Journal of Ethnopharmacology 170 (2015) 184–200

Contents lists available at ScienceDirect

Journal of Ethnopharmacology

journal homepage: www.elsevier.com/locate/jep

Ethnobotanical survey of medicinal plants used in the Maseru district of Lesotho

Lerato Seleteng Kose [a], Annah Moteetee [a,*], Sandy Van Vuuren [b]

[a] Department of Botany and Plant Biotechnology, University of Johannesburg, Johannesburg, South Africa
[b] Department of Pharmacy and Pharmacology, University of the Witwatersrand, Johannesburg, South Africa

ARTICLE INFO

Article history:
Received 8 December 2014
Received in revised form
13 March 2015
Accepted 26 April 2015
Available online 7 May 2015

Chemical compounds studied in this article:
Aloin (PubChem CID: 12305761)
1,8-Cineole (PubChem CID: 523035)
α-Thujone (PubChem CID: 261491)
ent-Kaurenic acid (PubChem CID: 73062)
Helichrysetin (PubChem CID: 6253344)
α-Pinene (PubChem: 6654)
α-Humulene (PubChem CID: 5281520)
β-Sitosterol (PubChem CID: 222284)
Carvone (PubChem CID: 7439)
Limonene (PubChem CID: 22311)
Menthol (PubChem CID 1254)
Oleuropein (PubChem CID: 5281544)
Oleanolic acid (PubChem CID: 10494)
Ursolic acid (PubChem CID: 64945)
Gallic acid (PubChem CID: 370)
Palmitic acid (PubChem CID: 985)
Withaferin A (PubChem CID: 265237)
Uzarin (PubChem CID: 348483)
Xysmalorin (PubChem CID: 208007)[www.ncbi.nlm.nih.gov/pccompound (accessed 03-03-2015)].

Keywords:
Ethnobotany
Herbalists
Lesotho
Medicinal plants
Traditional healers

ABSTRACT

Ethnopharmacological relevance: Ethnobotanical knowledge in Lesotho is passed on orally from one generation to another. As a result it has not been well documented. Existing publications have relied on previous literature and are limited either in terms of scope or coverage. Furthermore, some of them are out of print. Therefore, there are gaps in the documentation of medicinal plants used in Lesotho.
Aim of the study: The purpose of the current study is to investigate common ailments in Lesotho's traditional medicine and document plants that are used in treating such ailments.
Materials and Methods: Interviews were conducted in five urban and four rural areas of the capital town of Maseru, by means of questionnaires to elicit information on medicinal plant use to cure common ailments. The informants were 20 males and seven females comprising 15 traditional healers, 11 herbalists and one pharmacist.
Results: Reproductive ailments were found to be the most commonly treated, followed by respiratory, degenerative and digestive problems. A list of the 80 plants used for treating the common ailments is given. A total of 44 families is represented, with Asteraceae, Fabaceae, Asphodelaceae and Poaceae families having the highest number of species used for medicinal purposes. The most frequently mentioned medicinal plants in interviews include; *Elephantorrhiza elephantina*, *Pentanisia prunelloides*, *Hypoxis hermerocallidea*, *Eriocephalus* sp., *Salvia runcinata*, *Scabiosa columbaria*, *Dicoma anomala*, *Morella serrata*, *Xysmalobium undulatum*, and *Leobordea lanceolata*. Due to the high demand of medicinal plants, some species such as *L. lanceolata*, *Tephrosia capensis*, *E. elephantina*, *D. anomala* and *P. prunelloides* were reported as over-harvested. In some cases animal products are added to the medicinal plants to enhance their curative abilities.
Conclusions: A total of 80 plants were recorded in the study as treating 38 common ailments in the Maseru district of Lesotho. Records of eight medicinal plants and 146 new medicinal uses of 34 plants that were not recorded elsewhere in literature are reported in the current study for the first time. The new records of medicinal plants used in traditional healing practices in Lesotho clearly show the need to document these practices, and the wealth of new knowledge gained with the current study reinforces the importance of extending the study to other parts of Lesotho.

1. Introduction

Lesotho is a mountainous, landlocked country completely surrounded by South Africa. It lies between latitudes 29°28′S, and longitudes 27°56′E. It has a total area of 30, 648 km^2 and comprises ten districts (Fig. 1), Maseru district being the capital town (Chakela, 1999). The country has a population of 2072,046, of which an estimated 80% lives in rural areas. The culture is cohesive with Basotho (the people of Lesotho) comprising 99% of the country's population, the remainder being of Asian and European origin [www.worldpopulationreview.com/countries/Lesotho-population (accessed 30-01-2015)]. Two forms of health-care systems are used in Lesotho, namely traditional and westernised healing systems. Traditional medicine plays a vital role towards the well-being of the rural population in Lesotho, particularly where there is limited accessibility to clinics or

* Corresponding author. Tel.: +27 11 559 2977; fax: +27 11 559 2411.
E-mail address: amoteetee@uj.ac.za (A. Moteetee).

