

## Ethnopharmacological survey of the Bunda district, Tanzania: Plants used to treat infectious diseases

Sheila Mgole Maregesi<sup>a,b,\*</sup>, Olipa David Ngassapa<sup>a</sup>, Luc Pieters<sup>b</sup>, Arnold J. Vlietinck<sup>b</sup>

<sup>a</sup> Department of Pharmacognosy, School of Pharmacy, Muhimbili University College of Health Sciences, P.O. Box 65013, Dar es Salaam, Tanzania

<sup>b</sup> Laboratory of Pharmacognosy, Department of Pharmaceutical Sciences, University of Antwerp, Universiteitsplein 1, 2610 Antwerp, Belgium

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### Abstract

An ethnobotanical study was carried out in six villages in the Bunda district, Mara Region, Tanzania, where the use of plants still has a special meaning to the society, in the treatment of various diseases. Information was obtained from the traditional healers and other experienced persons, having some knowledge on medicinal plants. Fifty-two plants were reported for use in the treatment of various infectious diseases. These plants belong to 29 families, with Papilionaceae being the most represented. Leaves ranked the highest, especially for use in topical preparations. Oral administration was the most frequently used route of administration. Twenty-one percent of the recorded plants were reported for treating venereal diseases, with syphilis and gonorrhoea being the most commonly mentioned. Information providers requested feedback with regard to the plants proven scientifically to be toxic in order to avoid risks while offering their services. From this work it was found out that, people in this area commonly use medicinal plants with trust they have built on the curative outcome witnessed. As the first ethnobotanical study in Bunda district recording 52 plants in a small area covered, publication of this work is expected to open up more studies to record many useful medicinal plants unfolded.

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### 1. Introduction

Plants have always played a major role in the treatment of human traumas and diseases worldwide (Principe, 1991). They have been used as sources of drugs employed in modern medicine, either by providing pure compounds, starting materials for partial synthesis of useful compounds or models for synthesis of new drugs (Hansel, 1972). Folklore information from many different cultures is an important tool in revealing plants with useful medicinal properties (Balandrin et al., 1993). Since many clinically useful prescription drugs worldwide have originated from the tropical forest, it is worth to embark researching on tropical vegetation (Farnsworth et al., 1985) with an anticipation of obtaining more new bioactive substances. Tanzania is located in this zone with a natural forest containing about 10,000 species which also carry a very high degree of species

diversity as well as endemism in the world, as more than 1100 species are reported to be endemic in this country (Mahunnah and Mshigeni, 1996).

Few ethnomedical surveys that been carried out in Tanzania resulted into compilation of many plants that are used in treating various diseases (Haerdi, 1964; Hedberg and Hedberg, 1982; Hedberg et al., 1983a, 1983b; Chhabra et al., 1987, 1989, 1990a, 1990b, 1991, 1993; Ruffo, 1991). The country covers a geographical area of about 945,000 km<sup>2</sup> with a population of over 30 million, consisting of many ethnic groups. The variable physical features and climatic conditions in different regions provide the country with the richest biological diversity in both flora and fauna. Many parts of the country, particularly the remote areas with poor infrastructure have not been reached for the inventory of medicinal plants. These rural communities are almost totally dependent on traditional/herbal medicine for their health care needs. However, useful information about medicinal plants is still passed from one generation to another by oral communication, posing the danger of losing some knowledge. There is, therefore, a need to carry out more research pertaining to

\* Corresponding author.

E-mail address: [smaregesi@hotmail.com](mailto:smaregesi@hotmail.com) (S.M. Maregesi).



Fig. 1. Map of Tanzania showing Bunda district.

documentation of useful medicinal plants in this country before they disappear, especially those which are already endangered by the arid climatic conditions and man made activities. Aging and natural death of medicine men (Waganga) are other factors having a negative impact on this matter/subject.

The purpose of this survey was to document useful medicinal plants with a clearly defined therapeutic context of being used to treat infectious diseases. Although ailments such as convulsions, hypertension, asthma and infertility were beyond the scope of the present study, it was considered important to record plants that were frequently mentioned for the treatment of such health conditions. In ethnomedical studies, the frequency by which a given plant is mentioned to be of medicinal value is a good indicator of its efficacy

The study was conducted in Bunda district located in the Savannah grassland, Northern part of Tanzania (Fig. 1).

## 2. Methodology

The survey was carried out for a period of 28 days in July, 2000, in six villages located in Bunda district. The villages included Bitaraguru, Kung'ombe, Nyasana, Kabasa, Kamukenga and Kangetutya. The interview was conducted using national language, Kiswahili, and sometimes it was necessary to combine with local dialects to enable the informants to give correct information with ease. This was possible, since one of us (SMM) speaks those dialects fluently. There were a total of 10 informants, two of them were traditional healers and the rest were family members and other individuals who gained knowledge on medicinal uses of plants, from their parents or relatives and had used the plants with promising results.

Interviews and fieldwork were done on alternate days. The interviews were in the form of group discussions, in groups of three or four people, except for the traditional healers who preferred confidentiality. Information was sought concerning their

knowledge about infectious diseases, local names of plants used in the treatment of the mentioned ailments, plant parts, methods of preparation, dosage, duration of use and any special condition/information about the drug. The information about each particular plant was then immediately recorded on a questionnaire (see Appendix A). During fieldwork plant materials were collected for preparation of herbarium specimens and for biological testing. The plants were identified by Mr. Frank Mbago, of the Herbarium Unit, Botany Department of the University of Dar es Salaam, by comparison with the herbarium specimens. Voucher specimens were deposited in the same herbarium.

