

Full Length Research Paper

Plants used in traditional management of human ailments at Bale Mountains National Park, Southeastern Ethiopia

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Though the majority of people in Ethiopia at large, and at Bale Mountains National Park in particular, rely on ethnomedicinal plant species to manage human ailments, the indigenous knowledge largely remains undocumented. Therefore, an ethnobotanical study was conducted on medicinal plant species used to manage human ailments at Bale Mountains National Park, Southeastern Ethiopia. Observations and semi-structured interviews were used to gather ethnobotanical data. Altogether, 56 ailments were reported to be managed using 101 different ethnomedicinal plant species. Consensus of traditional healers was high in managing eczema (ICF = 0.58), tinea versicolor (ICF = 0.50), rheumatism (ICF = 0.43), haemorrhoids (ICF = 0.33), earache (ICF = 0.33) and gonorrhoea (ICF = 0.27). The mean number of plant species used by each healer showed significant difference with district. Most medicinal plant species reported in this study were found to be under threat and this calls for urgent conservation measures so as to maximize the sustainable use of these vital resources in the study area.

Key words: Ethnobotany, ethnomedicine, indigenous knowledge, medicinal plant, traditional medicine, traditional healer, Bale, Ethiopia.

INTRODUCTION

Ethiopia is an eastern African country with a total surface area of 1,127,127 Sq. Km and an estimated population size of 74,777,981. The birth rate of the country is 37.98 births per 1000 population while the death rate is 14.86 deaths per 1000 population (The World Fact book, 2007). Available information regarding the burden of diseases showed that the highest number of deaths occur due to communicable, maternal and prenatal problems (Fantahun and Degu, 2004; CSA Ethiopia and ORC Macro, 2006; WHO, 2006). The ten top causes of death among all age groups in 2002 for instance were lower respiratory infections, HIV/AIDS, prenatal conditions, diarrhoeal diseases, tuberculosis, measles, cerebrovascular disease, ischaemic heart disease, malaria and syphilis (WHO, 2006). The population of the country at large is also at a very high risk of major infectious

diseases such as food or waterborne (bacterial and protozoal diarrhoea, hepatitis A, typhoid fever, and hepatitis E), vector borne (malaria and cutaneous leishmaniasis), respiratory (meningococcal meningitis), animal contact (rabies) and water contact (schistosomiasis) diseases (The World Fact book, 2007).

Like any other developing and least developed nations, the available modern healthcare services of the country are not only insufficient but also inaccessible and unaffordable to the majority. This problem along with the rapidly increasing human population and cultural resistances towards the use of modern medicines means that the majority of the people in Ethiopia are dependent on traditional medicines of mainly plant origins so as to manage various human ailments (Abebe, 2001). As the country is known to have diverse socio-economic, ethnic, linguistics and cultural landscapes, the existence of rich indigenous medicinal plant use knowledge and practices in managing human ailments might reasonably be expected.

However, ethnomedicinal plant knowledge and use in Ethiopia is largely undocumented and research in this

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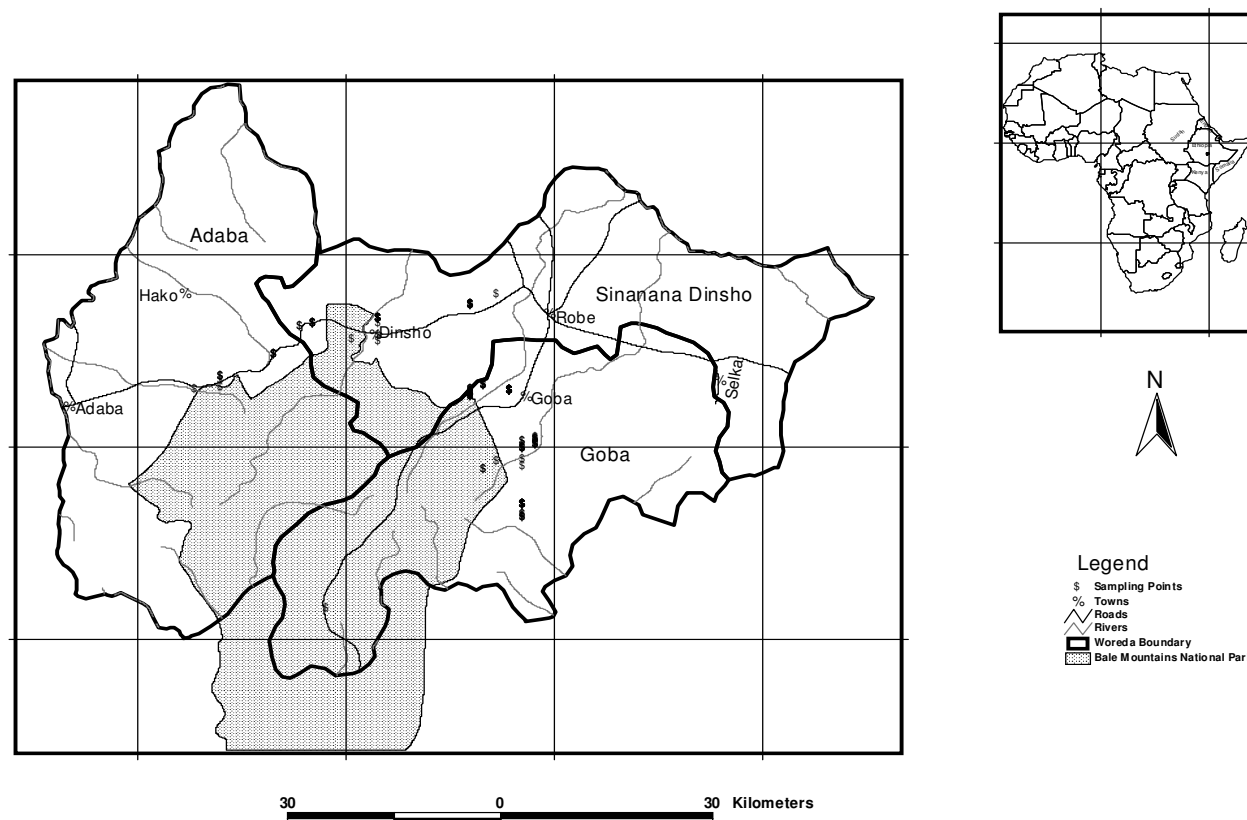


Figure 1. Map showing location of study area and sampling points.

field has been very recent activity (Tadesse and Demissew, 1992), as it was neglected and considered irrelevant in earlier times (Abebe and Ayehu, 1993). In fact, some early visitors have made inventory of medicinal plants in some areas of the country but the information has not been easily accessible to most researchers (Abebe, 1986). Moreover, most of the studies made to date are more general and do not focus on a specific ethnic group or agro-ecological zone of the country. Of course, there have been a number of such ethnomedicinal studies, especially recently (Addis et al., 2001; Fassil, 2003; Giday et al., 2003; Fassil, 2005; Giday et al., 2007; Teklehaymanot et al., 2007; Teklehaymanot and Giday, 2007; Wondimu et al., 2007; Yineger et al., 2007; Yineger and Yewhalaw, 2007; Yineger et al., 2008a; Yineger et al., 2008b; Lulekal et al., 2008). Documentation of medicinal plants and the associated indigenous knowledge of each ethnic group or agro-ecological zone of the country is thus far from complete. This holds true especially in the case of Bale Mountains National Park and adjacent areas where, to the best of our knowledge there were no previous studies on ethnomedicinal plant species used to manage human ailments. Therefore, the current study was conducted with the aim of documenting the traditional knowledge on the use of ethnomedicinal plant species by traditional healers within

the study area.

MATERIALS AND METHODS

Study area

The study was conducted in 16 selected *Kebeles* (the smallest administrative units in Ethiopia) of three districts (Sinana Dinsho, Adaba and Goba) found in and around Bale Mountains National Park, Bale Zone, Southeastern Ethiopia, between latitudes $06^{\circ}05'46'' - 07^{\circ}54'35''N$ and longitudes $039^{\circ}33'19'' - 039^{\circ}59'24''E$ (Figure 1) at an altitudinal range of 2441-3600 m a.s.l. The area has a typical vegetation type of undifferentiated Afromontane forests in Ethiopia and has a mean annual rainfall and temperature of 1218.64 mm and $10.26^{\circ}C$, respectively. The economic activities of the local people are primarily based upon mixed farming that involves pastoralism and cultivation of crops such as wheat and barely (Figure 1).

Ethnobotanical data collection

Ethnobotanical data were collected from January 2004 to March 2005 on medicinal plant species used by 43 traditional healers to manage human ailments in the study area. The chair persons of each *Kebele* and local inhabitants were used to identify and register traditional healers residing in and around the Bale Mountains National Park. In addition, identified traditional healers were invited to nominate other traditional healers. Authors demonstrated their maximum effort to involve as many female healers as possible in

the study. However, that was not realized due to the relative absence of female healers as well as lack of consent for some due to complicated socio-cultural reasons, which they could not tell to authors. Any way, all female traditional healers ($n = 8$) who gave their consent were involved in the study whereas systematic list sampling was employed to select 35 male traditional healers. Semi-structured interviews and observations were used (Martin, 1995). Interviews were facilitated by translators who were well conversant of the local language, *Oromiffa*, and this was done having first obtained verbal informed consent from each traditional healer. After consent was obtained, the backgrounds of each traditional healer including address, sex, age, occupation, educational level and marital status were recorded. Additionally the human ailments treated, local name of plant species used, source (wild/cultivated), habit, marketability, status (degree of scarcity), plant part used, form used (fresh/dried), methods of preparation and administration, dosages, other uses of the medicinal plant species, threats to ethnomedicinal plant species, conservation practice and indigenous knowledge transfer were also recorded.

The authors accompanied traditional healers, translators and assistants to the field and collected herbarium voucher specimens for plant species reported as medicinal. The general habitats and morphological features of the ethnomedicinal plant species were also observed and recorded. The specimens were pressed, dried, identified and deposited at The National Herbarium (ETH), Addis Ababa University. Identification of specimens was done using taxonomic keys in the Flora of Ethiopia and Eritrea (Hedberg and Edwards, 1989, 1995; Edwards et al., 1995; Edwards et al., 1997; Edwards et al., 2000; Hedberg et al., 2003; Hedberg et al., 2004) and comparison with herbarium materials.

Data analyses

MS Excel 2003 was used to quantify and sort data, determine proportions, and draw bar graphs and tables. ICF (informant consensus factor) values were determined following Trotter and Logan (1986) to evaluate healers' consensus on managing human ailments. The formula used to calculate these values was: $ICF = \frac{nuc - ns}{nuc - 1}$, where nuc = the number of use citations for a specific ailment, ns = the number of species used to treat the ailment. Fidelity levels (FL) (Friedman et al., 1986) were also determined to identify the most important medicinal plant species used to treat a particular ailment. These values were calculated as: $FL (\%) = \frac{SF}{TF}(100)$, where SF = frequency of citation of a species for a specific ailment and TF = total number of citations of that species.