http://dx.doi.org/10.1016/j.jep.2015.04.047
0378-8741/

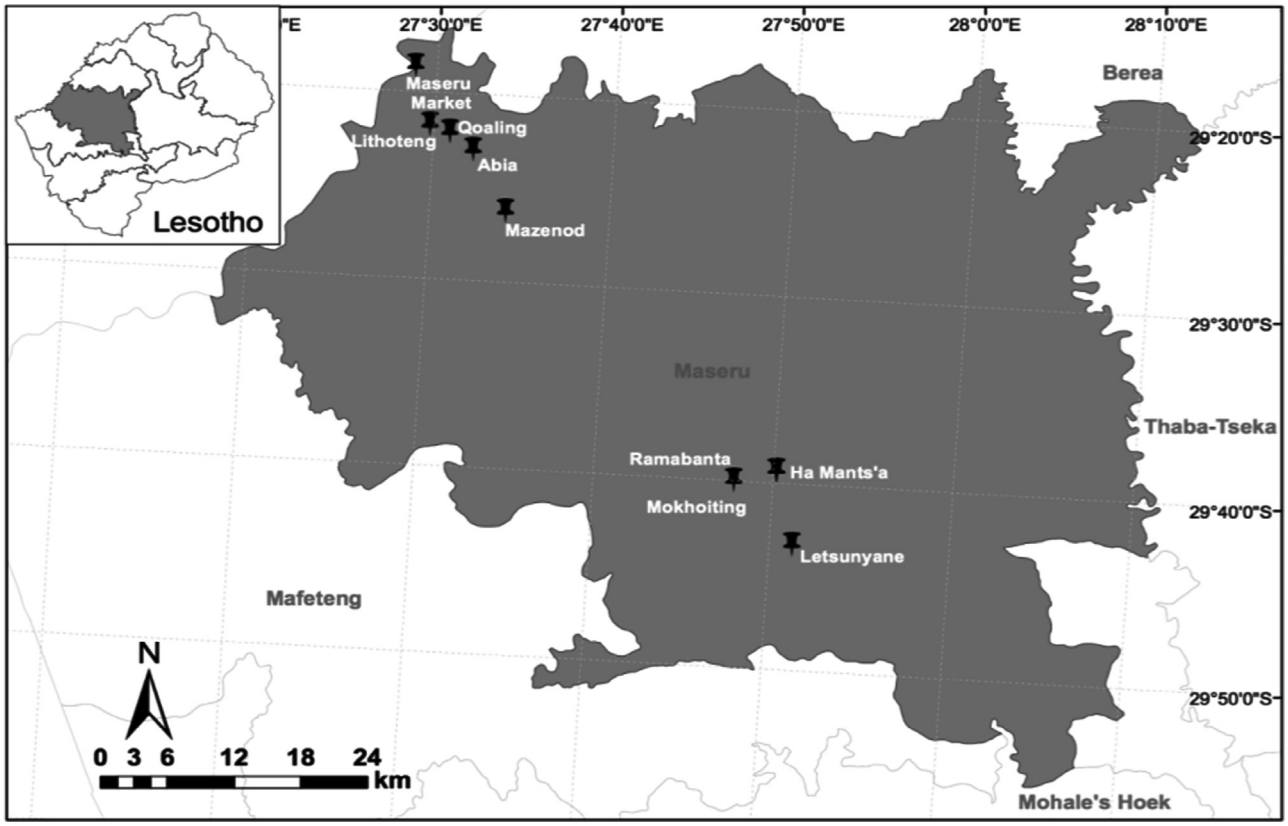

Fig. 1. Study areas (indicated with dropped pins, mapped by Barnabas Daru). The location of Maseru district within Lesotho is shown in the inset. [www.maphill.com/lesotho/maseru (accessed 05-09-2014)].

health facilities (Shale et al., 1999). The use of traditional medicine is through either self-medication or consultation with traditional healers and/or herbalists. This practice relies almost exclusively on medicinal plants and to a lesser extent on animals (Moteetee and Van Wyk, 2011).

Ethnobotanical knowledge in Lesotho is passed orally from one generation to another. However, a limited number of publications documenting indigenous plant use in Lesotho are available. For example, the publication by Phillips (1917), is outdated and was confined, although not exclusively, to only one district (Leribe). Jacot Guillarmod (1971) is also out of print and was based mainly on the pioneering publication of Phillips (1917). Schmitz (1982) listed 300 plants based on Jacot Guillarmod, but it is also out of print. Later, Maliehe (1997) listed 60 medicinal plants used in Lesotho, but this too is out of print. Unpublished work of Ramohlabi (1989), listed only 10 medicinal plants. More recently Shale et al. (1999) interviewed traditional healers from two districts of Lesotho namely Mohale's Hoek and Qacha's Nek, and listed 23 species for traditional medicinal use. Publications by Pooley (1998, 2003) were based on previous literature and confined to Eastern and mountainous parts of Lesotho. A recent comprehensive documentation, Moffett (2010) relied mostly on previous literature. Some of the second author's earlier publications in this field (Moteetee and Van Wyk, 2007, 2011), listed 20 and 303 medicinal plant species respectively, based mainly on previous literature and own experiences.

Most of these publications mentioned are limited either in terms of scope or coverage (i.e. the number and source of plants documented). Furthermore, as mentioned some of them are out of print. Therefore, it is evident that there are gaps in the documentation of medicinal plants used in Lesotho. The current study extends on previous publications by incorporating indigenous knowledge from traditional healers and herbalists from the Maseru district, which is the capital town and most populated of the ten districts. The aim of this study is therefore to present the results of ethnobotanical surveys documenting medicinal plants used for treating common ailments in the specific district of Maseru in Lesotho, as well as highlighting new medicinal records.

2. Material and methods

2.1. Data collection

A total of 27 resource persons (comprising 20 males and seven females) were interviewed in the current study, identified with the help of Lesotho Traditional Medical Practitioners Council (LTMPC). The President and Secretary of the Council liaised in setting up meetings with resource persons, who comprised 15 traditional healers, 11 herbalists and one pharmacist, ranging from 23 to 80 years of age. The interviewed pharmacist was from Husteds Pharmacy, one of the few pharmacies in Lesotho that import and store medicinal plants making them readily available to users. The pharmacist imports medicinal plants that have become scarce from South Africa, particularly Durban. Informants were interviewed in Sesotho (the local language) by means of questionnaires. The objectives of the study were explained to each interviewee prior to the interviews. The questionnaires were primarily aimed to source information on common infections, medicinal plants used for treating such ailments, administration of the medicines and parts of the plant used. Ethical clearance was obtained from the University of Johannesburg.

2.2. Study area

The study area is in the Maseru district, which is the capital and largest urban district in Lesotho. Nineteen interviewees resided in urban parts of Maseru namely; Mazenod, Abia, Lithoteng, Qoaling and Maseru market. Eight informants resided in rural parts of Maseru namely; Ramabanta, Ha Mants'a, Mokhoiting and Letsunyane (Fig. 1).

3. Results and discussion

Results and discussions have been presented in the manner that gives information on who has provided the ethnobotanical information and also highlights common ailments that are treated by the informants, the plants that are used to treat such ailments, newly recorded medicinal plants as well as animal products that are used to enhance efficacy of the herbal medicines.

