



# Ethnobotanical study of knowledge and medicinal plants use by the people in Dek Island in Ethiopia

Tilahun Teklehaymanot\*

Endod and Other Medicinal Plants Unit, Aklilu Lemma Institute of Pathobiology, Addis Ababa University, P.O. Box 1176, Addis Ababa, Ethiopia

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## ABSTRACT

**Ethnopharmacological relevance:** It reveals the trend of knowledge of medicinal plants and the documentation serves as a baseline data for future phytochemical and pharmacological studies.

**Aim of the study:** The medicinal plants are the integral part of the variety of cultures in Ethiopia and have been used over many centuries. Hence, the aim of this study is to assess knowledge specifically with regard to gender and age, and to document medicinal plants used by the people in Dek Island.

**Materials and methods:** The ethnobotanical surveys and quantitative analytical methods were used to study the level of knowledge and medicinal plants use in Dek Island.

**Results:** The male (mean =  $5.75 \pm 0.65$ ;  $p < 0.001$ ) and informants with  $\geq 40$  years of age (mean =  $5.25 \pm 0.56$ ;  $p < 0.05$ ) reported more medicinal plants. Age ( $p < 0.05$ ) and sex ( $p < 0.05$ ) have influence on knowledge of medicinal plants though sex (partial eta squared = 0.496) has stronger influence than age. The medicinal plants uses showed similarity with other studies conducted in different cultural setups and locations.

**Conclusion:** The trend of knowledge loss in both age categories and sexes implicates the likely risk of loss of knowledge. The documented data could be useful for future phytochemical and pharmacological studies.

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## 1. Introduction

The Ethiopian people have been using medicinal plants to treat different diseases over many centuries, though the religious and secular pharmacopoeia had been compiled since 15th century. The traditional medicinal plants are the integral part of the variety of cultures in Ethiopia; resulted in the traditional medical system pluralism (Pankhurst, 1965, 1990; Abebe and Ayehu, 1993).

In Ethiopia, about 800 species of plants are used in the traditional health care system to treat nearly 300 physical and mental disorders, and remains to be the main resource of treatment for a large majority (80%) of the people. Medicinal plants occur throughout the country's diverse highland and lowland areas (Edwards, 2001).

The documentation of the traditional medicinal plants used by the people in Ethiopia is limited compared to the extent of variety of cultures and the diversity of the terrain. Furthermore, the majority of these studies are focused only on the herbalists and Ethiopian medico-religious manuscripts (Abebe and Ayehu, 1993) without regarding the existing traditional knowledge and practices of common people. This trend might ignore the study on the level of knowledge in the society, affect the documentation and the search

for medicinal plants conserved and administered by the local people.

Therefore, assessment or investigation and documentation of knowledge of indigenous people on the use and management of medicinal plants would fill the gap of indigenous knowledge on medicinal plants. Moreover, the presence of natural and anthropogenic factors affecting the losses of valuable medicinal plants calls for the need to document the eroding medicinal plants and the associated knowledge. Thus, the purpose of this study is to assess traditional medicinal plants knowledge specifically with regard to gender, age and to document the knowledge and the uses of medicinal plants used by the people in Dek Island, which is part of an initiative to document baseline data for future pharmacological and phytochemical studies.

## 2. Materials and methods

### 2.1. Description of the study area

Dek Island ( $11^{\circ}53'N$ ,  $37^{\circ}17'E$ ) is the biggest island (approximately  $16 \text{ km}^2$ ) in Lake Tana with an estimated total population of 17,000. Lake Tana is the largest fresh water lake in Ethiopia and the source of the Blue Nile River. It is located in the country's northwest highlands at 600 km northwest of Addis Ababa and at an altitude of 1800 m (Fig. 1). The residents are Amahra people and speak the

\* Tel.: +251 112 763091; fax: +251 112 755296.

E-mail address: [tilahunmt@yahoo.com](mailto:tilahunmt@yahoo.com).

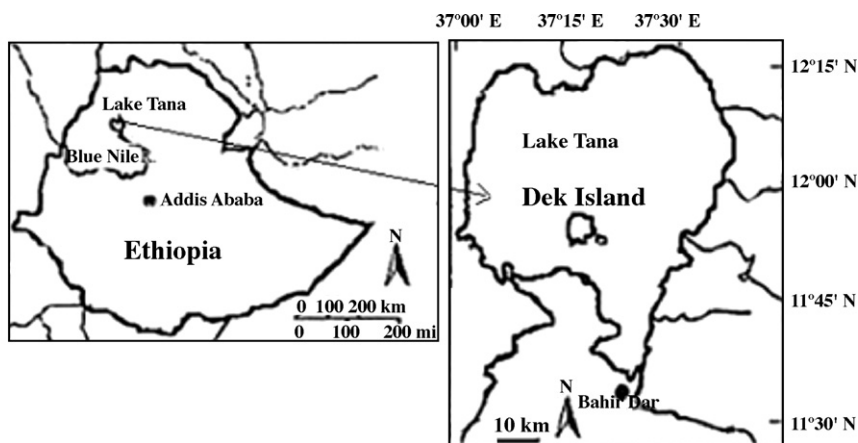


Fig. 1. Location of Dek Island in Ethiopia.

country's official language, Amharic. The main occupation of the people is fishing and farming.

## 2.2. Sampling informants

Two hundred informants were selected at random during house-to-house surveys that covered all parts of Dek Island; however, age class was taken into consideration; 108 were from 18 to 39 years of age and 92 were  $\geq 40$  years of age: 80 were females and 120 were males.

## 2.3. Ethnobotanical data collection

The ethnobotanical surveys were carried out from October 2005 to June 2006 using semistructured questionnaire (Martin, 1995) and the interview was conducted in Amharic. Prior to the interview, the consent of informants was asked with the assistance of local Farmers' Association representative to build on trust. They were asked to give their knowledge about the plants they use against a disease, plant parts harvested, method of preparation of the remedy, details of administration, and the dosage. Each informant was visited two to three times in order to confirm the reliability of the ethnobotanical information. The information provided that lack consistency were rejected and the informants were not included in the sample. Specimens of the reported medicinal plants were collected during regular walk in the fields. The plants were identified by experts: Dr. Mirutse Giday and Mr. Melaku Mandefro at Addis Ababa University following the Flora of Ethiopia and Eritrea (The National Herbarium of Addis Ababa University, 1989, 1995, 1997, 2000, 2006). Voucher specimens were deposited at National Herbarium and at Aklilu Lemma Institute of Pathobiology, Addis Ababa University.

## 2.4. Data analysis

### 2.4.1. Knowledge of medicinal plants

The knowledge of medicinal plants between female and male, and between two age categories; 18–39 and  $\geq 40$  years of age were compared using Chi-square statistics, *t*-test and analysis of variance.