## 3. Results and discussion

### 3.1. Information providers and criterion of plant selection

There were a total of 10 informants, all of them had the primary school education, except two. The informants' attitude was positive with regard to providing useful information, however, it was necessary to pay some money, as an incentive for the information they provided. Medicinal plants reported in this article are those mentioned by at least five informants, except for *Barleria eranthemoides* R.Br. that was collected due to emphasis of a traditional healer that it is a useful herb for several infectious diseases and that he obtained curing outcome(s). The frequency of mention is indicated in Table 1. The general concept of infectious diseases was clear to them that, such diseases were caused by very tiny organisms invisible with naked eyes. They referred to those tiny organisms as "Tuvidudu", meaning very tiny insects/organisms. In a very simple language some could differentiate disease conditions of a particular organ. For example for the stomach, the illness could be due to overeating or indigestion, food poisoning or contamination, and surgical problems, which they said were far beyond their limits. Skin problems were classified in two types: the infectious type, such as boils, athlete's foot and cellulites, and inborn illnesses such as allergic conditions.

### 3.2. Plant families, plant parts and local names

The study has identified 52 plants belonging to 29 families, which are used in the treatment of infectious diseases as shown in Table 1. Of these families, Papilionaceae was the most represented (27.59%) followed by Compositae (13.79%) and Anacardiaceae, Labiatae and Mimosaceae (10.34%) each. Others represented by either 6.90 or 3.45%.

During plant collection, it was observed that some plants had more than one vernacular name due to the different local dialects used in the area. The medicinal use of certain plants or plant parts were commonly mentioned by informants. Thus, in some cases, especially shrubs and trees, the whole plant had medicinal application.

Leaves were the most frequently used plant parts, especially for topical application, constituting 38.6%, followed by roots (28.6%), stems (20%), whole plant (10%) and fruit/seeds (2.8%).

Table 1  
Plants used to treat infections in Bunda district

Plant name (family, Latin, binomial and voucher specimen number)	Frequency of mention	Vernacular name(s)	Medicinal traditional uses	Some previous report(s) on ethnomedical/botanical uses
Acanthaceae, <i>Barleria eranthemoides</i> R. Br., SMM-BD23	1	Sese yahase (Sukuma)	Roots decoction or infusion of pounded leaves is drunk for treatment of dysentery. According to the traditional healer, the plant is very potent for several infectious diseases	The plant is used for human medicine in the Gash-Barka region, Eritrea (Ogbazghi and Bein, 2006)
Acanthaceae, <i>Blepharis panduriformis</i> Lindau, SMM-BD38	5	Mukilabaigi (Jita)	Whole plant is boiled in water, decoction drunk for dysentery	No report has been found
Aizoaceae, <i>Zaleya pentandra</i> (L) Jeffrey, SMM-BD25	5	Isindura (Jita & Ruri), Kaitongo (Sukuma)	The whole plant is dried, powdered and applied directly on Athelele's foot and very septic wounds. Roots are chewed with <i>Voandzeia subterranea</i> Thou. (njugu mawe (Swahili)) to shorten labour pains during delivery	Roots: wounds, stomach pain, diarrhoea, dysmenorrhoea, polymenorrhoea. Leaves: colds. (Samuelsson et al., 1991). Plant decoction: abortifacient and against stomach troubles (Saha et al., 1961; Farouk et al., 1983)
Anacardiaceae, <i>Lannea humilis</i> (Oliv.) Engl. SMM-BD34	6	Nyamunogo (Jita)	Roots are boiled in water, decoction is drunk for anaemia and stomach pains	Roots: nausea and general body weakness (Kokwaro, 1976)
Anacardiaceae, <i>Lannea schweinfurthii</i> (Engl.) Engl, SMM-BD01	7	Lisalwa (Jita)	Stem bark is boiled in water and drunk for treatment of syphilis, cellulitis, abscesses and oral candidiasis	Bark decoction: gingivitis, root decoction: nasal ulcers and asthma. (Neuwinger, 2000)
Anacardiaceae, <i>Ozoroa reticulata</i> (Bak.f.) R.A. SMM-BD22	5	Nago (Sukuma)	Decoction of either roots or stem barks is drunk for treating dysentery, cholera and anaemia. Root or stem barks boiled in water with sugar is taken orally for treatment of hypertension	Stem bark decoction: diarrhoea and stomach pain (Kokwaro, 1976), dysentery (Watt and Breyer-Brandwijk, 1962). Root decoction: bilharzia (Hedberg and Hedberg, 1982), malaria and aphrodisiac (Haerdi, 1964). Root and stem barks: vaginal and oral candidiasis (Runyoro et al., 2006)
Balanitaceae, <i>Balanites aegyptiaca</i> (L.) Del., SMM-BD27	8	Liluguyu (Jita)	The stem bark is macerated in warm water, the extract drunk for treating asthma, dry cough and chest infection	Plant: antiparastic, antipyretic, fish poison, abortifacient and molluscicidal (Iwu, 1993)
Bignoniaceae, <i>Kigelia africana</i> (Lam.) Benth, SMM-BD03	5	Lisamwa (Jita), Ng'wicha (Sukuma)	Stem bark is boiled in water and drunk for treatment of pneumonia, gonorrhoea, bilharzia, dysentery, coughing, and female gynaecological problems. The fruit is boiled and taken orally for treatment of anaemia especially with pregnant women	Roots: malaria, syphilis and snakebite. Stem: stomach pain, gonorrhoea, trachoma, burns and worms (Kokwaro, 1976). Stem bark decoction: measles, analgesic and fever (Kamuhabwa et al., 2000). Inner stem bark: dysentery, constipation, wound dressing and boils (Irvine, 1961)
Boraginaceae, <i>Trichodesma zeylanicum</i> (L.) R. Br., SMM-BD41	6	Nyabugimbi (Jita)	Roots are boiled in water, decoction drunk and douched for treatment of vaginitis. Leaf infusion is used as eye drop for treatment of cataract	Roots: wounds and analgesic. Plant: snakebite antidote and diuretic (Watt and Breyer-Brandwijk, 1962). Leaves: fevers, scorpion bite and analgesic (Iwu, 1993)