3.1. Informants

It was observed that there were more male than female informants. This is not surprising since according to Moteetee and van Wyk (2011), most traditional healers are men because (1) there is a strong traditional believe that women should perform their duties at home, taking care of their families, including children and the elderly; (2) there are taboos around women handling strong medicines.

3.2. Common ailments

A total of 38 ailments were reported as commonly treated in Lesotho's traditional medicine (Fig. 2). The ailments were ranked according to frequency mentioned in interviews, and the top ten commonest diseases treated (in descending order), were found to be: tuberculosis (TB), Human Immunodeficiency Virus (HIV), herpes, liver problems, breast cancer, diabetes mellitus (DM), syphilis, infertility, stomach disorders and difficult pregnancy/labor. According to the World Health Organization (WHO) (2011), HIV, DM, diarrheal diseases (categorized under stomach disorders in this study), TB, and birth trauma (reported under difficult pregnancy/labor in the current study) rank among the top ten illnesses that cause death in Lesotho. In fact, Lesotho is reported to have the third highest burden of HIV infections in the world with an adult prevalence of 24% (Satti et al., 2012). The country also has the fourth highest TB incidence in the world with 10,000 reported cases per year (Keshavjee et al., 2007). It is also worth noting that TB (as well as bacterial pneumonia) is the most common opportunistic infection associated with HIV (WHO, 2012). Other high ranking causes of death in Lesotho are stroke, influenza, pneumonia, coronary heart disease, and low birth weight (WHO, 2011). Interestingly, some of these diseases were not mentioned by the interviewees in the current study.

3.3. Medicinal plants used

Data on recorded plants such as the family, scientific name, vernacular name, medicinal uses as well as their chemical composition are presented in Table 1. Where no records exist, compounds recorded for other species are indicated in brackets. A total of 80 medicinal plant species representing two families of Pteridophytes and 42 of Angiosperms were found to be used in the Maseru district of Lesotho. The most represented family is Asteraceae with 16 species, followed by Fabaceae, Asphodelaceae and Poaceae, with four species each. Of these plants, 74 are indigenous and six exotic (marked with an asterix), none of which are endemic to Lesotho. The medicinal plants were ranked according to frequency mentioned by interviewees. The most frequently mentioned medicinal plants ranking in the top ten are; *Elephantorrhiza elephantina, Pentanisia prunelloides*, *Hypoxis hermerocallidea*, *Eriocephalus sp.*, *Salvia runcinata*, *Scabiosa columbaria*, *Dicoma anomala*, *Morella serrata*, *Xysmalobium undulatum* and *Leobordea lanceolata*. It is interesting though to note that traditional healers/herbalists use different plants for the treatment of the same ailment. This may not necessarily imply disagreement on usage

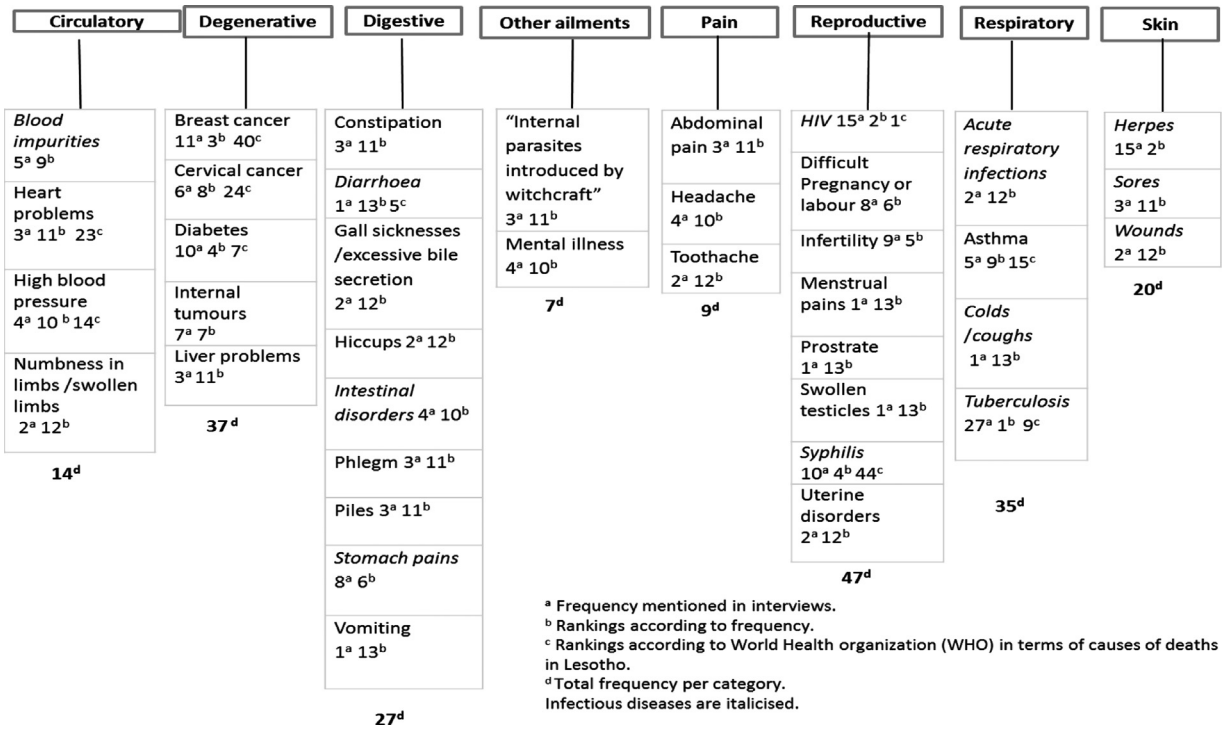

Fig. 2. Common ailments in Lesotho's traditional medicine.

Table 1
Medicinal plants used in Lesotho and their traditional use.