### 2.4.2. Informant consensus factor (ICF) and fidelity level (FL)

The reported remedies and diseases were grouped into nine categories based on the information gathered from the interviewees. The categories were 'mich' (febrile disease characterized by fever, headache, sweating, *Herpes labialis*, and muscle spasm), gastrointestinal illness and intestinal parasites, skin infection and external

injury, internal and respiratory diseases, evil eye, rabies, snake bite, cancer (non-infectious or infectious swelling), and venereal disease and impotence. The informant consensus factor (ICF) was calculated for each category to identify the agreements of the informants on the reported cures for the group of diseases. The ICF was calculated as follows: number of use citations in each category ( $n_{ur}$ ) minus the number of species used ( $n_t$ ), divided by the number of use citations in each category minus one (Heinrich et al., 1998).

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

The fidelity level (FL), the percentage of informants claiming the use of a certain plant for the same major purpose, was calculated for the most frequently reported diseases or ailments.

$$FL (\%) = \frac{Np}{N} 100$$

where  $Np$  is the number of informants that claim a use of a plant species to treat a particular disease, and  $N$  is the number of informants that use the plants as a medicine to treat any given disease (Alexiades, 1996).

## 3. Result

### 3.1. Knowledge of medicinal plants

The male (mean =  $5.75 \pm 0.65$ ) reported more medicinal plants than women (mean =  $1.67 \pm 0.45$ ) did and the difference in the knowledge of traditional medicinal plants between male and female was significant: Pearson Chi-square statistics ( $\alpha=0.05$ , d.f.(6) = 38.099 and  $p < 0.001$  (Table 1).

The *t*-test on the number of plants reported by the two age categories showed significant difference:  $t_{(\alpha=0.05, d.f. = 11)} = 4.36$ ;  $p < 0.05$ . Fig. 2 shows the median for the number of medicinal plants reported by the informants: 18–39 and  $\geq 40$  years of age. The number of medicinal plants reported by both female and male of  $\geq 40$  years of age (mean =  $5.25 \pm 0.56$ ) is more than 18–39 years of age (mean =  $2.167 \pm 0.63$ ). The informants, in both age categories, that reported a medicinal plant as a remedy for an illness were able to identify the plants during the collection of medicinal plants for depository.

Analysis of variance ( $\alpha=0.05$ ) was used to identify the effect of age, gender, and age-by-gender interaction on the traditional medicinal plants knowledge of the society. The age-by-gender interaction ( $F=2.365$ ;  $p > 0.05$ ) indicated that the difference in knowledge of medicinal plants between males and females is the same for both categories of ages whereas age ( $F=11.20$ ;  $p < 0.05$ ) and sex

**Table 1**

The number of medicinal plants reported by female and male informants in Dek Island.

| Medicinal plants reported | Female (age category in years) |                 |                   | Male (age category in years) |                 |                   |
|---------------------------|--------------------------------|-----------------|-------------------|------------------------------|-----------------|-------------------|
|                           | 18–39 (mean = 25)              | ≥40 (mean = 49) | Total (mean = 36) | 18–39 (mean = 29)            | ≥40 (mean = 53) | Total (mean = 40) |
| 0                         | 38                             | 22              | 60                | 44                           | 7               | 51                |
| 1                         | 3                              | 5               | 8                 | 3                            | 8               | 11                |
| 2                         | 1                              | 3               | 4                 | 3                            | 7               | 10                |
| 3                         | 0                              | 4               | 4                 | 8                            | 9               | 17                |
| 4                         | 1                              | 3               | 4                 | 4                            | 10              | 14                |
| 5                         | 0                              | 0               | 0                 | 0                            | 3               | 3                 |
| 6+                        | 0                              | 0               | 0                 | 3                            | 11              | 14                |
| Total                     | 43                             | 37              | 80                | 65                           | 55              | 120               |

( $F = 19.65$ ;  $p < 0.05$ ) have influence on the knowledge of medicinal plants in the society though sex (partial eta squared = 0.496) has strong influence than age.

### 3.2. Medicinal plants and uses reported by the informants

Eighty-nine informants reported 60 medicinal plants that are used to treat both human and animal diseases. Of which 14 individuals reported 6–11 medicinal plants. The female informants reported five medicinal plants: *Glinus lotoides*, *Momordica foetida*, *Brassica carinata*, *Justicia schimperiana* and *Zingiber officinale* that are used to treat 'mich', 'kosso' (Tapeworm) and 'hodkurtet' (stomach-ache).

The 60 medicinal plant species are distributed across 40 families and 58 genera (Tables 2–4). In terms of number of medicinal plant species, Asteraceae are the dominant family (4 genera, 5 species) followed by Euphorbiaceae, Malvaceae and Poaceae (3 genera, 3 species), Amaryllidaceae, Brassicaceae, Cucurbitaceae, Lamiaceae, Olacaceae, Sapindaceae, Solanaceae and Verbenaceae each has two genera and two species. The rest have one species each. All medicinal plants have local Amharic names.

The reported medicinal plants species are used to treat 45 diseases. Twenty-two are used to treat gastrointestinal illness and intestinal parasites followed by 17 for internal and respiratory diseases, 14 for evil eye, 13 for skin infection and external injuries, 11 for cancer and swellings, and 6 for 'mich'. Three medicinal plants

are used as a remedy for rabies, 2 for snakebite, and 2 for venereal disease and impotence (Table 2).

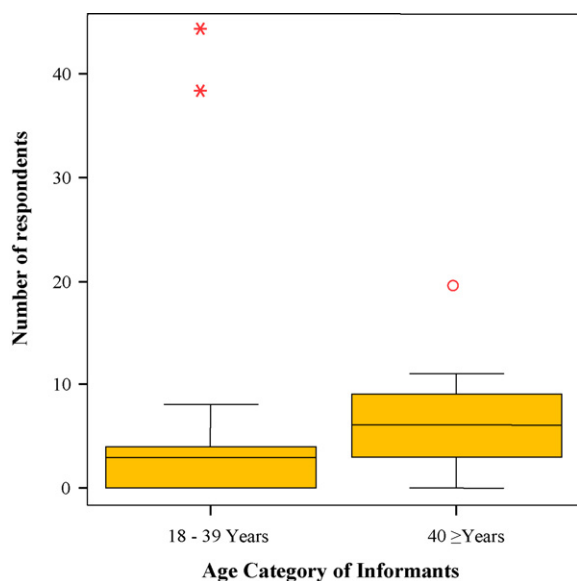
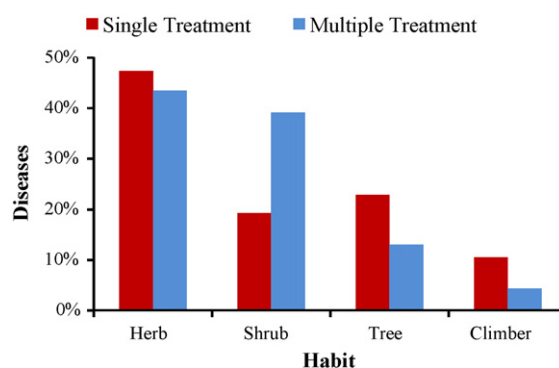
Fourteen multiple plants treatments with different combinations of medicinal plants are used to treat cancer, evil eye, internal and external illnesses. Six are used to treat internal illness followed by 3 for evil eye, and 2 for cancer and gastrointestinal illness. The highest number of medicinal plants in a multiple medicinal plants prescription is ten that is used to treat evil eye (Table 3).