Table 1 (Continued)

Plant name (family, Latin, binomial and voucher specimen number)	Frequency of mention	Vernacular name(s)	Medicinal traditional uses	Some previous report(s) on ethnomedical/botanical uses
Caesalpiniaceae, <i>Senna siamea</i> (Lam.) Irwin & Barneby, SMM-BD32	10	Masongoma (Jita, Sukuma), Mijohoro (Swahili)	Roots are peeled, pounded and boiled, the decoction is drunk for treating gonorrhoea	Roots decoction or infusion: malaria (Macfoy and Sama, 1983), decoction: hernia (Chhabra et al., 1987). Fresh roots decoction with lemon: fever and jaundice (Adjanohoun et al., 1986)
Capparidaceae, <i>Boscia angustifolia</i> R. Br., SMM-BD26	5	Lisingisi (Jita)	The stem bark is boiled in water and drunk for treatment of mumps, dysentery and venereal diseases	Bark decoction: malaria (Kokwaro, 1976). Plant: psychiatric and psychosomatic disorders (Mathias, 1982; Iwu, 1993)
Capparidaceae, <i>Maerua edulis</i> (Gilg & Bened.) De Wolf, SMM-BD14	10	Manywera manji (Kurya), Manywera (Jita)	The peeled roots infusion is taken orally for treating venereal diseases especially gonorrhoea and syphilis. Roots are eaten during food shortages. The plant is poisonous, death occurs when eaten in excess	Roots: gonorrhoea, syphilis and eye infection, Fruit and leaves: applied topically against pain and rheumatic swellings. Raw root induces thirst and is poisonous (Kokwaro, 1976)
Celastraceae, <i>Elaeodendron schlechteranum</i> (Loes.) Loes., SMM-BD16	8	Chihusilo (Jita), Ngakama (Sukuma)	The powder of root/stem barks is applied directly on foul smelling septic wounds. Stem bark is boiled in water to give a tonic used to treat anaemia and hypertension. Root bark decoction is drunk to treat dysmenorrhoea, female infertility, and male impotence	Roots: abscesses and carbuncles (Watt and Breyer-Brandwijk, 1962; Khan et al., 1980)
Chenopodiaceae, <i>Chenopodium ambrosioides</i> L., SMM-BD36	6	Injaga-yabekwabi (Jita), Nemu ya Masai (Sukuma)	The shoot is ground, soaked in warm water, extract is gurgled for oral thrush, drunk and douched for vaginal ulcers. The powder is sprinkled on boils. Leaves are soaked and drunk to expel tapeworm	Leaves: various advanced cancers including that of kidney, antihelminthic for humans and animals, antidiabetic, antiameba (Azuine, 1998), menstrual disorders and dysmenorrhoea (Ososki et al., 2002). Aerial part: stomach, bile and vesicular disorders (Macia et al., 2005)
Chenopodiaceae, <i>Chenopodium opulifolium</i> Koch & Ziz., SMM-BD33	5	Mogabhogole (Jita)	Leaves/shoot are dried, powdered and applied topically on fungal/bacterial scalp infection. Sometimes it is mixed with soda ash	Leaves: eye ointment. (Watt and Breyer-Brandwijk, 1962). Leaf maceration: female asthenia and diluted leaf sap: abdominal colic for newborns (Adjanohoun et al., 1993). Root decoction: inducing menstruation and hasten birth (Chhabra et al., 1989)
Combretaceae, <i>Combretum adenogonium</i> Steud ex A.Rich., SMM-BD18	7	Malangu (Jita), Nonja minze or Makoyoyo (Sukuma)	Powdered leaves or stem bark is sprinkled on septic wounds and fungal infection of the scalp	Roots decoction: coughs and syphilis (Kokwaro, 1976), leprosy (Chhabra et al., 1989). Root infusion: an aphrodisiac (Gelfand et al., 1985). Leaf decoction used to clean chronic wounds (Adjanohoun et al., 1986). Sap from chewed leaves and shoot is swallowed and pulp is applied on snakebite (Imperato, 1977)

Table 1 (Continued)