Scientific (botanical) name	Family	Vernacular (Sesotho) name	Frequency of mention in interviews (%)	Plant part (s) used	Red-data listing	Medicinal uses from interviews	Medicinal use from literature	Chemical compounds	References
Elephantorrhiza elephantina (Burch.) Skeels	Fabaceae	Mositsane	37	Rhizome	LC	Stomach and intestinal disorders, **breast cancer**, **infertility**, *syphilis*, ***TB***, **herpes**, **piles**, **abdominal pains**, ***cleans blood***	Fever, dysentery, chest complaints, ulcers, heart conditions, stops bleeding, hypertension, intestinal disorders, syphilis, purgative	Flavonoids, tannins, terpenoids	Jacot Guillarmod (1971), Mpofu et al. (2014), Pooley (1998), Watt and Breyer-Brandwijk (1962)
Pentanisia prunelloides (Klotzsch ex. Eckl. & Zeyh.) Walp.	Rubiaceae	Setima-mollo	26	Roots, leaves	LC	**Cancer, high blood pressure,** *TB*, **heart problems, diabetes, liver problems**	Dysentery, indigestion, relieves burning pains from boils, stomach pains, headache, diarrhoea, internal tumours, ulcers, colds, sexually transmitted infections (STI's) TB, heartburn, vomiting, chest pains, toothache, blood impurities, burns, rheumatism, snakebites, eases childbirth, fever, sores, swellings, sore joints, expulsion of retained placenta haemorrhoids	Flavonoids, tannins, terpenoines,	Jacot Guillarmod (1971), Maliehe (1997), Moteetee and van Wyk, (2011), Mpofu et al. (2014), Phillips (1917), Pooley (1998), Ramohlabi (1989), Schmitz (1982), Van Wyk et al. (1997), Watt and Breyer-Brandwijk (1962)
Eriocephalus sp. L.	Asteraceae	Sehala-hala sa matlaka	22	Whole plant	LC	Diabetes, high blood pressure, ***TB***	Diarrhoea, colds, diabetes, high blood pressure, aspirant	Terpenoids	Jacot Guillarmod (1971), Moteetee and van Wyk, (2011), Phillips (1917), Sandasi et al. (2011), Watt and Breyer-Brandwijk (1962)
Hypoxis hemerocallidea Fisch. Mey. & Ave-Lall.	Hypoxidaceae	Moli	22	Corm, leaves	Declining	*HIV related infections*, ***TB***, ***syphilis***, **infertility**, swollen testicles	Dizziness, cancers, inflammations, mental disorders, Human Immunodeficiency Virus (HIV), bladder disorders, burns, prostrate problems, testicular tumours, urinary infections, headache	Glucosides, sterols, sterolins	Ncube et al. (2013), Pooley (1998), Van Wyk et al. (1997)
Salvia runcinata L.f.	Lamiaceae	Mosisili	22	Whole plant	LC	**Infertility, cancer, *syphilis*, abdominal pains, internal tumours**	Coughs, purifies blood, improves appetite	Terpenoids	Jacot Guillarmod (1971), Kamatou et al. (2008), Moteetee and van Wyk, (2011), Schmitz (1982)
Dicoma anomala Sond. subsp. *anomala*	Asteraceae	Hloenya	18	Roots, leaves	LC	**Gall sickness**, stomach ailments, uterine disorders, diabetes, breast cancer, ***TB***, ***HIV related infections***	Colic, diarrhoea, constipation, stomach cramps, colic, upset stomach, intestinal worms, coughs, colds, toothache, wounds, sores, STI's, sugar diabetes, painful menstruation, high blood pressure, influenza, cancer, haemorrhoids, nasal congestion, dysentery, infertility, ringworm	Sesquiperpene lactones	Becker et al. (2011), Jacot Guillarmod (1971), Maliehe (1997), Moteetee and van Wyk, (2011), Phillips (1917), Pooley (1998), Ramohlabi (1989), Schmitz (1982), Shale et al. (1999), Van Wyk et al. (1997), Watt and Breyer-Brandwijk (1962)
Drimia depressa (Baker) Jessop	Hyacinthaceae	Moretele	18	Whole plant	LC	**Liver, *TB*, mental illness, cancer, *HIV***	**Toxic**, used as powerful good luck charm	Glycosides	Crouch et al. (2007), Jacot Guillarmod (1971), Moteetee and van Wyk, (2011), Phillips (1917), Pooley (2003), Watt and Breyer-Brandwijk (1962)
Leobordea lanceolata (E.Mey.) B.-E. van Wyk & Boatwr.	Fabaceae	Khonathi	18	Roots	LC	**Cancer, *TB*, asthma,** stomach pains	Fever, contagious diseases, diarrhoea	Alkaloids	Jacot Guillarmod (1971) Phillips (1917), Van Wyk and Verdoorn (1989), Watt and Breyer-Brandwijk (1962)
Morella serrata (Lam.) Killick	Myricaceae	Maleleka	18		LC				

Table 1 (*continued*)