Ethnomedicinal data were also analyzed utilizing three nonparametric tests in SPSS 12.0.1. The Spearman rank correlation test was used to see if there was a significant positive correlation between the educational level of traditional healers and the number of ailments treated as well as the number of ethnomedicinal plant species reported. Chi-square test was used to evaluate whether the mean number of ethnomedicinal plant species reported by each traditional healer varied significantly in the three districts and whether there was a significant difference between female and male traditional healers with respect to the number of species reported and used to treat human ailments. Binomial test was used to evaluate;

- i. Whether remedies were prescribed with doses.
- ii. Whether indigenous medicinal plant knowledge was transferred to generations.
- iii. Whether the reported ethnomedicinal plant species had multiple uses other than medicinal value.
- iv. If the medicinal plant species were reported to be threatened and
- v) whether traditional healers were practicing conservation activities for medicinal plant species of the study area.

RESULTS

The traditional healers involved in this study ranged in their ages from 18 to 88 and most (97.67%) belong to the Oromo ethnic group. Most of the traditional healers were males (81.40%), and had attended educational standards 1 - 4 (32.56%) and could only read and write (30.23%). The proportions of healers who were illiterate (18.60%) and who attended standards 5-8 (16.28%) were also high while one female healer (2.33%) was found to have completed grade 12.

Consensus of traditional healers in managing human ailments

In total, 56 different human ailments were reported to be managed by traditional healers using various medicinal plant species of the study area (Appendix I). The number of human ailments reported to be treated by each traditional healer was highly correlated (Spearman correlation test, $r = 0.511$, $\alpha = 0.01$, $p = 0.000$) with their educational level.

Traditional healers agreed more in the treatment of eczema (ICF = 0.58), tinea versicolor (ICF = 0.50), rheumatism (ICF = 0.43), haemorrhoids (ICF = 0.33), earache (ICF = 0.33) and gonorrhoea (ICF = 0.27) (Table 1). The species with the highest level of fidelity (FL = 53.85%) in the treatment of eczema was *Olea europae* subsp. *Cuspidata*. This human disease was also reported to be treated using *Solanum anguivi* Lam. and *Heracleum abyssinicum* (Boiss.) Norman, which shared the same fidelity level (FL = 25%). High degree of consensus was observed among the traditional healers on the use of *Datura stramonium* L. (FL = 50%) to manage tinea versicolor but low consensus on using *S. anguivi* (FL = 12.50%).

Senecio syringifolius O.Haffm. (FL = 100%), *Hypericum revolutum* Vahl. (FL = 100%) and *Cassipourea malosana* (Baker) Alston (FL = 75%) were medicinal species with very high fidelity level used to manage rheumatism. High fidelity level (FL = 50%) was also observed for *Schefflera volkensii* (Engl.) Harms, *Peperomia tetraphylla* (Foster) Hook. & Arn., *Nuxia congesta* R.Br.ex Fresen. and *Myrica salicifolia* A. Rich. Medicinal plant species with low fidelity levels in managing this ailment were *Linum usitatissimum* L. (FL = 33.33%), *Clerodendrum myricoides* (Hochst.) R.Br. ex Vatke (FL = 30%), and *Eucalyptus globulus* Labill. (FL = 14.29%).

Traditional healers reported that they treat haemorrhoids using *Aloe macrocarpa* Tod. (FL = 40%), *Ranunculus multifidus* Forssk. (FL = 20%), *Olea europae* subsp. *Cuspidata* (FL = 15.38%) and *S. anguivi* (FL = 12.50%). They also agreed in treating earache by employing *Melilotus officinalis* (L.) Lam. (FL = 100%), *Ajuga alba* (Gurke) Robyni (FL = 25%) and *Olea europae* subsp. *Cuspidata* (FL = 7.69%) Table 1.

Table 1. Degree of healers' consensus on managing human ailments.

| Human disease | ICF | Species | Fidelity level |
|----------------------------------|------|---|----------------|
| Eczema | 0.58 | <i>Heracleum abyssinicum</i> (Boiss.) Norman | 25.00 |
| | | <i>Olea europae subsp. Cuspidata</i> | 53.85 |
| | | <i>Solanum anguivi</i> Lam. | 25.00 |
| Tinea versicolor | 0.50 | <i>Datura stramonium</i> L. | 50.00 |
| | | <i>Solanum anguivi</i> Lam. | 12.50 |
| Rheumatism | 0.43 | <i>Cassipourea malosana</i> (Baker) Alston | 75.00 |
| | | <i>Clerodendrum myricoides</i> (Hochst.) R.Br. Ex Vatke | 30.00 |
| | | <i>Eucalyptus globulus</i> Labill. | 14.29 |
| | | <i>Hypericum revolutum</i> Vahl. | 100.00 |
| | | <i>Linum usitatissimum</i> L. | 33.33 |
| | | <i>Myrica salicifolia</i> A.Rich. | 50.00 |
| | | <i>Nuxia congesta</i> R.Br.ex Fresen. | 50.00 |
| | | <i>Peperomia tetraphyla</i> (Foster) Hook. & Arn. | 50.00 |
| | | <i>Schefflera volkensii</i> (Engl.) Harms | 50.00 |
| Haemorrhoids | 0.33 | <i>Senecio syringifolius</i> O.Haffm. | 100.00 |
| | | <i>Aloe macrocarpa</i> Tod. | 40.00 |
| | | <i>Olea europae subsp. Cuspidata</i> | 15.38 |
| | | <i>Ranunculus multifidus</i> Forssk. | 20.00 |
| Earache | 0.33 | <i>Solanum anguivi</i> Lam. | 12.50 |
| | | <i>Ajuga alba</i> (Gurke) Robyni | 25.00 |
| | | <i>Melilotus officinalis</i> (L.) Lam. | 100.00 |
| Gonorrhoea | 0.27 | <i>Olea europae subsp. Cuspidata</i> | 7.69 |
| | | <i>Euphorbia depauperata</i> A.Rich. | 33.33 |
| Evil spirit | 0.25 | <i>Euphorbia dumalis</i> S.Carter | 100.00 |
| | | <i>Euphorbia lathyris</i> L. | 33.33 |
| | | <i>Foeniculum vulgare</i> Mill. | 25.00 |
| | | <i>Gladiolus dalenii</i> Van Geel | 50.00 |
| | | <i>Kniphofia isoetifolia</i> Steud. ex Hochst. | 50.00 |
| | | <i>Lycopersicon esculentum</i> (L.) Mill | 50.00 |
| | | <i>Clerodendrum myricoides</i> (Hochst.) R.Br. Ex Vatke | 20.00 |
| Febrile illness (<i>Michi</i>) | 0.25 | <i>Helichrysum gofense</i> Cuf. | 50.00 |
| | | <i>Heracleum abyssinicum</i> (Boiss.) Norman | 25.00 |
| | | <i>Olea europae subsp. Cuspidata</i> | 7.69 |
| | | <i>Sideroxylon oxyacanthum</i> Baill. | 50.00 |
| | | <i>Artemisia afra</i> Jacq. ex Willd. | 33.33 |
| | 0.25 | <i>Cynoglossum amplifolium</i> Hochst.ex A.Rich. | 50.00 |
| | | <i>Eucalyptus globulus</i> Labill. | 14.29 |
| | | <i>Satureja punctata</i> (Benth.) Briq. | 100.00 |
| | | <i>Solanum anguivi</i> Lam. | 12.50 |

Diversity of medicinal plant species and healers' indigenous knowledge

A total of 101 medicinal plant species distributed in 88 genera and 51 botanical families were recorded and documented. The family reported with the highest number of medicinal plant species was Asteraceae (14 species, 13.86%). This was followed by Apiaceae (8 species, 7.92%) and Lamiaceae (6 species, 5.94%) (Table 2).

Most of the reported species were collected from

Sinana Dinsho (61.79%) and Goba (30.89%) districts while some (7.32%) from Adaba district. The average number of ethnomedicinal plant species reported by each healer varied significantly ($\chi^2 = 207.690$, $df = 22$, $\alpha = 0.05$, $p = 0.000$) with district: Adaba (3.67 ± 0.333), Goba (10.26 ± 0.837), Sinana Dinsho (7.66 ± 0.367). A significant ($\chi^2 = 62.338$, $df = 11$, $\alpha = 0.05$, $p = 0.000$) difference was also observed between female and male traditional healers with respect to the number of medicinal plant species reported and used. The mean number of