Plant name (family, Latin, binomial and voucher specimen number)	Frequency of mention	Vernacular name(s)	Medicinal traditional uses	Some previous report(s) on ethnomedical/botanical uses
Combretaceae, <i>Terminalia mollis</i> Laws, SMM-BD06	8	Linyago (Jita)	Root bark decoction drunk against urine-blockage, kidney problems, diarrhoea, and dysentery. Stem bark decoction is drunk for jaundice treatment, and infusion is applied as drops for eye infection	Bark powder: wounds, haemorrhoids and used as haemostatic. Leaf extract/decoction: diarrhoea and as enema (Neuwinger, 2000)
Compositae, <i>Emilia coccinea</i> (Sims) Sweet, SMM-BD49	5	–	Infusion from whole plant is drunk for treatment of cancer	Root decoction: syphilis, leaves: nose infection, sores and as a poultice (Kokwaro, 1976), ear infection (Tabuti et al., 2003), threatened abortion, cardiac and ovarian problems, splenomegaly, ulcers, abscess and children epilepsy/convulsions (Neuwinger, 2000)
Compositae, <i>Felicia grantii</i> (Oliv. & Hiern) Grau, SMM-BD45	5	Nyaseko-indume (Jita)	Plant sap is used against eye infection. Roots decoction is drunk for stomach pains	Plant decoction: insanity, and plant sap: eye problems (Neuwinger, 2000)
Compositae, <i>Senecio discifolius</i> Oliv. SMM-BD09	5	Imangwe (Ruri)	Decoction of the whole plant is drunk for treatment of syphilis, the preparation is said to be more effective when combined with <i>Harrisonia abyssinica</i> Oliv	Plant decoction: stomachache during pregnancy, and stimulation of milk production after birth. Leaves: sore eyes. (Kokwaro, 1976)
Compositae, <i>Tithonia diversifolia</i> (Hemsl.) A.Gray, SMM-BD30	10	Maua (Swahili, Sukuma)	Pounded fresh leaves are soaked in water and bathed for skin infections. While the concentrated macerate is drunk for stomach problems	Leaf infusion: abdominal pains, indigestion, sore throat, and liver pain (Kokwaro, 1976). Leaf maceration: amoebic dysentery (Tona et al., 1998)
Compositae, <i>Vernonia cinerascens</i> Sch. Bip., SMM-BD05	5	Mbalike (Sukuma)	Leaves boiled and bathed for skin infection, Steam is inhaled for mental disorders treatment	Young twigs, leaves and roots: depression (Von Koenen, 2001)
Euphorbiaceae, <i>Euphorbia heterophylla</i> L., SMM-BD39	5	Nyamata (Jita)	Whole plant is boiled in water, decoction drunk for typhoid fever	Plant: antidote for irritation produced by other species of <i>Euphorbia</i> (Watt and Breyer-Brandwijk, 1962)
Euphorbiaceae, <i>Euphorbia tirucalli</i> L., SMM-BD43	10	Minyaa (Swahili), Masongorwa (Jita, Sukuma)	Latex is applied into the eyes for ophthalmic infections. Root decoction is drunk to treat gonorrhoea and syphilis. Sometimes the preparation is done by a combination of <i>Senna siamea</i> (Lam.) Irwin & Barneby	Young branches: sore throat, and stomach complain. Roots: emetic for snakebite, women sterility and the plant is toxic (Kokwaro, 1976). Root and leaf extracts: syphilis and malaria, respectively (Rwangabo, 1993)
Fabaceae, <i>Crotalaria cf. Caudata</i> Welw. ex Baker., SMM-BD17	5	Bulebasubhugu (Jita), Kaninagu (Sukuma)	Powdered leaves is mixed with fats or oils is applied topically to treat skin diseases. Leaf decoction is drunk to treat of gonorrhoea and threatened miscarriage	Leaf infusion: insanity (Baerts and Lehmann, 1989)
Fabaceae, <i>Crotalaria retusa</i> L, SMM-BD50	6	Ganyabhundege (Jita)	Leaf juice used as drops against eye infection, while the leaf infusion is bathed for skin diseases	Leaves: fever and skin diseases, roots: haemoptysis and colic. Seeds are toxic (Nobre et al., 2005), Fresh roots paste: applied on wounds (Samuelsson et al., 1992)

Table 1 (Continued)

Plant name (family, Latin, binomial and voucher specimen number)	Frequency of mention	Vernacular name(s)	Medicinal traditional uses	Some previous report(s) on ethnomedical/botanical uses
Labiatae, <i>Hoslundia opposita</i> Vahl, SMM-BD31	6	Omunyenete (Kurya)	Ground fresh leaves are soaked in water the extract douched to treat vaginitis, drunk for treatment of hypertension. The roots are boiled and taken orally to cure children fever and convulsions	Leaves: skin diseases and herpes zoster, whole plant: liver cancer (Azuine, 1998). The plant: gonnorrhoea, blenorrhoea cystitis, liver disease, chest pain, cough, fever, hookworm, stomach disorders, wounds and mental disturbances (Watt and Breyer-Brandwijk, 1962), Roots: treatment of malaria (Haerdi, 1964), epilepsy and convulsions, measles like swellings on the skin (Hedberg et al., 1983a)
Labiatae, <i>Leonotis nepetifolia</i> L., SMM-BD40	6	Gabunyunya (Jita)	Juice from fresh ground leaves or dry powder is applied fresh or septic wounds, leaves are boiled and the decoction is drunk for treatment of convulsions	The whole plant: fever, headaches elephantiasis, and amenorrhoea. Leaves: malaria, typhoid, syphilitic ulcers asthma and as haemostatic (Watt and Breyer-Brandwijk, 1962). Aerial parts decoction: fever (Rasoanaivo et al., 1992)
Labiatae, <i>Plectranthus kilimandschari</i> Gurke, SMM-BD47	9	Makoroma (Jita),	The leaf infusion drunk for chest pain, cough, dysmenorrhea and dysentery	Leaves are boiled in water and inhaled for psychiatric problems (Chhabra et al., 1990a). Leaves: phagedenic ulcers (Rwangabo, 1993)
Mimosaceae, <i>Acacia brevispica</i> Harms, SMM-BD19	5	Bigeye (Jita), Lugeye (Sukuma)	Pounded leaves is rubbed on the infected swollen part of the body or dressed on the abscess. Leaf infusion is occasionally drunk for the same ailments	Roots: cough (Chhabra et al., 1990b), snake bites, female infertility, antihelminthic, aphrodisiac (Kokwaro, 1976)
Mimosaceae, <i>Acacia tortilis</i> (Forsk.) Hyne, SMM-BD29	5	Ng'ale (Sukuma)	Stem bark is pounded and soaked in water, the extract gurgled to treat mouth infections and dental problems	Root: correction of irregular menses. (Chhabra et al., 1990b). Dried root maceration is drunk for malaria treatment (N'Diaye, 1962)
Mimosaceae, <i>Dichrostachys cinerea</i> (L.) Wight & Arn, SMM-BD44	7	Bisanjawe (Jita)	Roots are boiled in water and drunk for treating venereal diseases. Leaves are chewed and swallowed for snakebite antidote	Roots: pulmonary tuberculosis, antiseptic and wounds (Watt and Breyer-Brandwijk, 1962), syphilis and leprosy. Stem bark: dysentery and worms, leaves: gonorrhoea, urethral discharge, sore throat, inflammatory swelling, abscesses, and elephantiasis (Azuine, 1998). Fruits: venereal disease (Kambizi and Afolayan, 2001). Analgesic, antiasthma and antiviral (Iwu, 1993; Kamuhabwa et al., 2000)
Moraceae, <i>Ficus sycomorus</i> L., SMM-BD21	5	Likuyu (Jita), Nkuyu (Sukuma)	Stem bark is boiled in water and drunk for treatment of fungal infection of the gut, abscess, boils, peptic ulcers an jaundice. The same is douched for treating vaginal/anal infections	Plant: respiratory disorders and certain skin diseases (Mousa et al., 1994). Fruits: eaten to encounter stomach pain (Lockett and Grivetti, 2000), fruit infusion: against tuberculosis (Arnold and Gulumian, 1984)