Scientific (botanical) name	Family	Vernacular (Sesotho) name	Frequency of mention in interviews (%)	Plant part (s) used	Red-data listing	Medicinal uses from interviews	Medicinal use from literature	Chemical compounds	References
				Whole plant		Headache, ***TB*, mental illness**	Powdered roots sniffed to cause sneezing to get rid of headache	Flavonoids, terpenoids, steroids, saponins	Ashafa (2013), Moteetee and van Wyk, (2011)
Scabiosa columbaria L.	Dipsacaceae	Selomi	18	Roots, leaves	LC	Period pains, uterine disorders, **high blood pressure**, **acute respiratory infections**, complications associated with pregnancy, ***reduces transmission of HIV from mother to child***	Painful menstruation, colic, difficult childbirth, intestinal troubles, female sterility, cleanses womb, sore eyes, venereal sores	Glycosides	Jacot Guillarmod (1971), Moteetee and van Wyk, (2011), Phillips (1917), Pooley (1998), Schmitz (1982), Watt and Breyer-Brandwijk (1962), Van Wyk et al. (2009)
Trifolium burchellianum Ser. subsp. *burchellianum*	Fabaceae	Moroko	18	Roots	LC	Heart problems, ***TB***	Heart problems, sore throat, heartburn, stomach cramps, cancer, cleanses blood, diuretic		Maliehe (1997), Pooley (1998), Schmitz (1982)
Xysmalobium undulatum (L.) W.T. Aiton f. var.*undulatum*	Apocynaceae	Poho-ts'ehla	18	Roots	LC	Headache, **diabetes, *TB*, cervical cancer, phlegm**	Headache, decongestant, dysentery, colic, heartburn, vermifuge in children, intestinal worms, diarrhoea, eases pregnancy, afterbirth cramps, diuretic, indigestion, stomach and intestinal troubles, purgative, dysentery, sores, wounds, malaria, fever, typhoid, colic for abdominal troubles, uterine disorders	Glycosides	Jacot Guillarmod (1971), Maliehe (1997), Moteetee and van Wyk, (2011), Pooley (1998), Van Wyk et al. (1997), (2009), Watt and Breyer-Brandwijk (1962)
Cephalaria pungens Szabó	Dipsacaceae	Ts'oene	15	Whole plant	LC	**Infertility, hiccup, complications associated with pregnancy**	No reference of medicinal use in Literature	No records (Saponins, glycosides)	Kayce et al., (2014)
Euphorbia clavarioides Boiss. var. *clavarioides*	Euphorbiaceae	Sehlooko	15	Whole plant	LC	**Diabetes**, *Herpes*, ***HIV related infections*, high blood pressure**	Leprosy, cancerous sores, skin rash in children, acne, swollen feet, cracked heels, warts, wounds	No records (Phenolics)	Gopi et al., (2015), Jacot Guillarmod (1971), Maliehe (1997), Moteetee and van Wyk, (2011), Pooley (1998), Shale et al. (1999), Watt and Breyer-Brandwijk (1962)
Othonna natalensis Sch. Bip.	Asteraceae	Phela	15	Roots	LC	***TB*, mental illness**	Nausea, tapeworm, anthelmintic	Sesquiterpenes esters	Azimova and Saidkhodzhaev (2013), Pooley (1998), Watt and Breyer-Brandwijk (1962)
Rumex lanceolatus Thunb.	Polygonaceae	Khamane	15	Leaves, roots	LC	**Diabetes, *syphilis*, piles, constipation, cleansing womb after childbirth**	Intestinal worms, internal bleeding, tumours, blood purifier, wounds, bruises, diarrhea, sterility, tapeworm, stomach ache	Glycosides, anthroquinones	Pooley (1998), Van Wyk et al. (1997, 2009), Watt and Breyer-Brandwijk (1962)
Selaginella caffrorum (Milde) Hieron.	Selaginellaceae	Moriri oa matlapa/mafika	15	Whole plant	LC	***Syphilis*, *herpes*, cancer,** headache, **abdominal pains**	Headache, chest colds, fevers caused by ancestral spirits	No records (alkaloids, flavonoids, coumarins, steroids)	Almeida et al. (2013), Cooper-Driver et al. (2008), Jacot Guillarmod (1971), Moteetee and van Wyk, (2011)
[a]*Agave americana* L. subsp. *americana*	Agavaceae	Lekhala le leputsoa	11	Leaves	Not evalu-ated	***Human Immunodeficiency Virus* (HIV)**, *herpes*	Skin problems, sore feet, bruises, purgative, rheumatism, diuretic, syphilis	Flavonoids, saponins, glycosides	Moteetee and van Wyk, (2011), Tinto et al. (2005), Watt and Breyer-Brandwijk (1962)
Berkheya setifera DC	Asteraceae	Leleme la khomo	11	Roots, leaves	LC	***Herpes*, uterine disorders, complications associated with pregnancy, *reduces***	Abdominal pains, sore, colds, coughs, respiratory infections, jaundice, decongested breasts of a	No records (terpenoids)	Bohlmann et al. (1979), Maliehe (1997), Moteetee and van Wyk, (2011), Pooley (1998), Schmitz