Table 2. Medicinal botanical families at Bale Mountains National Park

| Family | No. Genera | % | No. Species | % | No. Ailments treated | % |
|-----------------|------------|-------|-------------|-------|----------------------|-------|
| Acanthaceae | 2 | 2.27 | 2 | 1.98 | 2 | 1.10 |
| Aloaceae | 1 | 1.14 | 1 | 0.99 | 4 | 2.20 |
| Amaranthaceae | 1 | 1.14 | 1 | 0.99 | 3 | 1.65 |
| Amaryllidaceae | 1 | 1.14 | 1 | 0.99 | 2 | 1.10 |
| Apiaceae | 8 | 9.09 | 8 | 7.92 | 12 | 6.59 |
| Aquifoliaceae | 1 | 1.14 | 1 | 0.99 | 1 | 0.55 |
| Araceae | 1 | 1.14 | 1 | 0.99 | 4 | 2.20 |
| Araliaceae | 1 | 1.14 | 1 | 0.99 | 3 | 1.65 |
| Asparagaceae | 1 | 1.14 | 1 | 0.99 | 2 | 1.10 |
| Asphodelaceae | 1 | 1.14 | 1 | 0.99 | 2 | 1.10 |
| Asteraceae | 12 | 13.64 | 14 | 13.86 | 20 | 10.99 |
| Balsaminaceae | 1 | 1.14 | 1 | 0.99 | 1 | 0.55 |
| Boraginaceae | 2 | 2.27 | 2 | 1.98 | 4 | 2.20 |
| Cactaceae | 1 | 1.14 | 1 | 0.99 | 2 | 1.10 |
| Caricaceae | 1 | 1.14 | 1 | 0.99 | 2 | 1.10 |
| Caryophyllaceae | 1 | 1.14 | 1 | 0.99 | 2 | 1.10 |
| Celastraceae | 2 | 2.27 | 3 | 2.97 | 5 | 2.75 |
| Chenopodiaceae | 1 | 1.14 | 1 | 0.99 | 1 | 0.55 |
| Commelinaceae | 1 | 1.14 | 1 | 0.99 | 1 | 0.55 |
| Convolvulaceae | 1 | 1.14 | 1 | 0.99 | 1 | 0.55 |
| Crassulaceae | 3 | 3.41 | 3 | 2.97 | 4 | 2.20 |
| Euphorbiaceae | 1 | 1.14 | 3 | 2.97 | 6 | 3.30 |
| Fabaceae | 2 | 2.27 | 3 | 2.97 | 2 | 1.10 |
| Flacourtiaceae | 1 | 1.14 | 1 | 0.99 | 3 | 1.65 |
| Geraniaceae | 1 | 1.14 | 1 | 0.99 | 2 | 1.10 |
| Hyacinthaceae | 1 | 1.14 | 1 | 0.99 | 1 | 0.55 |
| Hypericaceae | 1 | 1.14 | 1 | 0.99 | 1 | 0.55 |
| Iridaceae | 1 | 1.14 | 1 | 0.99 | 2 | 1.10 |
| Lamiaceae | 5 | 5.68 | 6 | 5.94 | 8 | 4.40 |
| Linaceae | 1 | 1.14 | 1 | 0.99 | 3 | 1.65 |
| Loganiaceae | 1 | 1.14 | 1 | 0.99 | 2 | 1.10 |
| Malvaceae | 1 | 1.14 | 1 | 0.99 | 3 | 1.65 |
| Menispermaceae | 1 | 1.14 | 1 | 0.99 | 1 | 0.55 |
| Moraceae | 1 | 1.14 | 1 | 0.99 | 1 | 0.55 |
| Myricaceae | 1 | 1.14 | 1 | 0.99 | 2 | 1.10 |
| Myrtaceae | 1 | 1.14 | 2 | 1.98 | 6 | 3.30 |
| Oleaceae | 1 | 1.14 | 1 | 0.99 | 6 | 3.30 |
| Piperaceae | 1 | 1.14 | 2 | 1.98 | 3 | 1.65 |
| Plantaginaceae | 1 | 1.14 | 2 | 1.98 | 2 | 1.10 |
| Ranunculaceae | 2 | 2.27 | 3 | 2.97 | 6 | 3.30 |
| Rhamnaceae | 1 | 1.14 | 1 | 0.99 | 1 | 0.55 |
| Rhizophoraceae | 1 | 1.14 | 1 | 0.99 | 2 | 1.10 |
| Rosaceae | 2 | 2.27 | 3 | 2.97 | 4 | 2.20 |
| Rubiaceae | 4 | 4.55 | 4 | 3.96 | 4 | 2.20 |
| Salicaceae | 1 | 1.14 | 1 | 0.99 | 2 | 1.10 |
| Santalaceae | 1 | 1.14 | 1 | 0.99 | 1 | 0.55 |
| Sapindaceae | 1 | 1.14 | 1 | 0.99 | 3 | 1.65 |
| Sapotaceae | 1 | 1.14 | 1 | 0.99 | 3 | 1.65 |
| Solanaceae | 3 | 3.41 | 4 | 3.96 | 11 | 6.04 |
| Verbenaceae | 3 | 3.41 | 3 | 2.97 | 12 | 6.59 |
| Vitaceae | 1 | 1.14 | 1 | 0.99 | 1 | 0.55 |

medicinal plant species reported and used by a female and a male traditional healer was 4.97 ± 0.390 and 8.66 ± 0.385 , respectively. Highly significant positive correlation (Spearman correlation test, $r = 0.509$, $\alpha = 0.01$, $p = 0.000$) was observed between the number of species reported and healers' educational level. The absence of

indigenous knowledge transfer was more significantly (binomial test, $\alpha = 0.05$, $p = 0.022$) cited by traditional healers of the study area. Nevertheless, some of the renowned traditional healers (e.g. Shek Tajju Haji Mohammed, Mr. Shifera Mekonnen, Shek Mohammed Haji Hayi, Priest- Meaza G/Wold, Mrs. Shube Sheko Sha-

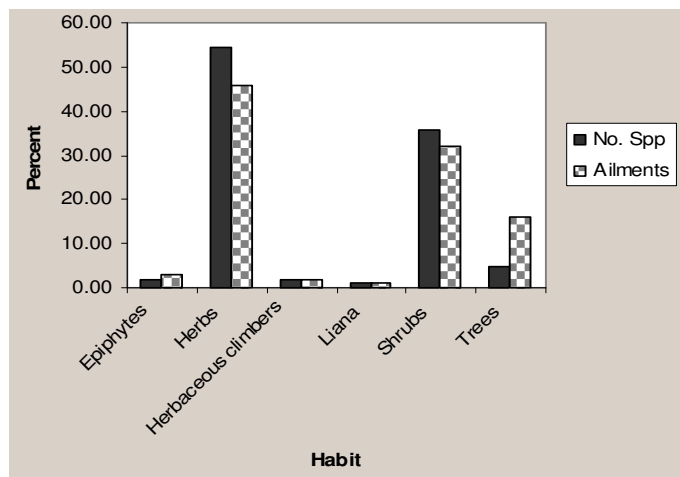


Figure 2. Habit of ethnomedicinal plant species used to manage human ailments.

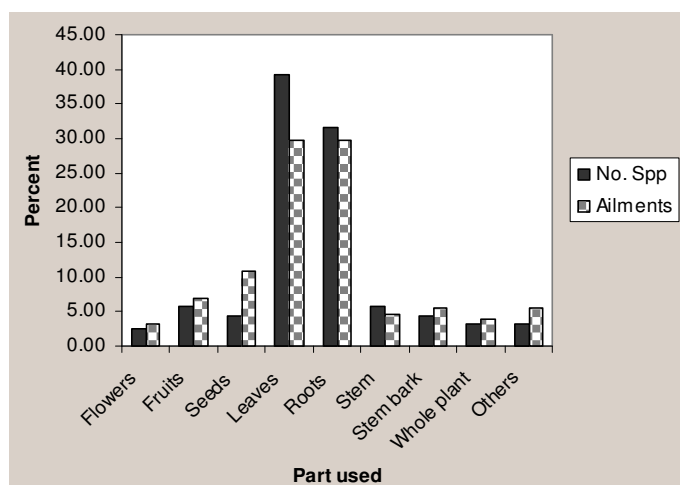


Figure 3. Medicinal plant parts used for remedy preparation.

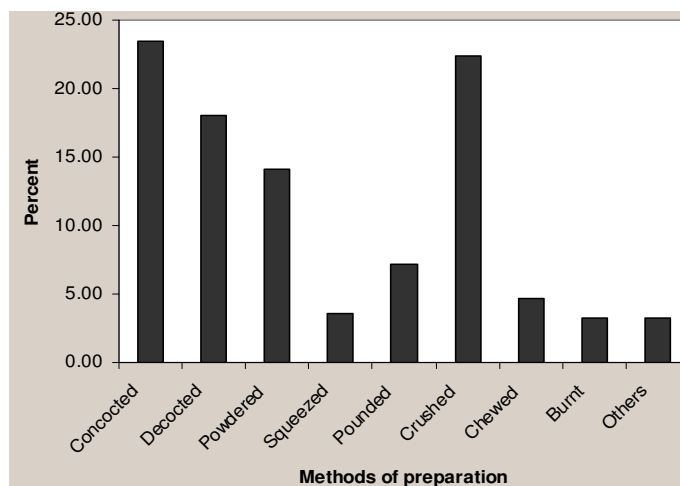


Figure 4. Methods of traditional medicine preparation.

Shaba and Shek Nuru Haji Hussen) demonstrated to authors during the interviews that they have written records of their indigenous knowledge, which could potentially be transferred to the next generation. We actually observed during the interviews that most healers who could at least read and write were referring to their written records while providing the ethnomedicinal information.

The majority of the reported species (83.64%) were wild whereas some (10.91%) were reported as cultivated and others (5.45%) both wild and cultivated. Most of the recorded ethnomedicinal plant species were herbs (54.46%) and shrubs (35.64%) (Figure 2).

Medicinal plant processing and administration methods

Traditional healers reported to harvest most of the medicinal plant species for their leaves (62 species, 39.24%) and roots (50 species, 31.65%) to prepare remedies (Figure 3). Most species were processed in fresh (46.58%) and fresh or dried forms (32.19%) while some (21.23%) in solely dried forms.

Traditional healers also reported to process remedies mainly through concoction (23.47%), crushing (22.38%), decoction (18.05%), and powdering (14.08%) (Figure 4). Substances like cold water, honey, coffee, butter, olive oil, salt, sugar, kerosene, ash and milk were reported to be mixed with the plant materials during the preparation of remedies. The processed remedies were mostly administered through oral (50.72%) and dermal (37.68%) routes. These were followed by nasal (7.97%), auricular (2.17%) and optical (1.45%) administrations. Remedy prescriptions were mostly claimed to have doses (binomial test, $\alpha = 0.05$, $p = 0.000$) and were measured using water glasses, tea glasses, cups, lids, spoons, pinches, handfuls and forefingers Figure 4.

Use diversity and status of the reported medicinal plant species

The majority of ethnomedicinal plant species were reported as abundant (48.51%) and less abundant (32.67%) where as some as rare (15.84%) and very rare (2.97%). Though many species (28.74%) were indicated to have not use other than their medicinal value, most were reported as multipurpose species (binomial test, $\alpha = 0.05$, $p = 0.000$) and were mainly used for forage (29.31%), fencing (12.07%), firewood (9.77%) and construction (9.20%) (Figure 5).

Although healers reported most species as abundant based on their perception, the existence of threats (binomial test, $\alpha = 0.05$, $p = 0.000$) to the majority of the species was evident from analysis of their responses and the most frequently cited threats to ethnomedicinal plant species of the study area were ecological degradation through agricultural expansion (29.66%),

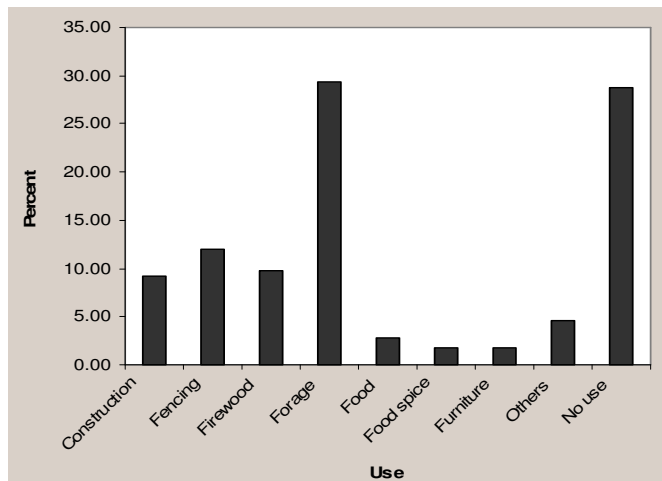


Figure 5. Other uses of the reported ethnomedicinal plant species.