Table 1 (Continued)

Plant name (family, Latin, binomial and voucher specimen number)	Frequency of mention	Vernacular name(s)	Medicinal traditional uses	Some previous report(s) on ethnomedical/botanical uses
Nyctaginaceae, <i>Boerhavia coccinea</i> Mil, SMM-BD46	6	Likukubi (Jita)	Leaf infusion is gurgled for oral candidiasis and aphthous ulcers. Root decoction is taken orally for the same ailments	Plant: gastrointestinal infections (Tapia-Pérez et al., 2003), root and leaves: liver problems and toothache, respectively (Neuwinger, 2000)
Oleaceae, <i>Jasminum fluminense</i> Vell., SMM-BD15	7	Binyafwira (Jita)	Fresh leaves are pounded to give a paste dressed on the affected area to treat cellulites ( <i>termed wild abscess</i> ) and abscess. Leaves macerated in cold water and drunk to treat female infertility	Roots: snakebite antidote (Watt and Breyer-Brandwijk, 1962; Kokwaro, 1976) and uvulitis, Leaves: as antihelminthic in children, (Chhabra et al., 1990b), antirheumatic and antidiarrhoea (Haerdi, 1964)
Papavaraceae, <i>Argemone mexicana</i> L., SMM-BD12	10	Rangiibili (Sukuma), Rikararungu (Kurya)	The juice (latex) from different parts of the shoot is applied directly on wounds and sores. Crushed leaves are soaked in cold water and bathed for treating skin infections	Whole plant: skin cancer, latex: warts and chancres, roots: inflammatory swelling and toothache, tapeworm, boils and abscesses (Azuine, 1998). Plant sap used for treatment of warts and ulcers (Amico, 1977)
Papilionaceae, <i>Dalbergia melanoxyton</i> Guill & Perr, SMM-BD20	6	Echigembe (Jita), Gembe (Sukuma), Mpingo (Swahili)	Decoction of the leaves is drunk for abscess and other swollen parts due to infections, the pounded leaves are used to massage swollen parts	Roots: abdominal pain, hernia, uterine prolapse, dysuria, hiccups, impotence, and as aphrodisiac (Chhabra et al., 1990b), headaches and bronchitis (Kerharo and Adam, 1974). Leaves: throat inflammation, cardiac problems, amoebic dysentery, and syphilis (Haerdi, 1964), joint pains (Kokwaro, 1976)
Papilionaceae, <i>Aeschynoneme indica</i> L., SMM-BD 51	5	–	Leaf or root infusion drunk for treatment of jaundice	Plant used as antifertility drug, the <i>in vitro</i> test was positive in male human and rat semens (Oliver-Bever, 1986)
Papilionaceae, <i>Erythrina abyssinica</i> Lam, SMM-BD02	5	Liebhete (Jita)	Stem bark and roots are boiled the decoction is drunk for curing diarrhoea dysentery and jaundice	Roots infusion: venereal diseases (Kambizi and Afolayan, 2001), jaundice, leprosy, rheumatism, dysentery, and beriberi, bronchitis, pneumonia and fever (Azuine, 1998). Stem bark: stomachaches (Chhabra et al., 1990b). Root bark/root: trachoma, gonorrhoea, abdominal pains, burns, general body swelling and antihelminthic, malaria syphilis and snakebites (Kokwaro, 1976)
Papilionacea, <i>Indigofera colutea</i> (Burm.f.) Merr, SMM-BD24	5	Nengo yahase (Sukuma)	The whole plant is pounded and soaked in warm water. The extract is used to clean multiple boils while part of the extract is concentrated by boiling and taken orally for treating the same problem	Pounded root mixed with ghee is applied on cuts and bruises. The plant is rubbed in against scabies (Neuwinger, 2000)
Papilionacea, <i>Lonchocarpus eriocalyx</i> Harms, SMM-BD28	6	Lijare (Jita), Mutungutu (Zanaki)	Stem bark is boiled in water, decoction drunk to treat cough, stomach pain and dysentery	Root powder: pimples (Kokwaro, 1976), skin-eruptions (Watt and Breyer-Brandwijk, 1962)