						mother-child HIV transmission	young mother, cleanses blood, kidney problems, arthritis, stomach complaints, sterility		(1982), Watt and Breyer-Brandwijk (1962)
Cussonia paniculata Eckl. & Zeyh. subsp. *sinuata* (Reyneke & Kok) De Winter	Araliaceae	Mots'ets'e	11	Leaves	LC	**Cervical cancer**, *wounds*	Kidney and bladder disorders, heartburn, intestinal ulcers, intestinal parasites introduced by witchcraft, sores, emetic, colic, mental illness, rheumatism	Triterpene glycosides	Dovgii et al (2005), Jacot Guillarmod (1971), Maliehe (1997), Moteetee and van Wyk, (2011), Phillips (1917), Watt and Breyer-Brandwijk (1962)
Euclea coriacea A.DC.	Ebenaceae	Ralikokotoana/ Monna-mots'o	11	Bark	LC	Constipation, **stomach pains**	Purgative, gall sicknesses	Terpenoids, phytosterols	Jacot Guillarmod (1971), Phillips (1917), Watt and Breyer-Brandwijk (1962), Mugomeri et al. (2014)
Gazania krebsiana Less. subsp. *krebsiana*	Asteraceae	Tsikitlane	11	Roots	LC	***TB***	Earache, heartburn, toothache, colic, vomiting and stomach cramps in children, sterility in women, eases digestion	Terpenoids	Bohlmann et al. (1979), Jacot Guillarmod (1971), Moteetee and van Wyk, (2011), Pooley (1998)
Gunnera perpensa L.	Gunneraceae	Qobo	11	Rhizome, leaves	Declining	**Cancer, *cleans blood***, eases pregnancy, stomach ailments	Colic in pregnant woman, contraceptives by women, regulates menstrual cycle, leaves used for treating wounds, sores, tones uterus, stomach bleeding, stomach problems, rheumatic fever, swellings, menstrual pains, psoriasis, leaves smoked for headache, induces labour, expulsion of placenta, kidney, bladder complaints	Glucosides	Phillips (1917), Maliehe (1997), Moteetee and van Wyk, (2011), Pooley (1998), Ramohlabi (1989), Van Wyk et al. (1997), (2009)
Helichrysum caespititium (DC.) Harv.	Asteraceae	Phate ea ngaka	11	Whole plant	LC	**Liver**, ***TB***, acute respiratory infections	Head or chest colds, coughs, congestion in chest or sinuses, cleanses intestines of worms, relieves nausea, increases virility, gonorrhea	Flavonoids	Jacot Guillarmod (1971), Maliehe (1997), Mathekga et al. (2000), Phillips (1917), Pooley (1998), Schmitz (1982), Watt and Breyer-Brandwijk (1962)
Ipomoea oblongata E. Mey. ex Choisy	Convolvulaceae	Mothokho	11	Roots	LC	**Cancer, stomach ailments, swollen feet**	No record of medicinal use in humans from Literature (only used to drive away lightening)	No records (Alkaloids)	Cholich et al. (2013)
Ledebouria cooperi (Hook.f.) Jessop	Hyanthiaceae (formelyLiliaceae)	Leptjetlane	11	Bulb	LC	**Phlegm**, constipation in children, ***cleans blood***	Diarrhoea in infants, constipation, heartburn, eases pregnancy	Flavonoids, terpenoids	Maliehe (1997), Pooley (1998), Schmitz (1982), Mulholland et al. (2013)
Malva parviflora L. var. *parviflora*	Malvaceae	Tika-motse	11	Whole plant	LC	***Herpes***, ***TB***, swollen feet, ***syphilis***	Bruised and broken limbs, burns, swellings, emetic for excessive bile, nerves, uterine troubles, tape worm, profuse menstruation	Flavonoids, steroids, glucosides	Jacot-Guillarmod (1971), Moteetee and Van Wyk (1997), Phillips (1917), Watt and Breyer-Brandwijk (1962),
Withania somnifera (L.) Dunal	Solanaceae	Mofera-ngope	11	Roots (bark), leaves	LC	TB, internal tumours, skin sores, breast cancer	Intestinal ailments, sores, colds, chills, wounds, fever, asthma, enema, syphilis, rheumatism, removes retained conception products, bed sores, haemorrhoids, ringworms, gall sicknesses, chest complaints, worms introduced into the body by witchcraft	Alkaloids, steroids	Jacot Guillarmod (1971), Moteetee and Van Wyk (2011), Philips (1917), Pooley (1998), Van Wyk et al. (1997), (2009), Watt and Breyer-Brandwijk (1962)
Zantedeschia albomaculata (Hook.) Baill subsp. *albomaculata*	Araceae	Mohalalitoe /Mohale ha a likoe	11	Rhizome	LC	**Headache, mental illness, *TB***	Sore throat, kidneys, bladder infections, mouth ulcers, tumours in womb, poultice, frequent miscarriage	No records (Terpenoids, sterols)	Greca et al. (1998), Jacot Guillarmod (1971), Maliehe (1997), Moteetee and van Wyk, (2011), Pooley (1998), Schmitz (1982)
Artemisia afra Jacq. ex Willd.	Asteraceae	Lengana	7	Leaves	LC	**Prostrate**	Fever, colds, coughs, chills, respiratory troubles, decongestant, intestinal worms, eases digestion, influenza, colic, earache, malaria,	Flavonoids, coumarins, terpenoids,	Jacot Guillarmod (1971), Maliehe (1997), Moteetee and van Wyk, (2011), Phillips (1917), Ramohlabi (1989), Schmitz

Table 1 (*continued*)

Scientific (botanical) name	Family	Vernacular (Sesotho) name	Frequency of mention in interviews (%)	Plant part (s) used	Red-data listing	Medicinal uses from interviews	Medicinal use from literature	Chemical compounds	References
							loss of appetite, headache, stomach trouble, constipation, toothache, gout		(1982), Van Wyk et al. (1997), Van Wyk and Gericke (2000), Watt and Breyer-Brandwijk (1962)
Buddleja salviifolia (L.) Lam.	Buddlejaceae	Lelothoane	7	Leaves	LC	***TB*, *syphilis*, *herpes*, cervical cancer, complications associated with pregnancy**	Constipation, anti-emetic, improves digestion, nausea, coughs, colic, eye problems	Flavonoids	Maliehe (1997), Moteetee and van Wyk (2011), Pendota et al. (2013), Pooley (2003), Schmitz (1982), Watt and Breyer-Brandwijk (1962)
Bulbine narcissifolia Salm-Dyck	Asphodelaceae	Khomo ea balisa	7	Bulb, roots	LC	Stomach ailments, diabetes, infertility, *cleans impurities in blood*	Induce pregnancy in barren women, fibroids in uterus, stomach cramps, anaemia, laxative, improves blood circulation, vomiting, diarrhoea, convulsions, venereal diseases, sugar diabetes, rheumatism, urinary complains, blood disorders, warts, corns, colds, rash, wounds	Anthraquinones, glycosides	Jacot Guillarmod (1971), Maliehe (1997), Moteetee and van Wyk, (2011), Phillips (1917), Pooley (2003), Qhotsokoane-Lusunzi and Karuso (2001), Schmitz (1982), Van Wyk et al. (1997), Watt and Breyer-Brandwijk (1962)
Dianthus basuticus Burtt Davy	Caryophyllaceae	Hlokoana-la-tsela	7	Roots	LC	***TB*, internal parasites introduced by witchcraft**	Love charm, constipation, cleansing of blood from poison, flatulency	Alkaloids, tannins, saponins, glycosides	Jacot Guillarmod (1971), Lamula and Ashafa (2014), Maliehe (1997), Moteetee and van Wyk, (2011), Pooley (2003), Schmitz (1982)
Eucomis autumnalis (Mill.) Chitt. subsp. *autumnalis*	Hyacinthaceae	Mathethebale/ Khapumpu	7	Bulb, roots	Declining	**Hiccup, infertility**	STI's, piles, urinary and pulmonary ailments, backache, post-operative recovery, healing fractures, stomach ache, fevers, colic, flatulence hangovers, facilitates child birth	Flavonoids, terpenoids	Maliehe (1997), Moteetee and van Wyk, (2011), Pooley (1998), Van Wyk et al. (1997, 2009)
Haplocarpha scaposa Harv.	Asteraceae	Papetloana	7	Roots, leaves	LC	***Reduces mother to child transmission in HIV infections***, internal tumours	Infertility in women, menstrual pains, STI's, internal sores, cancer, wounds, chest colds, sore ears	Terpenoids	Bohlmann and Wallmeyer (1982), Jacot Guillarmod (1971), Pooley (1998), Schmitz (1982), Shale et al. (1999), Watt and Breyer-Brandwijk (1962)
Helichrysum odoratissimum (L.) Sweet	Asteraceae	Phefo	7	Whole plant	LC	***TB***	Flu, coughs, colds, headache, menstrual pains, backache, emetic for excessive bile, abdominal pains, heartburn	Flavonoids	Maliehe (1997), Moteetee and van Wyk, (2011), Pooley (1998), Van Wyk et al. (1997), (2009), Schmitz (1982), Watt and Breyer-Brandwijk (1962)
Helichrysum pallidum DC.	Asteraceae	Boleba	7	Whole plant	LC	***TB*, cleanses a baby after breast feeding**, charm to make a person forgotten or invisible to enemies	Charm to make a person invisible or forgotten by enemies	Terpenoids	Jacot Guillarmod (1971), Lourens et al. (2008)
Pelargonium sidoides DC.	Geraniaceae	Khoara	7	Roots	Declining	Constipation, *diarrhoea*, **vomiting**	Diarrhoea, heartburn in pregnant women, dysentery, constipation, bronchitis in children, worms	Tannins, coumarins, phenolic acids	Maliehe (1997), Van Wyk et al. (1997), (2009), Watt and Breyer-Brandwijk (1962)
Pennisetum glaucum (L.). R. Br.	Poaceae	Nyalothi	7	Whole plant	Not evaluated	***TB*, asthma**	No record of medicinal use from literature	Flavonoids, phenolic acids	Daniel et al. (2012)
Phygelius capensis E. Mey	Scrophulariaceae	Mafifi-mats'o	7	Roots	LC	***HIV*, herpes, internal tumours**	Numbness in legs and arms, protection against witchcraft	No records	