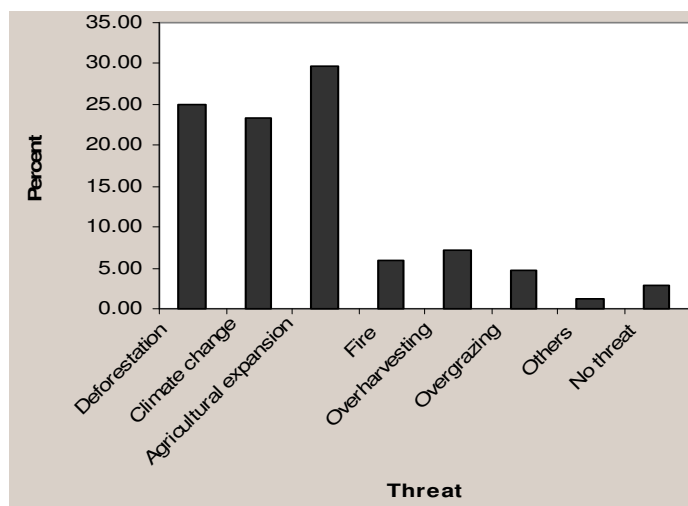


Figure 6. Reported threats to ethnomedicinal plant species of the study area.

deforestation (25%) and change in climate or weather condition (23.31%), followed by over-harvesting (7.20%), fire (5.93%) and overgrazing (4.66%) (Figure 6). Although these threats were identified by traditional healers within the study area, most healers indicated that they were not themselves practicing conservation activities for ethnomedicinal plant species within the study area (binomial test, $\alpha = 0.05$, $p = 0.000$). Of course, some healers reported to cultivate many species (30.95%) in their home gardens or the immediate vicinity.

DISCUSSION AND CONCLUSIONS

Traditional healers of Bale Mountains National Park and buffer zones were found to be rich in their indigenous knowledge on the use of ethnomedicinal plant species to

manage various human ailments within the study area. This was evidenced with the result that a total of 56 human ailments were reported to be treated using 101 ethnomedicinal plant species. However, significant indigenous knowledge loss was evident as it was held in high secrecy and most healers did not yet transfer their knowledge to the subsequent generation. The high degree of secrecy surrounding ethnomedicinal knowledge among the traditional healers could be attributed to the fact that traditional healers derive a sort of 'income monetary or in-kind compensation for the treatments they provide'. The total number of plant treatments cited in this study could however indicate that the general culture of ethnomedicinal knowledge secrecy was slightly lower with few exceptions (Lulekal et al., 2008) compared to some ethnobotanical studies in other parts of the country (Giday et al., 2003; Fassil, 2003; Giday et al., 2007; Teklehaymanot et al., 2007; Teklehaymanot and Giday, 2007; Yineger and Yewhalaw, 2007; Yineger et al., 2008a, Yineger et al. 2008b).

Results of this study showed an increase in the knowledge of ailments and ethnomedicinal plant species with healers' educational level. This could be because of the fragmentation and erosion of the indigenous knowledge especially from the perspective of illiterate traditional healers, because they have no formal written records for reference. Knowledge that disappears from memory is hence lost forever.

Traditional healers dwelling in the three districts varied significantly in their indigenous knowledge on management of human ailments. This could on the one hand be attributed to the individual knowledge differences as a result of their background or indeed the depth of indigenous knowledge inherited. On the other hand it could be because of the ecological and environmental variations of the three districts, in other words there may be variations in species richness of the three districts.

Knowledge on management of human ailments was also found to be significantly different for different sexes; males appeared to be more knowledgeable than females. The gender imbalance of the samples involved in this study might have contributed to this difference. A similar result was also reported by Teklehaymanot et al. (2007) for people around Debre Libanos Monastery in Central Ethiopia, where on average a female healer reported 1.67 ± 0.33 and a male 5.77 ± 0.71 species with significant difference between them ($\alpha = 0.05$, $p = 0.023$).

Our result was, however, contrary to the finding of Kitula (2007) in Tanzania who reported that all the traditional medicine practitioners in the surveyed villages were females. Cultural differences between the study populations in the two countries might have contributed for the observed differences. The high degree of consensus observed among the traditional healers of Bale in managing eczema, tinea versicolor, rheumatism, haemorrhoids, earache and gonorrhoea could give high validity to the species used to treat these ailments and could be due to the existence of common criteria to select a specie

Appendix I. Human ailments reported to be treated and ethnomedicinal plant species used

| Human Disease | Scientific name | Family | Local name | Voucher | Part used | Form used | Methods of preparation | Route of admin. |
|--|---|---------------|---------------|-----------|-----------------|----------------------------|--|-----------------|
| Abdominal irritation (Gastritis) | <i>Galium simense</i> Fresen. | Rubiaceae | Jiddha | Haile 135 | Root | Fresh or dried | Chewed | Oral |
| Acute stomach illness (<i>Agano</i> , <i>Dingetegna</i>) | <i>Alchemilla haumannii</i> Rothm. | Rosaceae | Endrif | Haile 96 | Leaves | Fresh | Chewed | Oral |
| | <i>Anthriscus sylvestris</i> (L.) Hoffm. | Apiaceae | Bossoqua | Haile 36 | Root | Fresh | Crushed, salted, chewed | Oral |
| | <i>Eucalyptus globulus</i> Labill. | Myrtaceae | Barzafi | Haile 55 | Leaves | Fresh | Concocted, mixed with roasted coffee, chewed | Oral |
| | Flower | | | | Fresh or dried | Concocted, crushed, chewed | Oral | |
| | <i>Geranium arabicum</i> Forssk. | Geraniaceae | Qorsa Guracha | Haile 23 | Root | Fresh | Chewed or decocted & mixed with honey | Oral |
| | <i>Heracleum abyssinicum</i> (Boiss.)Norman | Apiaceae | Bunkaka Hida | Haile 130 | Root, Leaves | Fresh or dried | Chewed | Oral |
| | <i>Lippia adoensis</i> Hochst. ex Walp. | Verbenaceae | Sukahi | Haile 76 | Leaves | Fresh or dried | Concocted, crushed, chewed | Oral |
| | | | | | Root, Leaves | Fresh or dried | Chewed | Oral |
| | <i>Myosotis vestergrenii</i> Stroh | Boraginaceae | Dingetegna | Haile 161 | Leaves | Fresh | Squeezed, mixed with water | Oral |
| | <i>Satureja pseudosimensis</i> Brenan | Lamiaceae | Riggii | Haile 164 | Root, Leaves | Fresh or dried | Chewed | Oral |
| | <i>Senecio myriocephalus</i> Sch.Bip.ex Rich. | Asteraceae | Agadena | Haile 119 | Root | Fresh | Concocted, mixed with roasted coffee, chewed | Oral |
| | <i>Solanum adoense</i> Hochst ex. A.Rich. | Solanaceae | Hiddi | Haile 167 | Leaves | Fresh | Concocted, squeezed, salted | Oral |
| | <i>Solanum anguivi</i> Lam. | Solanaceae | Qore Worabesa | Haile 69 | Root | Fresh | Concocted, crushed, mixed with water | Oral |
| Amoebiasis (<i>Dubarraa</i>) | <i>Amaranthus caudatus</i> L. | Amaranthaceae | Bertefi | Haile 150 | Seed | Dried | Drying seeds | Oral |
| Amoebiasis (<i>Dubarraa</i>) | <i>Anthemis tigrensensis</i> J.Gay ex A.Rich. | Asteraceae | Sifay | Haile 2 | Root | Fresh or dried | Crushed, powdered, mixed with honey | Oral |
| | <i>Launea intybacea</i> (Jacq.) Beauv. | Asteraceae | Korsa Sheka | Haile 1 | Root, Leaves | Fresh or dried | Decocted | Oral |
| | <i>Ranunculus multifidus</i> Forssk. | Ranunculaceae | Kartasa | Haile 149 | Flower | Dried | Powdered, salted | Oral |
| Ascariasis | <i>Ajuga alba</i> (Gurke) Robyni | Lamiaceae | Anamuro | Haile 171 | Leaves | Dried | Decocted | Oral |
| | <i>Euphorbia depauperata</i> A.Rich. | Euphorbiaceae | Gurii | Haile 19 | Root, Stem bark | Fresh | Crushed, Decocted | Oral |

Appendix I. Contd

| | | | | | | | | |
|------------------------------|---|----------------|-----------------|-----------|--------------|----------------|--------------------------------------|--------|
| Asthma (<i>Asm</i>) | <i>Ranunculus multifidus</i> Forssk. | Ranunculaceae | Kertassa | Haile 149 | Root | Dried | Concocted, mixed with butter | Oral |
| Cold (<i>Qora</i>) | <i>Ageratum conyzoides</i> L. | Asteraceae | | Haile 126 | Leaves | Fresh | Crushed, decocted for steam bath | Dermal |
| | <i>Cassipourea malosana</i> (Baker) Alston | Rhizophoraceae | Muka Dadi | Haile 176 | Root | Fresh | Concocted, decocted | Dermal |
| | <i>Dorstenia barnimiana</i> Schweinf | Moraceae | | Haile 120 | Root | Fresh | Crushed, decocted for steam bath | Dermal |
| | <i>Myrica salicifolia</i> A.Rich. | Myricaceae | Tona | Haile 25 | Leaves | Fresh | Decocted | Dermal |
| | <i>Peperomia abyssinica</i> Mig. | Piperaceae | Rafu Osole | Haile 108 | Root | Fresh | Concocted, decocted | Dermal |
| | <i>Rhamnus staddo</i> A.Rich. | Rhamnaceae | Qedida | Haile 24 | Leaves | Fresh | Concocted, decocted | Dermal |
| | <i>Schefflera volkensii</i> (Engl.) Harms | Araliaceae | Ansha | Haile 33 | Leaves | Fresh | Concocted, decocted | Dermal |
| | <i>Sideroxylon oxyacanthum</i> Baill. | Sapotaceae | Faranqassa | Haile 151 | Leaves | Fresh | Powdered | Nasal |
| Common cold (<i>Qufa</i>) | <i>Ajuga alba</i> (Gurke) Robyni | Lamiaceae | Anamuro | Haile 171 | Leaves | Dried | Concocted, crushed, mixed with honey | Oral |
| | <i>Galinsoga parviflora</i> L. | Asteraceae | Kundoberbere | Haile 125 | Fruit | Dried | Concocted, crushed, decocted | Oral |
| Constipation | <i>Eucalyptus globulus</i> Labill. | Myrtaceae | Bahirzafi | Haile 55 | Leaves | Fresh | Crushed, mixed with sugar & salt | Oral |
| | <i>Lippia adoensis</i> Hochst. ex Walp. | Verbenaceae | Sukahi | Haile 76 | Leaves | Fresh | Pounded, mixed with water, salted | Oral |
| Dandruff (<i>Forefor</i>) | <i>Aloe macrocarpa</i> Tod. | Aloaceae | Hargissa | Haile 170 | Stem exudate | Fresh | Concocted, powdered | Dermal |
| | <i>Malva verticillata</i> L. | Malvaceae | Lut | Haile 136 | Root | Dried | Concocted, powdered | Dermal |
| | <i>Opuntia ficus-indica</i> (L.) Miller | Cactaceae | Beles | Haile 133 | Stem exudate | Fresh | Concocted, powdered | Dermal |
| <i>Dhukuba Dhudha</i> | <i>Anthemis tigrensensis</i> J.Gay ex A.Rich. | Asteraceae | Sifay | Haile 2 | Root | Fresh | Concocted, crushed, decocted | Oral |
| Diarrhoea (<i>Bassa</i>) | <i>Rubia cordifolia</i> L. | Rubiaceae | Anqis | Haile 147 | Root | Fresh or dried | Powdered, decocted | Oral |
| | <i>Tagetes minuta</i> L. | Asteraceae | Hada Gola | Haile 84 | Leaves | Fresh or dried | Concocted, crushed, decocted | Oral |
| Diuretic (unable to urinate) | <i>Verbena officinalis</i> L. | Verbenaceae | Dargu(Hulegeb) | Haile 163 | Leaves | Fresh | Crushed, filtered, mixed with honey | Oral |
| Dry cough | <i>Clerodendrum myricoides</i> (Hochst.) R.Br. Ex Vatke | Verbenaceae | Misirichi | Haile 70 | Root bark | Fresh or dried | Decocted | Oral |