Table 1 (Continued)

Plant name (family, Latin, binomial and voucher specimen number)	Frequency of mention	Vernacular name(s)	Medicinal traditional uses	Some previous report(s) on ethnomedical/botanical uses
Papilionaceae, <i>Ormocarpum kirkii</i> S. Moore, SMM-BD13	7	Mtemanjofu (Jita)	Roots and leaves are used for treatment of abscess and cellulites. Roots are boiled in water and drunk, fresh leaves are pound, little water added to make a paste used for dressing the affected area. Root decoction is drunk against fever	Whole plant: oedema, roots: rheumatism and stomach pains, (Kokwaro, 1976). epilepsy and hernia, root bark and stem bark for diarrhoea and headache, respectively (Chhabra et al., 1990b)
Papilionaceae, <i>Rhynchosia sublobata</i> (Schum.) Meikle, SMM-BD07	8	Nyakasorogo (Jita)	The root is ground and soaked in warm water, the infusion is drunk for treatment of blood diarrhoea	Leaf sap and root decoction: tachycardia and gall bladder disorders in children (Haerdi, 1964). Leaves: stomach problems, roots: chest illness, antidote for snakebite. (Kokwaro, 1976)
Papilionaceae, <i>Sesbania sesban</i> (L) M.S., SMM-BD49	10	Zuzuma (Sukuma)	Pounded fresh leaves soaked in cold or warm water, the infusion taken orally for treatment of venereal diseases	Plant: throat sore, gonorrhoea, syphilis, yaws, children convulsions and as insecticide. Leaves: leprosy (Chhabra et al., 1990b), swelling and stomach troubles (Kokwaro, 1976), root: dizziness and as antihelminthic (Haerdi, 1964), scorpion bite, guinea worm. Seed powder: applied topically, barks juice taken orally for skin itch. Seeds used for bronchial catarrh and excessive mensentral haemorrhage (Watt and Breyer-Brandwijk, 1962)
Polygonaceae, <i>Rumex usambarensis</i> (Dammer) Dammer, SMM-BD42	5	Binyambe (Jita)	The shoot is pounded, soaked in hot water, the infusion drunk for treatment of haemorrhoids. Leaves are wrapped in banana leaf, warmed and squeezed to give the juice applied through the nose to treat tonsillitis	Roots: bilharzia (Hedberg et al., 1983b), young stem: peptic ulcers, diarrhoea and vomiting (de Boer et al., 2005). Leaves: diabetes (Chhabra et al., 1991), stomach pain and cough. The whole plant: smallpox (Kokwaro, 1976)
Rubiaceae, <i>Crossopteryx febrifuga</i> (G. Don) Benth., SMM-BD11	5	Kumbwambizo (Sukuma)	Root bark is boiled in water, the decoction taken orally for treatment of tuberculosis and venereal diseases. Root decoction is used cure female infertility	Roots: tuberculosis, cough, spasm of the stomach and hookworm (Haerdi, 1964), syphilitic ulcers (Watt and Breyer-Brandwijk, 1962). Fermented leaves: conjunctivitis, root decoction: venereal diseases (Kokwaro, 1976)
Sapindaceae, <i>Cardiospermum halicacabum</i> L., SMM-BD08	6	Nyamtumuka (Jita)	The leaves or shoot system are ground and mixed with fats, the paste is used for dressing the abscess. Seeds are powdered for treatment of septic wounds	Leaves: purgitive (Natarajani et al., 1999), piles, digestive and pulmonary disorders, diarrhoea, dysentery, syphillis, and rheumatism, (Watt and Breyer-Brandwijk, 1962). Swelling, skin eruptions, itch, etc. Stem juice: for ophthalmia. Seeds induce epileitiform convulsion in children (Oliver-Bever, 1986). Leaves and roots: nervous disorders (Watt, 1967)



Table 1 (Continued)