Analysis of the growth forms of the medicinal plants used in single treatment elucidated that 33 species are herbs, 10 shrubs, 9 trees and 2 climbers. In multiple treatments, 26 are herb, 17 trees, 7 shrubs, and 1 climber. The herbaceous species constituted the largest number or proportion in both types of treatments (Fig. 3).

### 3.3. Plant parts used and mode of preparation

The dominant plant part used in the preparations both in single and multiple treatments is root: 58% and 48%, respectively. The next highest in single medicinal plant preparation is leaf (15%) followed by combinations of leaf and root (5%), and leaf and stem (5%). Fruit and rhizomes are used only in single medicinal plant treatments. In multiple medicinal plants treatment, the next highest are leaf and latex, and seed is used only in multiple medicinal plants preparation (Fig. 4).

The local people employed variety of methods in order to prepare remedies in single and in multiple preparations. The mode of preparation are pounding (16), crushing (15) and boiling (5), and chewing (6) or eating (4) fresh part. The crushed parts are used to prepare juices to be taken orally (20) or applied topically (2). The powdered parts are used to prepare paste (7) that is taken orally or applied as powder (13) on affected areas or sprinkled on burning charcoal and the smoke is inhaled (2).

**Fig. 2.** Boxplot illustrating variation changes between age categories in Dek Island.**Fig. 3.** Percent of diseases treated by each habit or growth form in single and multiple medicinal plants treatments in Dek Island.

**Table 2**  
Single medicinal plant uses and preparations.

| Family         | Species   | Local name           | Use(s)  | Preparation and parts  | Voucher number |
|----------------|---|----------------------|---|--|----------------|
| Acanthaceae    | <i>Justicia schimperiana</i> (Hochst. ex A. Nees) T. Anders | Smiza                | 'kuruba' stomach-ache and burning   | Juice of crushed fresh leaf is taken orally  | TD9810         |
| Amoryllidaceae | <i>Scadoxus multiflorus</i> (Martyn) Raf.                   | Dem Astefi           | 'gurtb' leshmaniasis  | Root paste is applied topically  | TD9840         |
| Apiaceae       | <i>Ferrula communis</i> L.                                  | Dog                  | 'serakesetan' excess bleeding during giving birth   | Fresh root is buried outside at the door   | TD9853         |
| Apocynaceae    | <i>Acokanthera schimperi</i> (A.DC.) Schweinf.              | Qerero               | 'chebtu' gonorrhoea   | Fresh root is chewed and swallowed before breakfast  | TD9855         |
| Apocynaceae    | <i>Carissa spinarum</i> L.                                  | Agam                 | 'ibab meklia' snake repellent   | Root powder mixed with water is poured into the holes of snake   | TD9888         |
| Araceae        | <i>Sauromatum venosum</i> (Ait.) Kunth.                     | Amoch                | 'wosfat' ascariasis   | Root paste mixed with water is taken in the morning before breakfast   | TD9836         |
| Asparagaceae   | <i>Asparagus africanus</i> Lam.                             | Yeset Lib            | 'likft' skin lesion   | Topical application of fresh crushed root  | TD9839         |
| Asteraceae     | <i>Crepis rueppellii</i> Sch. Bip.                          | Yemidir gusmt        | 'yedem bizat' blood pressure<br>'yedem tekimat' dysentery with blood  | Root is boiled in water and taken as tea at bed time<br>Juice of crushed fresh leaf and root is taken orally   | TD9843         |
| Asteraceae     | <i>Laggera crispata</i> (Vahl) Hepper and Wood              | Dedeho               | 'yeworabeba simeta' excessive menstruation  | Fresh crushed leaves with water is taken orally before breakfast   | TD978          |
| Asteraceae     | <i>Vernonia amygdalina</i> Del.                             | Giraw                | 'entil siwerd' tonsillitis  | Fresh leaf juice is taken orally   | TD9819         |
| Asteraceae     | <i>Vernonia filigera</i> Oliv. & Hiern                      | Daba Keded           | 'mich'  | Powder is sprinkled on burning charcoal and smoke is inhaled nasally   | TD9851         |
| Asteraceae     | <i>Zehneria scabra</i> (L.f.) Sond                          | Sharit (Hareg Ressa) | 'mich' or 'girfat' febrile illness<br>'hodkurtet' stomach-ache  | Boiled in water and inhaling the steam<br>Root paste is taken orally   | TD9820         |
| Boraginaceae   | <i>Cynoglossum coeruleum</i> Steud. ex DC.                  | Chemgogit            | 'katelo' burning on external part   | Topical application of fresh leaf powder   | TD986          |
| Brassicaceae   | <i>Brassica carinata</i> A. Br.                             | Gomen Zer            | 'hodkurtet' stomach-ache  | Eating seed  | TD9824         |
| Colchicaceae   | <i>Gloriosa superba</i> L.                                  | Yebab Mashila        | 'sinfete wesib' impotence<br>'ibabsinedf' snake bite<br>'hodkurtet' stomach-ache  | Root powder is taken with 'tej' for 3 days<br>Eating fresh root rolled with 'dagusa' injera or 'tef' porridge<br>Eating fresh root   | TD9829         |
| Commelinaceae  | <i>Commelina bengalensis</i> L.                             | Yelam Andebet        | 'kusil' external injury/wound   | Fresh crushed leaf and stem is applied topically   | TD9846         |
| Crassulaceae   | <i>Kalanchoe petittana</i> A. Rich.                         | Endehuahula (Awnda)  | 'hodkurtet' stomach-ache  | Chewing fresh root and taking the juice  | TD9844         |
| Cucurbitaceae  | <i>Momordica foetida</i> Schumacher                         | Amora Hareg          | 'mich'  | Leaf and stem boiled in water and inhaling the steam during bed time   | TD9825         |
|                |   |                      | 'tesbo beshita' epidemic disease  | Sprinkling mixed root and leaf powder on burning charcoal and inhaling smoke   |                |
| Curcubitaceae  | <i>Cucumis ficifolius</i> A. Rich.                          | Yemidir Embuay       | 'yewusha beshita' rabies  | Crushed fresh root with water fermented for 3 days is taken with honey early morning before breakfast orally until cure  | TD987          |
|                |   |                      | 'hodkurtet' stomach-ache<br>'yekusil merz' worsening external figure injury<br>'yeahya kintarot' wart<br>'yedem tekmat' amoebic dysentery | Chewing fresh root and swallowing the juice<br>Tying fresh root around the injury until cure<br>Topical application of leaf and root powder<br>Chewing fresh root and swallowing the juice before breakfast for 3 days |                |
|                |   |                      | 'mich'<br>'majirat getir' meningitis  | Boiled in water and inhaling the steam at bed time<br>Root powder mixed with honey taken orally until cure   |                |
| Euphorbiaceae  | <i>Croton macrostachyus</i> Del.                            | Bissana              | 'quaqucha' <i>Tinea versicolor</i>  | Rubbing the affected site with the latex   | TD985          |
| Euphorbiaceae  | <i>Euphorbia abyssinica</i> J. F. Gmel.                     | Qulqwal              | 'yeras fif' fungal infection on head  | Latex with butter is applied topically   | TD988          |
| Euphorbiaceae  | <i>Ricinus communis</i> L.                                  | Qachima              | 'wugat' chest pain<br>'kuruba' stomach-ache and burning   | Tying fresh root around neck with cotton trade<br>Juice of crushed fresh root is taken orally  | TD9832         |
| Fabaceae       | <i>Calpurnia aurea</i> (Alt.) Benth.                        | Digita               | 'hodkurtet' stomach-ache<br>'kusil' external injury<br>'tesbo' frequent dysentery with blood as plague                                    | Juice of fresh leaf is taken orally<br>Topical application of leaf paste<br>Juice of fresh leaf is taken orally for 3 days   | TD989          |
| Iridaceae      | <i>Gladiolus candidus</i> (Rendle) Goldblatt                | Milas golgul         | 'neqersa' cancer  | Topical application of root powder and mixed with water is taken orally  | TD9845         |
| Lamiaceae      | <i>Hoslundia opposita</i> Vahl.                             | Yemch medhanit       | 'mich'  | Leaf and stem boiled in water and inhaling the steam during bed time   | TD9856         |