Appendix I. Contd

| | | | | | | | | |
|----------------------------------|---|---------------|-----------------|-----------|-------------------------|----------------|---|-----------|
| Earache (<i>Dhibe Gura</i>) | <i>Ajuga alba</i> (Gurke) Robyni | Lamiaceae | Anamuro | Haile 171 | Leaves | Fresh | Squeezed | Auricular |
| | <i>Melilotus officinalis</i> (L.) Lam. | Fabaceae | Hanguge | Haile 111 | Leaves | Fresh | Squeezed | Auricular |
| | | | | | | Dried | Concocted, crushed, mixed with butter, filtered | Auricular |
| | <i>Olea europae subsp. Cuspidata</i> | Oleaceae | Ejersa | Haile 95 | Stem | Fresh | Oil extracted boiling stem | Auricular |
| Eczema (<i>Sibiji, Chife</i>) | <i>Canthium oligocarpum Hiern</i> | Rubiaceae | Amshiq | Haile 12 | Leaves | Fresh | Crushed | Dermal |
| Eczema (<i>Sibiji, Chife</i>) | <i>Heracleum abyssinicum</i> (Boiss.)Norman | Apiaceae | Anshoshiraa | Haile 11 | Root, Leaves, Flower | Dried | Concocted, crushed, mixed with ash & butter | Dermal |
| | <i>Olea europae subsp. Cuspidata</i> | Oleaceae | Ejersa | Haile 95 | Stem | Fresh | Oil extracted burning fresh stem, salted | Dermal |
| | | | | | Stem oil | Fresh | mixed with butter | Dermal |
| | | | | | Leaves, Steam oil | Fresh or dried | Crushed, stem oil extracted | Dermal |
| | | | | | Stem oil | Fresh or dried | Oil extracted burning fresh stem | Dermal |
| | | | | | | Fresh | Oil extracted burning fresh stem | Dermal |
| | | | | | | Fresh | Oil extracted burning fresh stem | Dermal |
| | | | | | | Dried | Oil extracted burning fresh stem | Dermal |
| | <i>Ranunculus simensis</i> Fresen. | Ranunculaceae | Kinta | Haile 85 | Root, Leaves | Fresh or dried | Crushed | Dermal |
| | <i>Sedum baleensis</i> M.Gilbert | Crassulaceae | Buri | Haile 145 | Root | Fresh | Crushed | Dermal |
| | <i>Solanum anguivi</i> Lam. | Solanaceae | Mujule Worabesa | Haile 69 | Fruit, Leaves | Fresh or dried | Powdered | Dermal |
| | | | | | Leaves | Dried | Concocted, crushed, powdered, mixed with butter | Dermal |
| Epilepsy (<i>Dhibe Qabana</i>) | <i>Artemisia afro</i> Jacq. ex Willd. | Asteraceae | Chuqne | Haile 56 | Leaves, Root, Stem bark | Fresh | Concocted, crushed, mixed with water, squeezed | Nasal |
| | <i>Clerodendrum myricoides</i> (Hochst.) R.Br. Ex Vatke | Verbenaceae | Misirichi | Haile 70 | Leaves | Fresh | Concocted, decocted | Dermal |

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| | | | | | | | | |
|-------------------------------------|---|----------------|--------------------|-----------|--------------------|----------------|--|--------------|
| Epilepsy (<i>Dhibe Qabana</i>) | <i>Maytenus gracilipes</i> (Welw.ex Oliv) Exell. subsp.arguta (Loes)Sebsebe | Celastraceae | Kombolcha | Haile 90 | Leaves | Dried | Powdered, mixed with water | Oral |
| Evil eye (<i>Buda</i>) | <i>Artemisia afra</i> Jacq. ex Willd. | Asteraceae | Chuqune | Haile 56 | Leaves | Dried | Burnt for smoke bath | Dermal |
| | <i>Cynoglossum amplifolium</i> Hochst.ex A.Rich. | Boraginaceae | Qorsa Michi | Haile 75 | Root | Dried | Concocted, crushed, powdered, mixed with water or milk | Oral |
| | <i>Dovyalis abyssinica</i> (A.Rich.) Warb. | Flacourtiaceae | Koshimo | Haile 22 | Root | Fresh or dried | Concocted, pounded, decocted for steam bath | Dermal |
| | <i>Justicia schimperiana</i> (Hochst. ex Nees) T.Anders. | Acanthaceae | Dhumuga (Sensel) | Haile 93 | Leaves | Dried | Powdered, mixed with water | Oral |
| | <i>Maytenus arbutifolia</i> (Hochst. ex A.Rich.) Wilztek | Celastraceae | Qartame(Kombolcha) | Haile 152 | Leaves | Dried | Pounded | Oral, nasal |
| Evil spirit (<i>Dhibe Laffaa</i>) | <i>Sideroxylon oxyacanthum</i> Baill. | Sapotaceae | Kombolcha | Haile 151 | Root | Fresh or dried | Concocted, pounded, decocted for steam bath | Dermal |
| | <i>Clerodendrum myricoides</i> (Hochst.) R.Br. Ex Vatke | Verbenaceae | Marasisa | Haile 70 | Root, Leaves | Fresh | Concocted, crushed, decocted | Oral |
| | <i>Clerodendrum myricoides</i> (Hochst.) R.Br. Ex Vatke | Verbenaceae | Misirichi | Haile 70 | Leaves | Fresh | Concocted, crushed, powdered, mixed with coffee | Oral |
| | <i>Helichrysum gofense</i> Cuf. | Asteraceae | Irisha | Haile 43 | Leaves, Stem, Root | Fresh | Concocted, decocted | Oral, dermal |
| | <i>Heracleum abyssinicum</i> (Boiss.)Norman | Apiaceae | Bunkaka Hida | Haile 11 | Leaves | Fresh | Burnt for smoke bath | Oral |
| | <i>Oldenlandia monanthos</i> (A.Rich.)Hiern | Rubiaceae | Matane Ilbisa | Haile 148 | Leaves, Stem | Fresh or dried | Concocted, decocted | Dermal |
| | <i>Olea europae subsp.Cuspidata</i> | Oleaceae | Ejersa | Haile 95 | Stem | Fresh | Burnt for smoke bath | Oral, dermal |
| Evil spirit (<i>Dhibe Laffaa</i>) | Rubus volkensis Engl. | Rosaceae | Gura Hagena | Haile 10 | Leaves | Fresh | Concocted, decocted | Oral, dermal |
| | <i>Sideroxylon oxyacanthum</i> Baill. | Sapotaceae | Faraqasa | Haile 151 | Leaves | Fresh | Concocted, crushed, powdered, mixed with coffee | Oral |
| | | | | | Root, Leaves | Dried | Burnt for smoke bath | Dermal |

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| | | | | | | | | | |
|--|--|--------------------------------------|------------------------|-------------|----------------|--------------------------------------|--------------------------------------|------------------------|-----------------|
| Eye disease (<i>Dhibe Eja</i>) | <i>Aloe macrocarpa</i> Tod. | Aloaceae | Hargissa | Haile 170 | Stem exudate | Fresh | Stem exudate collected making a cut | Optical | |
| Febrile illness (<i>Michi</i>) | <i>Malva verticillata</i> L. | Malvaceae | Lita | Haile 136 | Leaves | Fresh | Crushed | Optical | |
| | <i>Artemisia afra</i> Jacq. ex Willd. | Asteraceae | Chikugne | Haile 56 | Leaves | Fresh | Crushed, squeezed | Dermal | |
| | <i>Cynoglossum amplifolium</i> Hochst.ex A.Rich. | Boraginaceae | Kerchaba | Haile 75 | Leaves | Fresh | Squeezed | Nasal, dermal | |
| | <i>Eucalyptus globulus</i> Labill. | Myrtaceae | Barzafi | Haile 55 | Leaves | Fresh or dried Fresh | Decocted Chewed | Oral Oral | |
| | <i>Eucalyptus saligna</i> SM. | Myrtaceae | Barzafi | Haile 97 | Fruit | Fresh or dried | Burnt for smoke bath | Dermal | |
| | <i>Plectranthus barbatus</i> Group | Lamiaceae | Damakessie | Haile 169 | Leaves | Fresh or dried | Decocted | Dermal | |
| <i>Satureja punctata</i> (Benth.) Briq. | Lamiaceae | Yemich medihanit | Haile 172 | Leaves | Fresh or dried | Crushed, squeezed, mixed with coffee | Oral | | |
| | <i>Solanum anguivi</i> Lam. | Solanaceae | Hiddi | Haile 69 | Root | Fresh Fresh or dried | Crushed, squeezed Chewed | Nasal, dermal Oral | |
| | <i>Thymus schimperi</i> Ronniger | Lamiaceae | Tosigni | Haile 87 | Leaves | Dried | Concocted, crushed, mixed with water | Oral | |
| | Human Disease | Scientific name | Family | Local name | Voucher | Part used | Form used | Methods of preparation | Route of admin. |
| Gland TB (<i>Naqarsa</i>) | <i>Arisaema schimperianum</i> Schot | Araceae | Abutashe | Haile 173 | Root | Dried | Crushed, mixed with soot | Dermal | |
| <i>Asparagus setassus</i> (Kunth) Jessap | Asparagaceae | Zeriti | Haile 79 | Leaves | Fresh or dried | Powdered | Dermal | | |
| | <i>Cineraria deltoidea</i> Sond. | Asteraceae | | Haile 123 | Leaves | Fresh or dried | Powdered | Dermal | |
| | <i>Foeniculum vulgare</i> Mill. | Apiaceae | Alaqa Merga | Haile 128 | Leaves | Dried | Concocted, crushed, powdered | Dermal | |
| | <i>Geranium arabicum</i> Forssk. | Geraniaceae | Kinta | Haile 23 | Root | Fresh | Crushed | Dermal | |
| | <i>Ranunculus multifidus</i> Forssk. | Ranunculaceae | Scherif | Haile 149 | Leaves | Fresh or dried | Powdered | Dermal | |
| | <i>Solanum anguivi</i> Lam. | Solanaceae | Mujule Worabesa | Haile 69 | Leaves | Dried | Concocted, crushed, powdered | Dermal | |
| | | | Hidi (Mujule Worabesa) | Haile 69 | Root | Fresh | Crushed, Decocted | Oral | |
| | | <i>Verbena officinalis</i> L. | Verbenaceae | Atochi(Amh) | Haile 163 | Root | Fresh | Concocted, crushed | Dermal |
| | Gonorrhoea (<i>Chobto</i>) | <i>Euphorbia depauperata</i> A.Rich. | Euphorbiaceae | Gurii | Haile 19 | Root | Fresh | Crushed, Decocted | Oral |

