 days	Dermal	Eczema	Wild	AA77
		<i>Solanum dasycarpum</i> Schumacher & Thonn	Turkit (Mn)	Sh	Lf	Fresh	Apply the infusion to the nostrils for a duration of three consecutive days	Nasal	Nosebleed	Wild	AA78
		<i>Withania somnifera</i> (L.) Dun	Kumo (Or)	Sh	Lf	Dry	During times of illness, a remedy can be made by finely crushing the leaves of <i>Withania somnifera</i> along with the leaves of <i>Artemisia abyssinica</i> , <i>Ruta chalepensis</i> , and the bulb of <i>Allium sativum</i> . This mixture can then be sniffed and tied around the neck using cotton cloth and silk thread	Nasal	Evil eye	HG	AA79

Table 12 (continued)

S.No	Family	Scientific Name	Local Name	Ha	PU	CPU	Method of Preparation and Mode of Application	RoA	Ailment Treated (English)	Source	Voucher Number
				Lf	Fresh		The affected part can be treated by crushing leaves, combining them with butter, and applying the mixture for a period of three days	Dermal	Hata/Life		
				Lf	Fresh		The leaves were finely chopped, the juice was extracted, and a daily consumption of one cup of the solution was maintained for a duration of two days	Oral	Intestinal problem		
	Vitaceae	<i>Cissus petiolata</i> Hook.f	Asqusa (Sh)	Cl	Rt	Fresh	After chopping the root finely and extracting the juice, one cup of the mixture was consumed over the course of three days. Antidote: milk and honey	Oral	Bloody diarrhea	Wild	AA80
	Zingiberaceae	<i>Zingiber officinale</i> Roscoe	Gamchalech(Mn)	H	Rz	Fresh	The rhizome should be crushed and subsequently boiled with sugar. It is recommended to consume one tea glass of the mixture for a duration of two consecutive days	Oral	Common cold	Market	AA81
				Rz	Fresh		The rhizome is consumed on an empty stomach after being crushed	Oral	Stomach ache		
				Rz	Fresh		The rhizome's liquid is administered at a rate of approximately three drops per day for a duration of three days to alleviate discomfort	Optical	Eye disease		
				Rz	Dry		Mix tea with chopped rhizomes and consume a glass of it to alleviate pain	Oral	Nausea		
				Rz	Dry		The rhizomes were finely chopped, the juice was extracted, and a daily consumption of one cup of the solution was maintained for a duration of two days	Oral	Diarrhea		

Ha Habit, (T) Tree, Sh Shrub, H Herb, Cl Climber, PU Parts Used ((Lf) Leaf, Rt Root, Ba Bark, Fr Fruit, Sd Seed, St Stem, Lax Latex, Bub Bulb, Flw Flower, Wp Whole part, Rz Rhizome, Tub Tuber). RoA Route of Administration. Source = W Wild and HG Home garden. NUR Number of Use Report. CPU Condition of Plants used, Local Name: Or Afan Oromo, Am Amharic, Sh Sheko, Kf Kaffirano, Mn Meinit, Sd Sidamo, Ben Bench, Wol Wolyita

professional support can enhance healthcare integration. Setting up medicinal plant nurseries in partnership with the Agriculture Office can aid in propagating preferred species for cultivation. Implementing these recommendations will support sustainable use and conservation of medicinal plants, ensuring their availability for future generations and promoting the fusion of traditional and modern healthcare systems.

Abbreviations

ANOVA	Analysis of variance
CSA	Central Statistical Agency of Ethiopia
FL	Fidelity level
GPS	Global positioning system
IAS	Invasive alien species
ICF	Informant consensus factor
IK	Indigenous knowledge
MTU	Mizan-Tepi University
PPV	Plant part value
TMPK	Traditional medicinal plants knowledge
TMPs	Traditional medicinal plants

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Author contributions

All authors have made significant contributions to this original research, Ashebir Awoke performed the data collection and formal analysis, Girma Gudesho helped in reviewing and editing the technique, manuscript, and botanical name identification, Fetku Akmel editing the language, and Dr. P. Shanmugasundaram verified the data analysis. All authors have reviewed and approved the final manuscript.

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Declarations

Ethics approval and consent to participate

Prior to data collection, permission letters were acquired from the Guraferda District Administration Offices. Informants were verbally consented before interviews and group discussions, and their data were recorded with their permission. Furthermore, consent was obtained from the informants to publish the individual data collected from them.

Consent for publication

Not applicable.

Competing interests

The authors state that they do not have any conflicts of interest.

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