Table 2 (Continued)

|               |  |                   |   |   |        |
|---------------|--|-------------------|---|---|--------|
| Lamiaceae     | <i>Ocimum lamiifolium</i> Hochst.                | Dama Kesse (Buli) | 'mich'  | Juice of fresh leaf is taken with hot coffee  | TD9826 |
| Malvaceae     | <i>Abutilon mauritanium</i> (Jacq.) Medic.       | Yebab Medihanit   | 'ibabe sinedf' snake bite   | Fresh root is crushed and boiled and taken orally   | TD980  |
| Malvaceae     | <i>Gossypium herbaceum</i> L.                    | Tit               | 'yeras fiff' fungal infection on head   | Topical application of fruit powder on the head   | TD9834 |
| Malvaceae     | <i>Sida Schimperiana</i> Hochst. A. Rich         | Chiffrig          | 'dem makomia' blood clotting  | Topical application of fresh leaf powder on external injury for blood clotting              | TD9833 |
|               |  |                   | 'kusal' 'gurtm' external injury   | Topical application of fresh leaf paste   |        |
|               |  |                   | 'yemerz tat' worsening figure nail illness  | Topical application of fresh root paste   |        |
| Molluginaceae | <i>Glinus lotoides</i> L.                        | Amkin (Lefata)    | 'kosso' tape worm   | Powder pounded with 'nug' seed is taken orally at night before bed or early morning         | TD984  |
|               |  |                   | 'hodkurtet' stomach-ache  | Chewing fresh root and swallowing the juice   |        |
| Moraceae      | <i>Dorstenia barnimiana</i> Schwienf.            | Work Bemeda       | 'neqersa' cancer  | Making small opening at affected part and inserting in the opening fresh or dry root        | TD9857 |
|               |  |                   | 'yeibd wush beshita' rabies   | Root powder with skimmed milk or nug is taken orally early morning until cure               |        |
|               |  |                   | 'kitinge' syphilis  | Root powder with honey is taken orally  |        |
|               |  |                   | 'amenmin' thinning/unhealthy weight loss, dysentery and fever with rash on the body | Root powder paste with honey is fermented for 7 days and taken orally for 7 days            |        |
|               |  |                   | 'wef beshita' hepatitis   | Root powder with skimmed milk or nug is taken orally early morning until cure               |        |
|               |  |                   | 'yeahya kintarot' wart  | Root paste is applied topically   |        |
| Olacaceae     | <i>Ximenia americana</i> L.                      | Enkuay            | 'yeibd wush beshita' rabies   | Soaking bark in water and the water is taken orally   | TD9815 |
| Phytolacaceae | <i>Phytolacca dodecandra</i> L'Herit             | Endod             | 'wef beshita' hepatitis, jaundice   | Juice of crushed fresh root taken with skimmed milk orally                                  | TD9814 |
| Podocarpaceae | <i>Podocarpus alcatrus</i> (Thunb.) Mirb.        | Bribira           | 'neqersa' cancer  | Powdered dry root mixed with water is taken orally and applied topically at site of illness | TD9876 |
| Polygonaceae  | <i>Rumex nepalensis</i> Spreng.                  | Tult              | 'gurtb' leishmaniasis   | Rubbing the spot with fresh root and leaf until cure; topical                               | TD9822 |
|               |  |                   | 'entil siwered' tonsillitis   | Crushed fresh root and leaf with water is taken orally                                      |        |
|               |  |                   | 'serakian beshita' excess bleeding during giving birth                              | Fresh root is buried outside at the door  |        |
|               |  |                   | 'hodkurtet' stomach-ache  | Eating fresh root   |        |
| Rhamnaceae    | <i>Ziziphus abyssinica</i> Hochst. ex A. Rich.   | Kurkura           | 'wef beshita' jaundice  | Fresh leaves and root are crushed and mixed with water and taken orally                     | TD981  |
| Sapindaceae   | <i>Dodonaea angustifolia</i> L. f.               | Ktkitta           | 'kintarot' hemorrhoids  | Dry root powder mixed with butter is applied topically around the anus                      | TD9878 |
| Simaroubaceae | <i>Brucea antidysenterica</i> J. F. Mill.        | Waginos (Aballo)  | 'yedem tekimat' stomach-ache and dysentery  | Juice of crushed root with water is taken orally  | TD9811 |
|               |  |                   | 'tekmāt' dysentery  | Juice of crushed bark with water is taken orally  |        |
| Solanaceae    | <i>Capsicum frutescens</i> L.                    | Mtmita            | 'tehod quartet' stomach-ache  | Dry and powdered fruit is taken mixed with water orally                                     | TD9879 |
| Solanaceae    | <i>Solanum incanum</i> L.                        | Embuay            | 'kusal' external injury/wound   | Fresh leaf juice is applied topically   | TD9812 |
|               |  |                   | 'hodkurtet' stomach-ache  | Crushed fresh root juice is taken orally  |        |
| Tiliaceae     | <i>Triumfetta heterocarpa</i> Sprague and Hutch. | Yelam tut         | 'yewof beshita' hepatitis'  | Crushed fresh root is mixed water and taken orally without food                             | TD9875 |
| Zingiberaceae | <i>Zingiber officinale</i> Rosc.                 | Jinjible          | 'hodkurtet' stomach-ache  | Chewed rhizome taken orally   | TD982  |