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| | | | | | | | | |
|---|---|---|--------------------|------------------------|---------------|-------------------------|---|---------------------------------|
| | <i>Euphorbia dumalis</i> S.Carter | Euphorbiaceae | Gurii | Haile 20 | Stem bark | Dried | Powdered, mixed with water & honey | Oral |
| | | | | | Root | Fresh | Crushed, Decocted Concocted, crushed | Oral Oral |
| | <i>Euphorbia lathyris</i> L. | Euphorbiaceae | Ambuluk Amplu | Haile 118 Haile 118 | Seed Seed | Fresh or dried Fresh | Crushed, powdered Pounded, mixed with honey | Oral Oral |
| Gonorrhoea (<i>Chobto</i>) | <i>Foeniculum vulgare</i> Mill. | Apiaceae | Ensilal | Haile 128 | Leaves | Fresh or dried | Concocted, crushed, decocted | Oral |
| | <i>Gladiolus dalenii</i> Van Geel | Iridaceae | Kelede | Haile 179 | Root | Fresh or dried | Crushed, mixed with water | Oral |
| Gonorrhoea (<i>Chobto</i>) | <i>Impatiens aethiopiaca</i> Gray-Wilson | Balsaminaceae | Anshoshila | Haile 30 | Root | Fresh | Crushed | Dermal |
| Haemorrhoids (<i>Kurmuman, Kintarot</i>) | <i>Kniphofia isoetifolia</i> Steud. ex Hochst. | Asphodelaceae | Shinshile | Haile 316 | Root | Fresh or dried | Concocted, crushed, powdered, mixed with coffee & sugar | Oral |
| | <i>Lycopersicon esculentum</i> (L.) Mill | Solanaceae | Timatimo | Haile 166 | Leaves | Fresh or dried | Concocted, crushed, decocted | Oral |
| | <i>Stephania abyssinica</i> (Dillon & A.Rich.) | Menispermaceae | Kalala | Haile 37 | Root | Fresh | Crushed, Decocted | Oral |
| | <i>Aloe macrocarpa</i> Tod. | Aloaceae | Hargissa/Qore | Haile 170 | Leaves | Fresh | Concocted, crushed, powdered, mixed with butter | Dermal |
| | <i>Aloe macrocarpa</i> Tod. | Aloaceae | Hargissa | Haile 170 | Stem oil | Fresh | Concocted, crushed, powdered, mixed with olive oil | Dermal |
| | <i>Olea europae subsp. Cuspidata</i> | Oleaceae | Ejersa | Haile 95 | Stem oil | Fresh | Oil extracted burning fresh stem, mixed with camel dung | Dermal |
| | | | | | | | Concocted, crushed, powdered, mixed with olive oil | Dermal |
| | | <i>Ornithogalum tenuifolium</i> Delaroche | Hyacinthaceae | Kuras | Haile 180 | Seed | Fresh or dried | Concocted, crushed, powdered |
| Headache & oral sore of children | <i>Ranunculus multifidus</i> Forssk. | Ranunculaceae | Kartasa | Haile 149 | Root | Dried | Concocted, powdered, mixed with butter | Dermal |
| | <i>Solanum anguivi</i> Lam. | Solanaceae | Mujule Worabesa | Haile 69 | Fruit, Leaves | Fresh | Crushed | Dermal |
| | <i>Commelina foliocea</i> Chiov. | Commelinaceae | Harmala | Haile 78 | Root | Fresh | Chewing | Nasal |

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| | | | | | | | | |
|--|--|----------------|-------------------------|-----------|---------------------------|----------------|---|--------------|
| Headache (<i>Bowo</i>) | <i>Clerodendrum myricoides</i> (Hochst.) R.Br. Ex Vatke | Verbenaceae | Merasisa | Haile 70 | Root | Dried | Powdered, decocted for steam bath | Dermal |
| | <i>Cynoglossum amplifolium</i> Hochst.ex A.Rich. | Boraginaceae | Kerchaba | Haile 75 | Root, Leave | Fresh or dried | Chewed | Oral, dermal |
| Headache (<i>Bowo</i>) | <i>Helichrysum gofense</i> Cuf. | Asteraceae | Irisha | Haile 43 | Leaves | Fresh | Concocted, decocted | Dermal |
| | <i>Malva verticillata</i> L. | Malvaceae | Lita | Haile 136 | Leaves | Fresh | Crushed | Dermal |
| | <i>Maytenus gracilipes</i> (Welw.ex Oliv)Exell. subsp.arguta (Loes)Sebsebe | Celastraceae | Kombolcha | Haile 90 | Leaves, Fruit, Steam bark | Dried | Powdered | Oral |
| | <i>Schefflera volkensii</i> (Engl.) Harms | Araliaceae | Ansha | Haile 33 | Leaves | Fresh | Concocted, decocted | Dermal |
| Hemorrhage | <i>Ageratum conyzoides</i> L. | Asteraceae | | Haile 126 | Leaves | Fresh | Crushed | Dermal |
| Hepatitis B (<i>Dhibee Sinbiraa</i>) | <i>Aloe macrocarpa</i> Tod. | Aloaceae | Hargessaa | Haile 170 | Root | Fresh or dried | Concocted, crushed, mixed with water | Oral |
| | <i>Anthemis tigrensensis</i> J.Gay ex A.Rich. | Asteraceae | Sifay | Haile 2 | Root | Fresh or dried | Concocted, crushed, mixed with water | Oral |
| | <i>Asystasia excellens</i> Lindau | Acanthaceae | Dhumuga | Haile 177 | Leaves | Dried | Concocted, powdered, mixed with water, shaken & filtered | Oral |
| | <i>Crinum abyssinicum</i> Hochst.ex A.Rich. | Amaryllidaceae | Murquffaa | Haile 60 | Root | Fresh or dried | Concocted, crushed, mixed with water | Oral |
| | <i>Eucalyptus globulus</i> Labill. | Myrtaceae | Barzafi | Haile 55 | Leaves | Fresh | Concocted, salted, chewed | Oral |
| | <i>Euphorbia depauperata</i> A.Rich. | Euphorbiaceae | Gura Jarsa | Haile 19 | Root, Leaves | Fresh or dried | Concocted, crushed, mixed with water & honey, warmed | Oral |
| | <i>Euphorbia lathyris</i> L. | Euphorbiaceae | Ambuluk | Haile 118 | Fruit, seed | Fresh or dried | Crushed, powdered | Oral |
| | <i>Justicia schimperiana</i> (Hochst. ex Nees) T.Anders. | Acanthaceae | Sensel | Haile 93 | Leaves | Fresh | Crushed, mixed with water, squeezed, filtered, mixed with honey | Oral |
| Hepatitis B (<i>Dhibee Sinbiraa</i>) | <i>Justicia schimperiana</i> (Hochst. ex Nees) T.Anders. | Acanthaceae | Dhumuga | Haile 93 | Leaves | Dried | Concocted, powdered, mixed with water, shaken & filtered | Oral |
| | <i>Kniphofia isoetifolia</i> Steud. ex Hochst. | Asphodelaceae | Lela xixiqo (shinshile) | Haile 316 | Root | Fresh or dried | Concocted, crushed, decocted | Oral |
| | <i>Plantago afra</i> Verde | Plantaginaceae | Baxxicha | Haile 63 | Root | Fresh | Crushed, Decocted | Oral |