									Jacot Guillarmod (1971), Phillips (1917), Schmitz (1982), Watt and Breyer-Brandwijk (1962)
[a]*Populus* sp.	Salicaceae	Popoliri ea thaba	7	branches	Not evaluated	***Syphilis, HIV, herpes***	No record of medicinal use from literature	Flavonoids	
Rhamnus prinoides L'Her.	Rhamnaceae	Mofifi	7	Branches	LC	*Herpes*, **diabetes**, *HIV related infections*	Bladder and kidney problems, pulmonary TB, pneumonia, blood purifier, protective charm, colic, muscular rheumatism, purgatie	Naphthalene glycosides, anthraquinones, flavonoids	Abegaz and Peter (1995), Maliehe (1997), Moteetee and van Wyk, (2011), Phillips (1917), Watt and Breyer-Brandwijk (1962)
Scirpus falsus C.B. Clarke	Cyperaceae	Loli	7	Rhizome	LC	**Infertility**	No recorded medicinal use in literature	No records	
[a]*Searsia lancea* (L.f) F.A. Barkley	Anacardiaceae	Ts'ilabele	7	Leaves, fruits	LC	Diabetes, ***herpes***	Cures dizziness due to anaemia, diabetes, heart problems, high blood pressure, leaf infusion for asthma	Flavonoids, tannins	Aganga and Mosase (2001), Maliehe (1997), Moteetee and van Wyk, (2011), Nair et al. (1983)
Tulbaghia acutiloba Harv.	Alliaceae	Konofolo/ Sefotha-fotha	7	Whole plant	LC	**Boosts immune system, internal parasites introduced by witchcraft**	Dysentery, diarrhoea, cleanses blood from poison, high blood pressure, asthma, clears lungs and chest, colds, lotion used to wash incisions made on children, applied on the breasts of the mother in cases of infant with depressed fontanel	No records (Steroidal saponins, marasmin)	Jacot Guillarmod (1971), Maliehe (1997), Moteetee and van Wyk, (2011), Ncube et al. (2011), Phillips (1917), Watt and Breyer-Brandwijk (1962)
Cheilanthes hirta S.W.	Pteridaceae	'Mamauoaneng/ 'Mamarakoaneng	7	leaves	LC	***Herpes***	Colds, sore throats, headache, anthelmintic for tapeworm	No records (Flavonoids, glycosides)	Cooper-Driver et al. (2008), Imperato (1989, 1992), Jacot Guillarmod (1971), Phillips (1917), Van Wyk et al. (1997), Watt and Breyer-Brandwijk (1962)
Ajuga ophrydis Burch. ex. Benth.	Lamiaceae	Senyarela	4	Roots	LC	***Tuberculosis (TB)***	Female sterility, painful menstruation, fibroids in womb, regulates menstrual cycle, rushes	No records (Flavonoids)	Inomata et al. (2013), Jacot Guillarmod (1971), Maliehe (1997), Moteetee and van Wyk, (2011), Phillips (1917), Pooley (1998), Schmitz (1982), Watt and Breyer-Brandwijk (1962)
Aloe ferox Mill.	Asphodelaceae	Lekhala la Quthing	4	Leaves, roots	LC	*Herpes*	Laxative, arthritis, eczema, stress, conjunctivitis, high blood pressure, diabetes, herpes, shingles, sinusitis, burns and skin problems, gonorrhoea, bile problems, syphilis, opththalmia	Aloin, anthraquinones	Maliehe (1997), Moffett (2010), Moteetee and van Wyk, (2011), Ramohlabi (1989), Van Wyk et al. (1997), Van Wyk and Gericke (2000), Van Wyk and Wink (2004), Watt and Breyer-Brandwijk (1962)
Aloe maculata All.	Asphodelaceae	Lekhala la bafu	4	**Leaves**	LC	***HIV*, breast cancer**	Colds, wounds, boils, sores	Aloin, anthraquinones, saponins	Pooley (2003), Schmelzer et al. (2008), Watt and Breyer-Brandwijk (1962)
Aloe striatula Haw. var. *striatula*	Asphodelaceae	Mohalakane/ Seholobe	4	Leaves	LC	***HIV***	Upset stomach, bad digestion, cleanses blood, constipation, wounds, high blood pressure	No records (Aloin, anthraquinones)	Jacot Guillarmod (1971), Maliehe (1997), Moteetee and van Wyk, (2011), Moffett (2010), Van Wyk and Gericke (2000)
Anthospermum rigidum Eckl. & Zeyh. subsp. *pumilum* (Sond.) Puff.	Rubiaceae	Phakisane	4	Root	LC	**Infertility**	Used to hasten healing or recovery of a sick person	No records (Terpenoids)	Jacot Guillarmod (1971), Moffett (2010), Rosoarivelo et al. (2011)
Aristida congesta Roem. & Schult. subsp. *congesta*	Poaceae	Bolepo	4	Whole plant	LC	**Infants' ailments (colic, phlegm, hiccup, constipation)**	Sprinkled on sick person to sweep away sickness	No records	Jacot Guillarmod (1971)
Aster bakerianus Burtt Davy ex C.A.Sm.	Asteraceae	Phoa	4	Roots	LC	*Wounds*, *skin sores*	Syphilis, syphilitic sores, sexually transmitted infections (STI's), headaches, enema for colic, used	Terpenoids	Jacot Guillarmod (1971), Moffett (2010), Pooley (1998), Schmitz (1982), Shale et al. (1999), Van