'injera': local thin bread.

'tej': a fermented drink made from honey, water and hops (*Rhamnus prinoides*). The alcohol content varies considerably.

**Table 3**  
Multiple medicinal plants uses and preparations.

| Species   | Family           | Local name       | Use(s)                      | Preparation  | Voucher number |
|---|------------------|------------------|-----------------------------|--|----------------|
| 1 <i>Aerva javanica</i> (Burm. f.) Schultes.                        | Amaranthaceae    | Tobia            | 'neqersa' cancer            | Powder mixed with bat's blood is taken orally early morning before breakfast | TD9827         |
| 2 <i>Plumbago zeylanicum</i> L.                                     | Plumbaginaceae   | Amira            |                             |  | TD9842         |
| 3 <i>Lepidium sativum</i> L.  | Brassicaceae     | Fetto            |                             |  | TD9837         |
| 1 <i>Crinum abyssinicum</i> Hochst. Ex A. Rich                      | Amaryllidaceae   | Gibb Shinkurt    | 'neqersa' cancer            | Topical application of powder mixed with hyena feces and latex               | TD9838         |
| 2 <i>Kalanchoe petittana</i> A. Rich.                               | Crassulaceae     | Endehuahula      |                             |  | TD9844         |
| 3 <i>Verbascum sinaiticum</i> Benth.                                | Scrophulariaceae | Qetetina         |                             |  | TD9850         |
| 4 <i>Euphorbia abyssinica</i> J. F. Gmel.                           | Euphorbiaceae    | Qulqwal          |                             |  | TD9888         |
| 1 <i>Olea europaea</i> L. ssp. <i>cuspidata</i> (Viv.) P. S. Green. | Oleaceae         | Weyra            | 'yejoro wugat' ear sickness | Powder leaf mixed with oils and goat butter is used as ear drop              | TD9847         |
| 2 <i>Sesamum orientale</i> L.                                       | Pedaliaceae      | Selit            |                             |  | TD9835         |
| 3 <i>Verbena officinalis</i> L.                                     | Verbenaceae      | Atuch            |                             |  | TD9821         |
| 1 <i>Asparagus africanus</i> Lam.                                   | Asparagaceae     | Yeset Kest       | 'buda' evil eye             | Powder is sprinkled on burning charcoal and smoke is inhaled nasally         | TD9828         |
| 2 <i>Capparis tomentosa</i> Lam.                                    | Capparidaceae    | Gumero           |                             |  | TD9854         |
| 3 <i>Justicia schimperiana</i> (Hochst. ex A. Nees) T. Anders       | Acanthaceae      | Smiza            |                             |  | TD9810         |
| 4 <i>Syzygium guineense</i> (Willd.) DC.                            | Myrtaceae        | Doqima           |                             |  | TD9891         |
| 5 <i>Rhoicissus tridentata</i> (L. f.) Willd. & Drummond            | Vitaceae         | Wedel Asfesa     |                             |  | TD9823         |
| 6 <i>Carissa spinarum</i> L.  | Apocynaceae      | Agam             |                             |  | TD9888         |
| 7 <i>Brucea antidysenterica</i> J. F. Mill.                         | Simaroubaceae    | Waginos (Aballo) |                             |  | TD9811         |
| 8 <i>Clausena anisata</i> (Willd.) Benth.                           | Rutaceae         | Limbche          |                             |  | TD9896         |
| 9 <i>Calpurnia aurea</i> (Alt.) Benth.                              | Fabaceae         | Digita           |                             |  | TD989          |
| 10 <i>Solanaum incanum</i> L.                                       | Solanaceae       | Embuay           |                             |  | TD9812         |
| 1 <i>Capparis tomentosa</i> Lam.                                    | Capparidaceae    | Gumero           | 'buda' evil eye             | Mixed powder paste with water taken orally                                   | TD9854         |
| 2 <i>Carissa spinarum</i> L.  | Apocynaceae      | Agam             |                             |  | TD9888         |
| 3 <i>Justicia schimperiana</i> (Hochst. ex A. Nees) T. Anders       | Acanthaceae      | Smiza            |                             |  | TD9810         |
| 4 <i>Clausena anisata</i> (Willd.) Benth.                           | Rutaceae         | Limbche          |                             |  | TD9896         |
| 5 <i>Solanaum incanum</i> L.  | Solanaceae       | Embuay           |                             |  | TD9812         |
| 6 <i>Cucumis ficifolius</i> A. Rich.                                | Curcubitaceae    | Yemidir Embuay   |                             |  | TD987          |
| 1 <i>Clerodendrum myricoides</i> (Hochst.) Vatke                    | Verbenaceae      | Misrich          | 'buda' evil eye             | Mixed powder is sprinkled on burning charcoal and smoke is inhaled nasally   | TD9841         |
| 2 <i>Cucumis ficifolius</i> A. Rich.                                | Curcubitaceae    | Yemidir Embuay   |                             |  | TD987          |
| 3 <i>Verbascum sinaiticum</i> Benth.                                | Scrophulariaceae | Qetetina         |                             |  | TD9850         |
| 1 <i>Capparis tomentosa</i> Lam.                                    | Capparidaceae    | Gumero           | 'guroro siabt' sore throat  | Mixed powder mixed with water is taken orally                                | TD9854         |
| 2 <i>Carissa spinarum</i> L.  | Apocynaceae      | Agam             |                             |  | TD9888         |
| 1 <i>Euphorbia abyssinica</i> J. F. Gmel.                           | Euphorbiaceae    | Qulqwal          | 'kintarot' wart             | Topical application of root powder and latex paste                           | TD988          |
| 2 <i>Sida Schimperiana</i> Hochst. A. Rich                          | Malvaceae        | Chiffrig         |                             |  | TD9833         |
| 1 <i>Hordeumvulgare</i> L.  | Poaceae          | Barely           | 'kumegna' trypanosomiasis   | Mixed powder with water is taken orally                                      | TD9849         |
| 2 <i>Verbascum sinaiticum</i> Benth.                                | Scrophulariaceae | Qetetina         |                             |  | TD9850         |
| 3 <i>Vernonia filigera</i> Oliv. & Hiern                            | Asteraceae       | Daba Keded       |                             |  | TD9851         |
| 1 <i>Capparis tomentosa</i> Lam.                                    | Capparidaceae    | Gumero           | 'kuruba' anthrax            | Crushed fresh root with water is filtered and the liquid is taken orally     | TD9854         |
| 2 <i>Solanaum incanum</i> L.  | Solanaceae       | Embuay           |                             |  | TD9812         |
| 3 <i>Ricinus communis</i> L.  | Euphorbiaceae    | Qachima          |                             |  | TD9832         |
| 1 <i>Cardiospermum halicacabum</i> L.                               | Sapindaceae      | Semeg            | 'ibach' swelling            | Topical application of fresh crushed paste                                   | TD9817         |
| 2 <i>Momordica foetida</i> Schumach                                 | Cucurbitaceae    | Amora Hareg      |                             |  | TD9825         |
| 1 <i>Brucea antidysenterica</i> J. F. Mill.                         | Simaroubaceae    | Waginos (Aballo) | 'wef beshita' hepatitis     | Fresh parts boiling in water and inhaling the steam through mouth            | TD9811         |
| 2 <i>Gardenia ternifolia</i> Schumach & Thonn.                      | Rubiaceae        | Gambello         |                             |  | TD9830         |
| 3 <i>Solanum marginatum</i> L. f                                    | Solanaceae       | Geber Embuay     |                             |  | TD983          |
| 4 <i>Solanaum incanum</i> L.  | Solanaceae       | Embuay           |                             |  | TD9812         |