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| | | | | | | | | |
|---|---|-------------------------------|---------------------|-----------------------|----------------|-------------------------|--|--------------|
| | <i>Senecio myriocephalus</i> Sch.Bip.ex Rich. | Asteraceae | Agadena | Haile 119 | Root | Dried | Concocted, powdered, mixed with honey | Oral |
| Herpes Zoster (Darabaftu, Almaz balecira) | <i>Dodonaea angustifolia</i> L.f. | Sapindaceae | Kitkitta | Ermias 20 | Leaves | Dried | Powdered, mixed with butter | Dermal |
| Intestinal worms | <i>Cissus adenocaulis</i> Steud. ex A. Rich. | Vitaceae | Qorsa | Haile 13 | Root | Fresh | Concocted, pounded, mixed with water | Oral |
| Intestinal worms | <i>Euphorbia lathyris</i> L. | Euphorbiaceae | Amplo | Haile 118 | Seed | Fresh | Pounded, mixed with honey | Oral |
| Intestinal worms | <i>Ranunculus multifidus</i> Forssk. | Ranunculaceae | Akouku- Qartassa | Haile 149 | Root, Leaves | Dried | Crushed, Decocted | Oral |
| Intestinal worms | <i>Thalictrum</i> <i>rhynhocarpum</i> Dill. & A.Rich. | Ranunculaceae | Sire-Bizu | Haile 107 | Root | Fresh | Concocted, pounded, mixed with water | Oral |
| Jaundice (<i>Hamot</i>) <i>Kambussa</i> | <i>Euphorbia lathyris</i> L. <i>Catha edulis</i> (Vahl) Forssk.ex Endl. | Euphorbiaceae Celastraceae | Amplo Chat | Haile 118 Haile 99 | Seed Leaves | Fresh Fresh or dried | Crushed Concocted, pounded, decocted | Oral Oral |
| <i>Kambussa</i> | <i>Haplocarpa rueppelii</i> (Sch.Bip) | Asteraceae | | Haile 121 | Root | Fresh or dried | Concocted, pounded, decocted | Oral |
| Kidney disease (<i>Kalee</i>) | <i>Amaranthus caudatus</i> L. | Amaranthaceae | Bertefi | Haile 150 | Seed | Fresh | Concocted, decocted | Oral |
| | <i>Anethum graveolens</i> L. | Apiaceae | Komna | Haile 101 | Leaves | Fresh or dried | Pounded, decocted, mixed with honey, filtered | Oral |
| Kidney disease (<i>Kalee</i>) | <i>Foeniculum vulgare</i> Mill. | Apiaceae | Ensila | Haile 128 | Leaves | Fresh | Concocted, decocted | Oral |
| Liver disease (<i>Dhibe</i> <i>Tiru</i>) | <i>Lycopersicon</i> <i>esculentum</i> (L.)Mill <i>Acmella caulirhiza</i> Del. | Solanaceae | Timatimo | Haile 166 | Leaves | Fresh | Concocted, decocted | Oral |
| | <i>Amaranthus caudatus</i> L. | Amaranthaceae | Bertefi | Haile 150 | Seed | Dried | Concocted, powdered, mixed with water | Oral |
| | <i>Arisaema</i> <i>schimperianum</i> Schot | Araceae | Abutashe | Haile 173 | Fruit, Leaves | Dried | Concocted, crushed, mixed with water | Oral |
| | <i>Bidens macroptera</i> (Sch. Bip. ex Chiov.) Mesfin | Asteraceae | Kello | Haile 44 | Root | Fresh or dried | Crushed, powdered, mixed with water & sugar | Oral |
| | <i>Carica papaya</i> L. | Caricaceae | Papaye | Haile 101 | Root | Fresh or dried | Pounded, squeezed | Oral |
| | <i>Cineraria deltoidea</i> Sond. | Asteraceae | | Haile 123 | Whole plant | Fresh or dried | Concocted, powdered, mixed with water | Oral |
| | <i>Clerodendrum</i> <i>myricoides</i> (Hochst.) R.Br. Ex Vatke | Verbenaceae | Misirichi | Haile 70 | Fruit | Dried | Concocted, powdered, mixed with water | Oral |

Appendix I. Contd

| | | | | | | | | |
|-------------------------------------|--|-----------------|----------------------------|-----------|---------------|----------------|---|--------|
| | <i>Euphorbia lathyris</i> L. | Euphorbiaceae | Amplo | Haile 118 | Seed | Fresh or dried | Pounded, mixed with coffee | Oral |
| | <i>Ferula communis</i> L. | Apiaceae | Gnida | Haile 34 | Root | Fresh | Crushed, decocted | Oral |
| | <i>Maytenus arbutifolia</i> (Hochst. ex A.Rich.) Wilztek | Celastraceae | Kombolcha | Haile 152 | Fruit, Leaves | Dried | Concocted, crushed, mixed with water | Oral |
| Lung disease (<i>Dhibe somba</i>) | <i>Carica papaya</i> L. | Caricaceae | Papaye | Haile 101 | Root | Dried | Powdered, mixed with water | Oral |
| Menstrual pbm | <i>Polycarpon tetraphyllum</i> (L.)L. | Caryophyllaceae | Lalessa | Haile 109 | Root | Fresh | Powdered, mixed with water | Oral |
| Muje | <i>Agrocharis incognita</i> (Norman) Heywood & Jury | Apiaceae | Shishunka | Haile 35 | Root | Dried | Powdered, mixed with honey | Dermal |
| Muje | <i>Dodonaea angustifolia</i> L.f. | Sapindaceae | Dhitecha | Ermias 20 | Leaves | Dried | Concocted, pounded | Dermal |
| Nosebleed (<i>Funana</i>) | <i>Chenopodium schraderianum</i> Schult. | Chenopodiaceae | Kimo | Haile 131 | Leaves | Dried | Powdered | Nasal |
| | <i>Foeniculum vulgare</i> Mill. | Apiaceae | Ensila | Haile 128 | Leaves | Fresh | Concocted, crushed, mixed with water, squeezed | Nasal |
| | <i>Solanum adoense</i> Hochst ex. A.Rich. | Solanaceae | Hidi oromo | Haile 167 | Leaves | Fresh or dried | Pounded, mixed with water | Nasal |
| | <i>Umbilicus botryoides</i> Hochst.ex A.Rich. | Crassulaceae | Darara lafa (Lamcho) | Haile 92 | Root | Fresh or dried | Powdered | Nasal |
| Pharyngitis (<i>Dhibe Koke</i>) | <i>Umbilicus botryoides</i> Hochst.ex A.Rich. | Crassulaceae | Darara | Haile 92 | Whole plant | Fresh or dried | Crushed, mixed with water | Nasal |
| Qumata | <i>Olea europae subsp.Cuspidata</i> | Oleaceae | Ejersa | Haile 95 | Stem oil | Fresh | Oil extracted burning fresh stem | Dermal |
| Rabies (<i>Dhibe Sere</i>) | <i>Ajuga alba</i> (Gurke) Robyni | Lamiaceae | Anamuro | Haile 171 | Leaves | Fresh or dried | Pounded, mixed with water | Oral |
| | <i>Anthemis tigrensensis</i> J.Gay ex A.Rich. | Asteraceae | Sifay | Haile 2 | Root | Fresh | Concocted, crushed, mixed with water | Oral |
| | <i>Asparagus setassus</i> (Kunth) Jessap | Asparagaceae | Zeriti | Haile 79 | Root | Fresh | Concocted, crushed, mixed with water | Oral |
| | <i>Convolvulus kilimandschari</i> Engl. | Convolvulaceae | Aserkush Tebetebkush (Amh) | Haile 175 | Root | Fresh | Concocted, pounded, mixed with water, shaken, filtered | Oral |
| | <i>Salix subserrata</i> Willd. | Salicaceae | Aleltu | Haile 139 | Leaves | Dried | Concocted, powdered, mixed with water | Oral |
| Rajoo | <i>Acmella caulirhiza</i> Del. | Asteraceae | | Haile 110 | Whole plant | Fresh or dried | Concocted, crushed, powdered, mixed with coffee & sugar | Oral |

Appendix I. Contd

| | | | | | | | | |
|--|---|------------------------|-----------------------|-----------------------|----------------|-----------------|---|--|
| Rajoo | <i>Bidens macroptera</i> (Sch. Bip. ex Chiov.) Mesfin | Asteraceae | Kello | Haile 44 | Root | Fresh or dried | Concocted, crushed, powdered, mixed with coffee & sugar | Oral |
| | <i>Cineraria deltoidea</i> Sond. | Asteraceae | | Haile 123 | Whole plant | Fresh or dried | Concocted, crushed, powdered, mixed with coffee & sugar | Oral |
| | <i>Heracleum abyssinicum</i> (Boiss.)Norman | Apiaceae | Bobonka | Haile 130 | Root | Fresh or dried | Concocted, crushed, powdered, mixed with coffee & sugar | Oral |
| Retained placenta (Hobati) | <i>Crotalaria rosenii</i> (Pax) Milne-Redh. ex Polhill | Fabaceae | Shashamane | Haile 15 | Leaves | Fresh | Decocted | Oral |
| | <i>Crotalaria agatiflora</i> subsp. <i>Erlangeri</i> | Fabaceae | Shashamane | Haile 146 | Leaves | Fresh | Decocted | Oral |
| | <i>Dovyalis abyssinica</i> (A. Rich.) Warb. | Flacourtiaceae | Koshimo | Haile 22 | Leaves | Fresh | Concocted, pounded, mixed with water | Oral |
| | <i>Linum usitatissimum</i> L. <i>Salix subserrata</i> Willd. | Linaceae Salicaceae | Telba (Amh) Aleltu | Haile 17 Haile 139 | Seed Leaves | Dried Dried | Pounded, decocted Powdered, mixed with coffee | Oral Oral |
| Rheumatism (Harassa, Qilensa, Yebird Beshita) | <i>Cassipourea malosana</i> (Baker) Alston | Rhizophoraceae | Muka Dadi | Haile 176 | Twigs | Fresh | Concocted, decocted | Dermal |
| | <i>Cassipourea malosana</i> (Baker) Alston | Rhizophoraceae | Muka Dadi | Haile 176 | Leaves | Fresh | Concocted, crushed, decocted | Dermal |
| | <i>Clerodendrum myricoides</i> (Hochst.) R.Br. Ex Vatke | Verbenaceae | Merasisa | Haile 70 | Leaves | Fresh | Concocted, decocted | Oral, dermal Dermal |
| Rheumatism (Harassa, Qilensa, Yebird Beshita) | <i>Eucalyptus globules</i> Labill. | Myrtaceae | Barzafi | Haile 55 | Leaves | Fresh | Concocted, decocted | Dermal |
| | <i>Helichrysum traversii</i> Chiov. | Asteraceae | | Haile 5 | Stem | Fresh | Concocted, crushed, burnt for smoke bath | Dermal |
| | <i>Heteromorpha trifoliata</i> (Wendl.)E(K) & Zegh. | Apiaceae | Hare Hanqa | Haile 127 | Leaves | Fresh | Concocted, crushed, decocted | Oral |
| | <i>Hypericum revolutum</i> Vahl. | Hypericaceae | Garamba | Haile 27 | Leaves | Fresh | Concocted, decocted | Dermal |
| | | | | | | Twigs Leaves | Fresh Fresh | Concocted, decocted Concocted, crushed, decocted |