Plant name (family, Latin, binomial and voucher specimen number)	Frequency of mention	Vernacular name(s)	Medicinal traditional uses	Some previous report(s) on ethnomedical/botanical uses
Scrophulariaceae, <i>Buchnera speciosa</i> Skan, SMM-BD37	5	Ifufya (Jita), Kidua (Swahili)	Roots are pounded and macerated in water, the extract is gurgled for dental problems. The root is also used as a toothbrush	No report has been found.
Simaroubaceae, <i>Harrisonia abyssinica</i> Oliv., SMM-BD10	10	Lisawa (Jita)	Peeled roots are boiled in water, the decoction is drunk for treatment of fever, malaria, diarrhoea and abscess	Roots decoction: epilepsy (Moshi et al., 2005), abscesses, dysmenorrhoea, malaria and as vermifuge against ascaris (Haerdi, 1964). Fever, Insomnia, nausea, vomiting, bubonic plague, testicles swelling and tuberculosis (Kokwaro, 1976). Fever, dyspepsia, and cancer (Kamuhabwa et al., 2000)
Solanaceae, <i>Withania somnifera</i> (L.) Dunal, SMM-BD35	5	Lifubefube (Jita)	The roots are used for treating convulsions in children. Root decoction is drunk and pounded roots is mixed with oil or fats and smeared all over the body during the attack. Root powder is sprinkled on the nipples to enable babies take it while breast-feeding	Leaves: breast cancer, infusion taken orally as antibiotics against broad-spectrum bacteria and virus (Azuine, 1998). Both leaves and roots taken internally, and fresh-pounded leaves applied externally against fever, chills, rheumatism and colics (Oliver-Bever, 1986). Leaves: otitis insanity, and skin diseases, (Baerts and Lehmann, 1989)
Sterculiaceae, <i>Waltheria indica</i> L., SMM-BD04	5	Ngung'u (Sukuma), Echumya (Ruri), Mkama-werungu (Jita)	Powdered leaves are sprinkled on fresh septic wounds. Whole plant is boiled and drunk for treatment of dysentery and taken as an antidote of poisoning	Leaves: blood diarrhoea (Chhabra et al., 1993), convulsions and wounds (Hedberg et al., 1983b). Roots: syphilis (Haerdi, 1964, Kokwaro, 1976)
Verbenaceae, <i>Stachytarpheta jamaicensis</i> (L.) Vahl, SMM-BD52	5	–	The fresh leaves are ground and juice applied to treat fungal infections of the nails	Leaves: snake and insect bites (Natarajani et al., 1999), headache (Kokwaro, 1976). Plant: used to treat tumors (Ososki et al., 2002)

### 3.3. Dosage forms and routes of administration

Dosage forms included liquid preparations (decoctions, infusions or macerates), juices obtained by steaming or crushing the plant material followed by squeezing and latex. Solid preparations included dry powdered materials and soft pasts made in fat/oils or water. Most of the preparations were taken orally, while topical application was mainly used for wounds and other skin infections. Other routes of administration included inhalation of steam from hot, water-boiled preparations, douching or bathing with macerates, infusions or decoctions. In most cases, the use of a given drug preparation was continued up to at least three days after a symptomatic relief was achieved. This was especially the case for oral dosage forms, to make sure that the infection was cleared. Twenty-one percent of the plants were reported for the treatment of venereal diseases with gonorrhoea and syphilis being frequently mentioned. About 19% of the plants were

used for dysentery and diarrhea, and 15% for skin problems.

### 3.4. Plants with scarce documentation on medicinal use

To the best of our knowledge, this is the first documentation of the medicinal applications of *Buchnera speciosa* Skan and *Blepharis panduriformis* Lindau. Recently the medicinal use of *Barleria eranthemoides* R.Br. for human purposes in the Gash-Barka region, Eritrea has been reported, however, no detailed information such as how and for what disease was described (Ogbazghi and Bein, 2006). The scanty distribution, small size and thorny nature of *Barleria eranthemoides* could hardly attract its collection for random screening. It happened to be among those plants documented in our study with some medicinal uses giving a credit to plant collection based on ethnobotanical/ethnomedical data. Reluctance of a traditional healer to reveal all information pertaining to the medicinal application

of *Barleria eranthemoides* augmented with the then, lack of documented data triggered our interest to search therapeutical claims of other plants belonging to the same genus. Those having medicinal application include *Barleria lupulina*, used in India for treatment of various ailments including mental illness, fever, pain and diabetes, and as diuretic (Chopra et al., 1968). Pharmacological/biological activities of the *Barleria* genus include anti-diabetic activity (*Barleria lupulina*, *Barleria cristata*, and *Barleria prionitis*) (Rahman and Zaman, 1989; Suba et al., 2004), anti-HSV-2 (Yoosook et al., 1999; Yoosook et al., 2000) and anti-inflammatory activity (*Barleria lupulina* and *Barleria prionitis*) (Singh et al., 2003; Suba et al., 2005). Antifertility and central nervous system activities have been observed in animal models for *Barleria prionitis* and *Barleria lupulina*, respectively (Gupta et al., 2000; Suba et al., 2002; Verma et al., 2005). Further research on *Barleria eranthemoides* will reveal its medicinal potential and facilitate its use as a standardized herbal drug.

### 3.5. Common plants in the area with previous medicinal reports

The Combretaceae is a large family with at least 600 species, and its commonly occurring genera *Terminalia* and *Combretum* with 250 species each are widely used in African traditional medicine. Previous studies had confirmed antimicrobial activity from extracts/isolated compounds of some species belonging to this family (Baba-Mousa et al., 1999; Fyhrquist et al., 2002; Katerere et al., 2003; Martini et al., 2004). *Terminalia mollis* and *Combretum adenogonium* were noted as common medicinal plants in the study area, these are among the evergreens of the Savannah grassland. Their survival is in part due to possession of fire resistance. In case proven medically useful the supply will not pose a problem of availability. Currently, these plants are mainly used to provide wood for fuel and construction in that area.

Two traditional healers highly trusted in the area confidently reported with emphasis to use *Crossopteryx febrifuga* and *Ozoroa reticulata* to cure confirmed cases of tuberculosis and cholera respectively. The use of *Crossopteryx febrifuga* as antitubercular had previously been reported (Haerdi, 1964). Tuberculosis is among the infectious disease currently facing treatment problems due to the emerging of new multidrug resistance strains (Centers for disease Control, 1991). This creates a need of searching new antituberculosis drugs. The antimicrobial testing is essential to prove such claims and if true to carry out further steps of isolating bioactive principle(s).