Table 3 (Continued)

|   |   |               |             |  |  |        |
|---|---|---------------|-------------|--|--|--------|
| 1 | <i>Calpurnia aurea</i> (Alt.) Benth.                        | Fabaceae      | Digita      | 'yeayne bar teza' (igeseb) mental disorder | Mixed powder with water is taken orally early morning before breakfast | TD989  |
| 2 | <i>Capparis tomentosa</i> Lam.                              | Capparidaceae | Gumero      |  |  | TD9854 |
| 3 | <i>Justicia schimperiana</i> (Hochst. ex A. Nees) T. Anders | Acanthaceae   | Smiza       |  |  | TD9810 |
| 4 | <i>Carissa spinarum</i> L.                                  | Apocynaceae   | Agam        |  |  | TD9888 |
| 1 | <i>Crepis rueppellii</i> Sch. Bip.                          | Asteraceae    | Yemdr Gusmt | 'yeahiya kintarot' wart                    | Topically applying fresh leaf and root paste mixed with Latex          | TD9843 |
| 2 | <i>Euphorbia abyssinica</i> J. F. Gmel.                     | Euphorbiaceae | Qulqwal     |  |  | TD988  |

### 3.4. Route of administration and dosage

The administration routes are oral (57%), external (36%), and nasal (4%). In addition, such as for cancerous swellings, a cut is made at the spot and the fresh plant part is inserted in the swollen body part. The remedies that are administered orally are taken diluted by water, skimmed milk and honey or are taken with 'tef' or 'dagussa injera' or taken with boiled coffee or 'tej'. Those taken through nasal are either smoked or boiled in water and the patient inhales the smoke or the steam being covered with cloth. The dosage varies with age, severity of the illness and symptoms. The unit of measurement can be finger length for root, bark, and stem and numbers for leaves, seeds, fruits and flowers. A remedy is mostly taken until cure, however, in some cases; it is taken only for 1 day or from 3 to 7 days.

### 3.5. Veterinary important medicinal plants

Thirteen medicinal plants were reported by the informants and they are distributed into 10 families and 12 genera and are used to treat nine diseases. The plant parts used are root (5), leaf (3) and mixture of root and leaf (1). Five of the reported treatments are used as remedy for 'Kumegna' (Trypanosomiasis) and two for 'aba senga' (Blackleg/fatal toxemia). Most of the preparations are from single medicinal plants. The majority of remedies are prepared from fresh plant parts either crushed or powdered and administered orally or topically (Table 4).

### 3.6. Informants consensus factor and fidelity level

The category that has the highest ICF is venereal disease and impotence (0.67) followed by rabies (0.60) and gastrointestinal illness and intestinal parasites (0.52). The lowest is cancer and swelling (Table 5). The most cited disease in Dek Island is gastrointestinal illness and intestinal parasites, and 22 species of medicinal plants are used as remedy. The medicinal plants that are used as a treatment for more types of diseases have lower fidelity level than those that are cited for one or fewer treatments (Table 6).

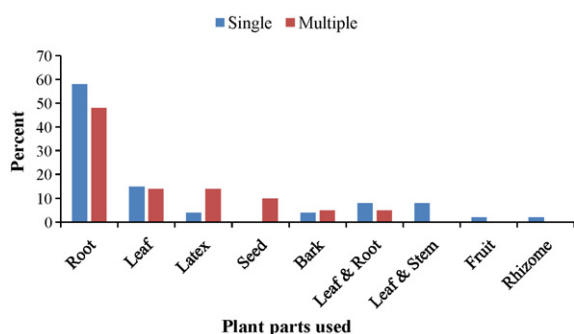


Fig. 4. Percentage of plant parts used in single and multiple medicinal plants preparations in Dek Island.

## 4. Discussion and conclusion

### 4.1. Medicinal plants and the associated knowledge

In this study, the average number of medicinal plants reported by informants of 18–39 years of age is  $2.167 \pm 0.63$  and this may elucidate the loss of the local traditional medicinal plants associated knowledge and their uses. The knowledge of medicinal plants use is nearly disappearing among the young generation, because, may be most of the knowledgeable persons did not properly pass on their knowledge to the next generation. Hence, the young generation may not have the opportunity to acquire the traditional knowledge. On the other hand, the higher number of medicinal plants reported by the informants of  $\geq 40$  years of age corroborates the long-standing belief that only the elder people possess the knowledge of medicinal plants use and have a strong tendency to keep their knowledge secret. In spite of that, the traditional knowledge may be rapidly eroded when these elderly individuals pass away (Abebe and Ayehu, 1993).