Appendix I. Contd

| | | | | | | | | |
|--|---|----------------|-------------|-----------|---------------------------------------|-------------------------|---|----------------------------|
| | <i>Ilex mitis</i> (L.) Radlk. | Aquifoliaceae | | Haile 7 | Leaves, Sstem bark | Fresh | Concocted, decocted | Dermal |
| | <i>Myrica salicifolia</i> A.Rich. | Myricaceae | Tona | Haile 25 | Leaves, Stem | Fresh | Concocted and burnt for smoke bath | Dermal |
| | <i>Nuxia congesta</i> R.Br.ex Fresen. | Loganiaceae | Bitena | Haile 89 | Leaves, Sstem bark | Fresh | Concocted, decocted | Dermal |
| | <i>Peperomia tetraphyla</i> (Foster) Hook. & Arn. | Piperaceae | | Haile 8 | Whole plant | Fresh | Concocted, decocted | Dermal |
| | <i>Rubus steudneri</i> Schwienf. | Rosaceae | Gora | Haile 14 | Leaves | Fresh | Concocted, decocted | Dermal |
| | <i>Schefflera volkensii</i> (Engl.) Harms | Araliaceae | Ansha | Haile 33 | Leaves | Fresh | Concocted, decocted | Dermal |
| | <i>Senecio syringifolius</i> O.Haffm. | Asteraceae | Lukan Luko | Haile 122 | Leaves | Fresh | Concocted, crushed, decocted | Oral |
| Rheumatism (Kurtmat) | <i>Linum usitatissimum</i> L. | Linaceae | Telba (Amh) | Haile 17 | Leaves Twigs Seed | Fresh Fresh Fresh | Concocted, decocted Concocted, decocted Seed oil mixed with gas, salted | Dermal Dermal Dermal |
| Ringworm (Robii) | <i>Arisaema schimperianum</i> Schot | Araceae | Abutashe | Haile 173 | Root | Fresh | Concocted, crushed | Dermal |
| Scabies (Hossis, Chito) | <i>Nuxia congesta</i> R.Br.ex Fresen. | Loganiaceae | Bitena | Haile 89 | Stem bark | Fresh or dried | Concocted, crushed, decocted | Dermal |
| Scabies (Hossis, Chito) | <i>Peperomia abyssinica</i> Mig. | Piperaceae | Rafu Osole | Haile 108 | Leaves | Fresh | Concocted, crushed, decocted | Dermal |
| | <i>Solanum adoense</i> Hochst ex. A.Rich. | Solanaceae | Hiddi Oromo | Haile 167 | Leaves | Fresh | Concocted, crushed, mixed with water | Dermal |
| Skin disease (Bochore) | <i>Dodonaea angustifolia</i> L.f. | Sapindaceae | Dhitecha | Ermias 20 | Leaves | Dried | Powdered | Dermal |
| | <i>Olea europae subsp. Cuspidata</i> | Oleaceae | Ejersa | Haile 95 | Stem oil | Fresh | Oil extracted boiling stem | Dermal |
| Skin infection (Dhullaa, Bugun) | <i>Crinum abyssinicum</i> Hochst.ex A.Rich. | Amaryllidaceae | Chopi | Haile 60 | Root | Fresh | Decocted | Dermal |
| | <i>Linum usitatissimum</i> L. | Linaceae | Telba (Amh) | Haile 17 | Seed | Dried | Concocted, powdered | Dermal |
| Stabbing Pain (Wugat) | <i>Gladiolus dalenii</i> Van Geel | Iridaceae | Kelede | Haile 179 | Root | Fresh or dried | Pounded, mixed with water | Oral |
| Stomach pain (Garaa Ciniinnaa, Garaa kaasaa) | <i>Dovyalis abyssinica</i> (A.Rich.) Warb. | Flacourtiaceae | Koshimo | Haile 22 | Stem bark, Twigs, Flower, Fruit, Seed | Fresh or dried | Crushed, mixed with water | Oral |
| | <i>Lippia adoensis</i> Hochst. ex Walp. | Verbenaceae | Sukayee | Haile 76 | Leaves | Fresh or dried | Crushed, powdered, salted | Oral |

Appendix I. Contd

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|--|---|-----------------|------------------------------|-----------|-------------|-------------------------|---|--------------|
| | <i>Oenanthe procumbens</i> (Wolff) Norman | Apiaceae | Bunkaka Hida | Haile 11 | Root | Fresh or dried | Crushed, decocted | Oral |
| TB (<i>Samba naqarsa</i>) | <i>Arisaema schimperianum</i> Schot | Araceae | Amoch | Haile 173 | Root | Fresh or dried | Concocted, crushed, powdered | Dermal |
| Tinea versicolor (<i>Baki, Barile, Quaqucha</i>) | <i>Datura stramonium</i> L. | Solanaceae | Bengi | Haile 165 | Leaves | Fresh | crushed, mixed with vaseline | Dermal |
| | <i>Datura stramonium</i> L. | Solanaceae | Atefaris | Haile 165 | Seed | Dried | concocted, powdered, mixed with honey | Dermal |
| Tinea versicolor (<i>Baki, Barile, Quaqucha</i>) | <i>Solanum anguivi</i> Lam. | Solanaceae | Hiddi Binessa (Yejob imbuay) | Haile 69 | Fruit | Dried | concocted, powdered, mixed with butter | Dermal |
| Tonsillitis (<i>Qonqo</i>) | <i>Kalanchoe laciniata</i> (L.)DC. | Crassulaceae | Anchura | Haile 144 | Root | Fresh | Pounded, squeezed | Nasal |
| Toothache (<i>Hilicani</i>) | <i>Clerodendrum myricoides</i> (Hochst.) R.Br. Ex Vatke | Verbenaceae | Merasisa | Haile 70 | Root | Fresh or dried | Chewed | Oral |
| | <i>Datura stramonium</i> L. | Solanaceae | Bengi | Haile 165 | Seed | Fresh | Concocted, pounded, mixed with water, warmed | Oral |
| | <i>Galinsoga parviflora</i> L. | Asteraceae | Gubdu | Haile 125 | Seed | Fresh or dried Fresh | Burnt Concocted, pounded, mixed with water, warmed | Oral Oral |
| | <i>Osyris quadripartita</i> Decn. | Santalaceae | Karo | Haile 88 | Leaves | Fresh or dried | Crushed, decocted | Oral |
| | <i>Plantago lanceolatum</i> L. | Plantaginaceae | Sandabo | Haile 62 | Whole plant | Dried | Crushed, powdered, mixed with water | Oral |
| | <i>Polycarpon tetraphyllum</i> (L.)L. | Caryophyllaceae | Lalessa | Haile 109 | Root | Fresh or dried | Chewed | Oral |
| Typhoid (<i>Tesibo</i>) | <i>Eucalyptus globulus</i> Labill. | Myrtaceae | Barzafi | Haile 55 | Leaves | Fresh | Concocted, crushed, mixed with water and filtered | Oral |
| Wound | <i>Alchemilla haumannii</i> Rothm. | Rosaceae | Endrif | Haile 96 | Leaves | Fresh | Crushed | Dermal |
| | <i>Opuntia ficus-indica</i> (L.) Miller | Cactaceae | Beles | Haile 133 | Root | Fresh | Concocted, crushed | Dermal |
| | <i>Otostegia erlangeri</i> Gurke | Lamiaceae | Demboba | Haile 168 | Leaves | Dried | Concocted, powdered | Dermal |

for an ailment which in turn might be developed due to the high prevalence of these ailments in

the study area. On the other hand, the low degree of agreement among those healers in managing

human ailments with low ICF values (<0.27) was due to knowledge differences among the traditio-

tional healers and the variation in local knowledge as the study area was large (Almeida et al., 2006). This might also be attributed to the low prevalence of these diseases within the study area.

Our results showed *O. europaea* subsp. *cuspidata* to be the species with the highest fidelity level in treating eczema. According to Battinelli et al. (2006), extracts of this species were found to have *in vitro* antimicrobial activities and this may validate its traditional use in the study area.

The species with the highest fidelity level reported to be used by traditional healers of Bale to treat tinea versicolor was *Datura stramonium*. Extracts of this species were shown to have antimicrobial (Uzun et al., 2004; Eftekhar et al., 2005) and antimutagenic (Reid et al., 2006) activities. The reported antimicrobial activity of this species could validate its use by the Bale traditional healers to manage tinea versicolor.

Hypericum revolutum had the highest fidelity level in treating rheumatism in the current study area. Décostered et al. (1987) discovered antifungal compounds from the leaf and twig extract of this medicinal plant species. Moreover, Decosterd et al. (1989) reported an *in vitro* growth-inhibitory activity against the Co-115 human colon carcinoma cell line from petroleum-ether extract of the root bark of this species. However, these activities were not relevant to the use of this species by traditional healers within the study area to manage rheumatism. Further investigations are recommended on the phytochemical and biological activities of the species in relation to the claimed traditional use. *Myrica salicifolia* was another species with high fidelity level in managing rheumatism. Njung'e et al. (2002) found analgesic and antipyretic activities from the root extracts of this species while Kirira et al. (2006) reported anti-plasmodial activities from the methanol and aqueous extracts. Again the traditional use of this species was not consistent with the reported activity studies and this urges further biological activity investigation against rheumatism.

The Bale Mountains National Park and adjacent areas were found to have high diversity of ethnomedicinal plant species useful to manage human ailments. Most of the ethnomedicinal species were reported to be collected from wild sources. This was similar to studies from other areas (Addis et al., 2001; Giday et al., 2003; El-Hilaly et al., 2003; Ji et al., 2005; Joshua, 2006) where wild collection was frequently indicated to be dominant mode. The majority of ethnomedicinal plant species reported in this study were also reportedly harvested for their leaves and roots. Similar result was shown in the work of Huai and Pei (2005) where the frequencies of harvest for leaves and roots were reported to be 35.22 and 32.08%, respectively.

The plant life form use pattern by traditional healers for remedy preparation in this study was consistent with the use patterns noted by other studies in Ethiopia (Fassil, 2003; Teklehaymanot et al., 2007; Yineger et al., 2007)

where herbs and shrubs were consistently preferred life forms.

Most of the ethnomedicinal plant species were reported to be processed in fresh through concoction, crushing, decoction and powdering and administered mainly through oral and dermal routes. Remedies were mostly indicated to be prescribed by traditional healers of the study area with specific doses. However, their measurement methods were found to lack precision. This may be potentially dangerous as some of the species could have a high degree of toxicity, over dose might cause serious health problems for patients (Hillenbrand, 2006; Kitula, 2007).

Results of this study revealed that most ethnomedicinal plant species used by traditional healers of the study area to manage human ailments had multiple uses in addition to their medicinal values. This was indicative of the degree of threat that medicinal plant species were facing from different directions. On top of that, most species were reported to be threatened by several factors such as agricultural expansion, deforestation, change in climate or weather condition, over harvesting, fire and overgrazing. In addition, traditional healers significantly cited the absence of efforts to conserve the reported ethnomedicinal plant species. Urgent measures should therefore be taken so as to involve the traditional healers residing in and around Bale Mountains National Park in the conservation and sustainable use of ethnomedicinal plant resources as these were found to have significant contribution to meet the primary health cares of the local people in Bale. Any benefits arising from use or application of the indigenous knowledge reported in this study accrues equitably to traditional healers residing in and around Bale Mountains National Park, Ethiopia.

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