Another interesting observation is that certain plants such as *Dichrostacyx cinerea* used in Tanzania for treatment of venereal diseases, are also reported to be used in other parts of Africa for the same purpose (Azuine, 1998; Kambizi and Afolayan, 2001). *Erythrina abyssinica* Lam. used against diarrhoea, dysentery and jaundice, and its taxonomically related species, *Erythrina senegalensis* DC, *Erythrina vogelii* Hook. F., *Erythrina excelsa* Bak., *Erythrina sigmoidea* Hua and *Erythrina mildbraedii* Harms are chiefly used for the treatment of jaundice and gonor-rhoea in Nigeria and dysentery in Ghana (Oliver-Bever, 1986). Furthermore, *Erythrina senegalensis* DC has shown antibacte-

rial activity against *Pseudomonas aeruginosa*, *Staphylococcus aureus* and *Escherichia coli* (Adamu et al., 2005). Related or identical bioactive principles may account for their similar medicinal applications mentioned in different places.

### 3.6. Feedback of scientific findings to information providers

It is unfortunate that very few scientific findings are reported back to traditional healers due to the fact that scientific articles are inaccessible and incomprehensible to them (Jäger, 2005). While conducting this study, some informants raised some concern on false promises about getting the feedback. They agreed that scientific methods are better in revealing harmful effects of herbs, if any. Although scientific results are far beyond their understanding and interpretation, some information especially about poisonous plants is worthwhile knowing since their intention is to cure and not kill or produce other diseases. A good example of a toxic plant recorded in this study is *Euphorbia tirucalli* L. widely used in tropical Africa, Asia, and Latin America. Its ethnomedical uses appear in many published articles and are well outlined by Neuwinger (2000) and Taylor (2005). Phytochemical studies have revealed that it contains many harmful compounds that make it unsuitable for many claimed medicinal uses especially for cancer treatment. The latex is rich in terpenes including phorbol esters and ingenol esters. These phorbol esters are highly irritating, and clinical studies have shown them to be co-carcinogens (Aya et al., 1991; MacNeil et al., 2003). Other actions include suppression of the immune system, carcinogenicity, and caustic activity (Imai et al., 1994; Taylor, 2005).

In the drug development research, biological activity based on ethnomedical uses seems as a better approach compared to randomly selected plants (Cordell, 1995; Unander et al., 1995). If this is true, there is a need to send back useful findings to information providers at the level of their understanding and practices in order to reduce health hazards that might be an outcome of the treatment offered by them.

We are currently testing these plants for antibacterial, antifungal, antiparasitic, antiviral and cytotoxic activities to confirm the therapeutical claims indicated by informants. Any useful information from literature review and biological tests will be passed back in order to improve the proper use of medicinal plants and create a good relationship for future ethnobotanical studies.

## 4. Conclusion

Modern health care services provided in Bunda district area are not adequate, since the health care centers/hospitals are few and sometimes distantly located, and most people cannot afford to buy drugs prescribed due their low income. Traditional/herbal medicine keeps working as the most popular complementary/alternative medicine in solving health problems in the area, and people have strong trust in the efficacy of herbs. They believe in what they see, to them what matters is to have the correct diagnosis by the healer and get the right drug to produce a desirable outcome just as it is the case in modern medicine. Most of the recorded plants are also used in other

African countries where traditional medicine still contributes to health care services. This indicates the medicinal potential of these plants since nobody could be willing to use medicine(s) that do not offer healing result(s). If these drugs in their crude forms have curative properties in societies using them, scientific studies could lead to isolation of active principles or compounds that can serve as templates for the synthesis of modern drugs, or preparation of standardized herbal products.

Due to limited resources, only six villages were visited and it was noted that some plants were not readily available due to dry weather conditions during the study period. It is recommended that future work in this locality should be carried out immediately after the rainy season for one to be able to record a large number of medicinally useful plants, especially the annual herbs. Team-work consisting of a good number of pharmacognosists,

botanists/taxonomists and medical doctors is recommended for any future ethnobotanical surveys, in order to have broad scope of study leading to a rich documentation of medicinal plants in this area.

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### Appendix A. Questionnaire

#### 1. Source of information:

- i) Name of traditional healer/ herbalist/ others .....
- ii) Age: .....
- iii) Sex: .....
- iv) Date: .....
- v) Address: .....
- vi) Level of education: .....
- vii) Tribe: .....

#### 2. Do you know what infectious diseases are? Yes/No.

#### 3. If yes, mention the ones you know.

- i) ..... ii)..... iii) ..... , etc

#### 4. Which of the mentioned diseases do you treat and have obtained positive results?

#### 5. Which plant(s) and plant part(s) do you use? .....

#### 6. Do you use a one or a mixture of plants in treating your patients? .....

#### 7. Besides plant material(s) do you use other products like minerals or animal products? Yes/No.

#### 8. If yes what are they? .....

#### 9. Do you have any specific time/season for collection and storage conditions for you plant material? .....

10. How to you prepare your medicine? (e.g. soaking/boiling in water, powdering etc.)  
.....
11. How do you administer your medicine to your patients (e.g. orally, topical application, inhalation etc.) .....
12. What amount/quantity of medicine do you administer to your patient at one time? .....
13. How many times per day is the medicine to be taken? .....
14. With regard to the amount of medicine given, does the age/ weight matter? Yes/No
15. If yes, how do you determine the amount to be given to your patients. ....
16. How long do the patient have to take the medicine? .....
17. Do you know any side effect of the plants you are using? Do you mention this to your patients. ....
18. Do make any follow - up of your patient to see if they fully recovered?.....
19. Are you willing to show us the plant(s) so that we can carry out some scientific research to confirm their efficacy. Yes/No
20. If no, what reasons do you have for that? If yes, what are your future expectations from scientific findings? .....

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