The source of the medicinal plants knowledge is the main factor for the difference in knowledge of medicinal plants between female and male, and among informants. The females learn from their mother or father through routine observations while their fathers' teach the males, in addition to routine observations, since the traditional knowledge in the family or community is passed from male parent to his first-born son (Bishaw, 1990). The individuals specifically who reported 17 and 19 medicinal plants are serving in the monasteries on the Dek Island, and it is assumed that they might have acquired the knowledge from knowledgeable clergies (Teklehaymanot et al., 2007).

Ethnobotanical knowledge and practice within any culture vary by geographical origin, residence, ethnicity, religion, age, and gender (Pfeiffer and Butz, 2005). Nevertheless, the uses of medicinal plants reported in this study: *Acoanthera schimperii*, *Asparagus africanus*, *Carissa spinarum*, *Crepis rueppellii*, *Croton macrostachyus*, *Cucumis ficifolius*, *Rumex nepalensis*, *Sida schimperiana*, *Solanum incanum*, *Vernonia amygdalina*, *Ximenia americana*, and *Zehneria scabra* are found to be similar with the result of Addis et al. (2001), Giday et al. (2003), Wondimu et al. (2007), and Yineger et al. (2007) studies conducted in different cultural setups and locations. They are also similar with other studies conducted in areas surrounding Lake Tana, in northwest and central Ethiopia such as Gedif and Hahn (2003), Giday et al. (2007), Teklehaymanot and Giday (2007) and Teklehaymanot et al. (2007). The causes for the similarity may be an agreement on the possession of biological active compound or effectiveness of the medicinal plants for the reported diseases. This agreement could help for ethnopharmacological selection of plants for future phytochemical and pharmacological study (Trotter and Logan, 1986).

The medicinal plants that are reported as a remedy for such category of disease: internal diseases and respiratory infection, snakebite, and cancer and swelling have low ICF since the number of plants in each category is more than those categories of diseases

**Table 4**  
Veterinary important medicinal plant uses and preparations.

| Species                                   | Family           | Local Name       | Use(s)                                  | Preparation and parts   | Voucher number |
|---|------------------|------------------|---|---|----------------|
| <i>Momordica foetida</i> Schumacher       | Cucurbitaceae    | Amora Hareg      | 'kumegna' (trypanosomiasis)             | Fresh root paste with 'dagussa injera' is administered orally                               | TD9825         |
| <i>Eleusine coracana</i> (L.) Gaertner    | Poaceae          | Dagussa          |   |   | TD9852         |
| <i>Momordica foetida</i> Schumacher       | Cucurbitaceae    | Amora Hareg      | 'kumegna'                               | Crushed root is soaked in water and the water is given orally from 3 to 7 days              | TD9826         |
| <i>Rumex nepalensis</i> Spreng.           | Polygonaceae     | Tult             | 'kumegna'                               | Juice of crushed root is given orally or nasally  | TD9822         |
| <i>Gloriosa superba</i> L.                | Colchicaceae     | Yebab Mashila    | 'kumegna'                               | Fresh root with 'tef' injera' is given orally   | TD9829         |
| <i>Eragrostis tef</i> (Zucc.) Trotter     | Poaceae          | Tef              | 'kumegna'                               | Roots and barely seed powder mixed with water is given orally                               | TD9850         |
| <i>Verbascum sinaiticum</i> Benth.        | Scrophulariaceae | Qetetina         |   |   | TD9850         |
| <i>Vernonia filigera</i> Oliv. & Hiern    | Asteraceae       | Daba Keded       |   |   | TD9851         |
| <i>Hordeum vulgare</i> L.                 | Poaceae          | Barely           |   |   | TD9849         |
| <i>Asparagus africanus</i> L.             | Asparagaceae     | Yset lib         | 'yeibd wusha beshita' rabies            | Fresh or dry crushed and powdered leaves are mixed with cold water and administered orally  | TD9839         |
| <i>Sida Schimperiana</i> Hochst. A. Rich  | Malvaceae        | Chiffriig        | 'yekebt tkusat' blackleg/fatal toxemia/ | Root and leaf are crushed, powdered and mixed with water and administered orally or nasally | TD9833         |
| <i>Brucea antidysenterica</i> J. F. Mill. | Simaroubaceae    | Waginos (Aballo) | 'amedit' dermatophytes                  | Leaves are crushed and painted over the body of the animal                                  | TD9811         |
| <i>Vernonia amygdalina</i> Del.           | Asteraceae       | Giraw            | 'yewof beshita' hepatitis               | Crushed leaves are administered orally  | TD9819         |
| <i>Solanum incanum</i> L.                 | Solanaceae       | Embuay           | 'aba senga' blackleg/fatal toxemia/     | Fresh leaf is crushed and juice is applied topically  | TD9812         |
| <i>Carissa spinarum</i> L.                | Apocynaceae      | Agam             | 'kusil' external injury                 | Fresh root is grounded and put into the wounds of cattle to kill worms                      | TD9888         |

with high ICF and this does not mean that these plants are ineffective. On the other hand, lack of consensus among informants may be due to their diverse backgrounds or their sources of knowledge. Each informant reported his own experience; for example, two of the treatments for cancer and swelling are concoction of three or more plants each with different combination of medicinal plants: *Aerva javanica*, *Plumbago zeylanicum* and *Lepidium sativum* make one treatment group and *Crinum abyssinicum*, *Kalanchoe petittana*, *Verbascum sinaiticum* and *Euphorbia abyssinica* another. In addition, the diseases occurrence is rare, administered by healers and mostly treated with poly-herbal medicines, therefore, a variety of medicinal plants are reported. The multiple prescriptions reported usually contain a range of pharmacologically active compounds; in some cases, it is not known which ingredients are important for the therapeutic effect (Schulz et al., 2001).

The medicinal plants with 100% FL or cited only by few, in most of the cases, are reported as a remedy for a disease though some are reported in other studies as remedy for more than one type of diseases. *Croton macrostachyus* is reported as a remedy for sores, wounds, warts, ringworm, 'quaqucha' (*Tinea versicolor*), 'Mich', retained placenta, gonorrhoea, stomach-ache, anthrax, gum ailment, common flu and haemorrhage; *Phytolacca dodecandra* for 'wef beshita' (hepatitis, jaundice), rabies, scabies, contraceptive and abortion; *Plumbago zeylanicum* for cancer, dermatological disorders, gland tuberculosis, impotence, malaria, bone tuberculosis and anti-viral activities; *Ximenia Americana* for lung abscess, muscle cramp, wounds, eye problem and rabies; *Carissa spinarum* for stomach-ache, muscle cramps, evil eye, malaria and ascariasis; *Clerodendrum myricoides* for swelling leg, malaria and mental illness and *Syzgium guineense* for malaria, diarrhoea and evil eye (Addis et al., 2001; Gedif and Hahn, 2003; Giday et al., 2003, 2007; Njoroge and Bussmann, 2007; Ssegawa and Kasenene, 2007; Teklehaymanot and Giday, 2007; Teklehaymanot et al., 2007; Wondimu et al., 2007).

The majority of the plants (41%) with ICF that ranges from 38% to 100% are used as remedies for gastrointestinal illness and parasites infections and this indicates high prevalence of this category of diseases in Dek Island. In the island, since there is no water well, the inhabitants to meet their water demands depend on lake water for both domestic and recreational purposes (Erko and Tedla, 1993). The complaints of abdominal pain by the residents of Dek Island are probably from intestinal parasitic infections; therefore, it is most likely true to consider the medicinal plants among those reported in the future pharmacological study to search for active compounds with anti-intestinal parasite effect.

#### 4.2. Plant part, dosage and route of administration

Root is one of the most extensively used plant part in preparation of traditional herbal medicine in this study and in others conducted in Ethiopia followed by leaf (Kloos, 1976; Abebe and Ayehu, 1993). The quantity of the parts used determines the dosage and depends on the information given by the patient and the experience of the traditional medicine practitioners. For most of the remedies, a full dose is taken at one time. The dose depends on the patient's age, physical state, health conditions, the socio-cultural explanation and diagnosis of the illness. In addition, the units employed to measure the amount of the plant or plant parts used in the preparation of most of the remedies are rough estimates. Moreover, a part of a medicinal plant is used as a remedy for more than one type of illness, such as, root of *Dorstenia barnimiana*. It is used as a remedy for cancer, rabies, syphilis, hepatitis and wart, therefore, the dosage depend on the experience of individual herbalist and mode of application (Abebe and Ayehu, 1993; Addis et al., 2001).

The information documented on the knowledge and medicinal plants use has implicated the possible loss of traditional medicinal plants knowledge in the Dek Island in spite of natural and



**Table 5**  
Informant consensus factor (ICF).

| Category  | Species | All species (%) | Use citations | All use citations (%) | ICF  |
|---|---------|-----------------|---------------|-----------------------|------|
| Venereal disease and impotence                    | 2       | 4               | 4             | 3                     | 0.67 |
| Rabies  | 3       | 6               | 6             | 5                     | 0.60 |
| Gastrointestinal illness and intestinal parasites | 22      | 41              | 45            | 34                    | 0.52 |
| 'Mich'  | 6       | 11              | 10            | 8                     | 0.44 |
| Evil eye  | 14      | 26              | 21            | 16                    | 0.35 |
| Skin infection and external injury                | 13      | 24              | 16            | 12                    | 0.20 |
| Internal diseases and respiratory infection       | 17      | 31              | 18            | 14                    | 0.06 |
| Snake bite  | 2       | 4               | 2             | 2                     | 0.00 |
| Cancer and swelling                               | 11      | 20              | 11            | 8                     | 0.00 |

**Table 6**  
Fidelity level (FL).

| Species                       | Local name     | Therapeutic uses   | No. of informants | FL      |
|-------------------------------|----------------|--|-------------------|---------|
| <i>Glinus lotoides</i>        | Amkin          | Tape worm, stomach-ache  | 2                 | 100.00% |
| <i>Clausena anisata</i>       | Limbche        | Evil eye   | 2                 | 100.00% |
| <i>Vernonia filigera</i>      | Daba Keded     | 'mich', trypanosomiasis  | 3                 | 66.67%  |
| <i>Ricinus communis</i>       | Qachima        | Chest pain, stomach-ache and burning   | 3                 | 66.67%  |
| <i>Sida Schimperiana</i>      | Chiffrig       | Blood clotting, worsening external figure injury, wart, blackleg                               | 5                 | 60.00%  |
| <i>Calpurnia aurea</i>        | Digita         | Stomach-ache, external injury, dysentery   | 5                 | 60.00%  |
| <i>Capparis tomentosa</i>     | Gumero         | Evil eye, tonsillitis, trypanosomiasis   | 5                 | 60.00%  |
| <i>Kalanchoe pettitana</i>    | Endehuahula    | Cancer, stomach-ache   | 2                 | 50.00%  |
| <i>Vernonia amygdalina</i>    | Giraw          | Tonsillitis, hepatitis   | 2                 | 50.00%  |
| <i>Verbascum sinaiticum</i>   | Qetetina       | Cancer, evil eye, trypanosomiasis  | 4                 | 50.00%  |
| <i>Euphorbia abyssinica</i>   | Qulqwal        | Fungal infection, cancer, wart   | 4                 | 50.00%  |
| <i>Zehneria scabra</i>        | Sharit         | 'mich', stomach-ache   | 2                 | 50.00%  |
| <i>Asparagus africanus</i>    | Yeset Lib      | Skin lesion, rabies  | 2                 | 50.00%  |
| <i>Momordica foetida</i>      | Amora Hareg    | Trypanosomiasis, 'mich', epidemics, swelling   | 5                 | 40.00%  |
| <i>Brucea antidysenterica</i> | Waginos        | Stomach-ache, dysentery, evil eye, hepatitis, dermatophytes                                    | 5                 | 40.00%  |
| <i>Gloriosa superba</i> L.    | Yebab Mashila  | Impotence, snake bite, stomach-ache  | 5                 | 40.00%  |
| <i>Carissa spinarum</i> L.    | Agam           | Snake repellent, evil eye, swelling of throat/sore throat, 'mental disorder, external injury   | 6                 | 33.33%  |
| <i>Cucumis ficifolius</i>     | Yemidir Embuay | Stomach-ache, nail injury, wart, dysentery with blood, 'mich', meningitis, evil eye            | 3                 | 33.33%  |
| <i>Crepis rueppellii</i>      | Yemidir gusmt  | Wart, blood pressure, blood-dysentery  | 3                 | 33.33%  |
| <i>Solanum incanum</i>        | Embuay         | External injury, stomach-ache, evil eye, trypanosomiasis, blackleg, hepatitis                  | 7                 | 28.57%  |
| <i>Rumex nepalensis</i>       | Tult           | Leshmaniasis, tonsillitis, excess bleeding during giving birth, stomach-ache                   | 5                 | 20.00%  |
| <i>Dorstenia barnimiana</i>   | Work Bemeda    | Cancer, rabies, syphilis, thinning, dysentery and fever with rush on the body, hepatitis, wart | 6                 | 16.67%  |

socio-economical changes. Furthermore, the trend of knowledge loss in both age categories is similar and the consequence is a likely risk of loss of knowledge even in the older generations. This study shows the urgency of thorough documentation of medicinal plants used by different cultures. The documentation on medicinal plant uses has shown agreement with other studies in conducted in different cultural setups and locations; hence, it could be a lead for future phytochemical and pharmacological studies.

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