Table 1 (*continued*)

Scientific (botanical) name	Family	Vernacular (Sesotho) name	Frequency of mention in interviews (%)	Plant part (s) used	Red-data listing	Medicinal uses from interviews	Medicinal use from literature	Chemical compounds	References
							to treat sickly babies, earache, sterility in woman, stomach complaints, intestinal parasites, purgative, snake bites, fevers, blocked noses, urinary infections, eye infections, tonic for pregnant women, wasting diseases for infants, psychiatric disturbances		Wyk et al. (1997), (2009), Watt and Breyer-Brandwijk (1962)
Clematis brachiata Thunb.	Ranunculaceae	Morara oa thaba	4	Whole plant	LC	***TB***	Intestinal worms, charm to chase away evil spirits, as a vermufuge, abdominal disorders, head colds, headache, syphilis, snakebite remedy, good luck charm	Flavonoids, glycosides, saponins, tannins	Jacot Guillarmod (1971), Mostafa et al. (2010), Moteetee and van Wyk, (2011), Pooley (1998), Schmitz (1982), Watt and Breyer-Brandwijk (1962)
Clutia natalensis Bernh. ex Krauss	Euphorbiaceae	Mosali-mofubelu	4	Roots	LC	**Diabetes**	Stomach ailments, purifies blood, indigestion	No records (Coumarins, terpenoids)	Jacot Guillarmod (1971), Moffett (2010), Waigh et al., (1990, 1991), Watt and Breyer-Brandwijk (1962)
Cyathula uncinulata (Schrad.) Schinz*(=C. globulifera)*	Amaranthaceae	Bohome ba lipoli	4	Roots	LC	Excessive bile secretion	Emetic for excess bile, cleans stomach and intestines by enabling voluntary vomiting, unguent, love charm, syphilis, urinary tract infection	No records (Steroids)	Ibrahim et al., (2012), Jacot Guillarmod (1971), Moffett (2010), Watt and Breyer-Brandwijk (1962)
Eragrostis curvula (Schrad.) Nees	Poaceae	Seritsoana	4	Whole plant	LC	**Stomach ailments, *cleans blood***	No record of medicinal use from literature	Alkanol esters, triterpenol esters	Tulloch (1982)
Eragrostis plana Nees	Poaceae	Selile	4	Roots		***TB***	Infusion of roots drunk or used to wash body to reduce fever, profuse menstruation, impotency, barrenness, fractures, ingredient in many strengthening medicines	No records (Alkanol esters, triterpenol esters)	Jacot Guillarmod (1971), Moffett (2010), Phillips (1917), Tulloch (1982), Watt and Breyer-Brandwijk (1962)
[a]*Eucalyptus sp.*	Myrtaceae	Boloukomo	4	Leaves	Not evaluated	*Colds*, **asthma**	Leaf decoction for steaming to treat flu and colds, nasal congestion	Terpenoids, flavonoinds	Moteetee and van Wyk, (2011), Watt and Breyer-Brandwijk (1962), Van Wyk and Wink (2004)
Gerbera ambigua (Cass.) Sch. Bip.	Asteraceae	Seboka	4	Whole plant	LC	Infertility	Vermifuge, anti-emetic, heartburn in children, root infusion given to pregnant women, severe cold, decongestant, laxative in children	Terpenoids	Hutchings et al. (1996), Maliehe (1997), Moteetee and van Wyk, (2011), Schmitz (1982)
Gerbera piloselloides (L.) Cass.	Asteraceae	Tsebe ea pela	4	Root	LC	**Asthma**	Emetic for excess bile, cold in the head, TB, purgative in stomach troubles, miner's phthisis, improves fertility, cleans womb, earache, headache, coughs, tapeworm, as tonics, chest complaints	Coumarins, phenols	Jacot Guillarmod (1971), Maliehe (1997), Moffett (2010), Moteetee and van Wyk, (2011), Phillips (1917), Pooley (1998), Watt and Breyer-Brandwijk (1962), Xao et al. (2002)
Hermannia depressa N.E.Br.	Sterculiaceae	Seletjane/ Selenjane	4	Roots	LC	**Cancer**	Abdominal pains in pregnancy, nausea, diarrhoea, heartburn, colic, improves appetite in pregnant women, emetic, stomach ache, coughs, protective charm	Tannins, saponins, phenolics	Jacot Guillarmod (1971), Molefe et al. (2013), Moteetee and van Wyk, (2011), Phillips (1917), Pooley (1998), Reid et al. (2005), Schmitz (1982), Van Wyk and Gericke (2000), Watt and Breyer-Brandwijk (1962)
Leucosidea sericea Eckl. & Zeyh.	Rosaceae	Cheche	4		LC	***Herpes, HIV***			

				Leaves, stem (bark)			Vermifuge, coughs, high blood pressure, eye problems	Alkaloids, flavonoids, saponins, tannins	Aremu et al. (2010), Jacot Guillarmod (1971), Moffett (2010), Moteetee and van Wyk, (2011), Phillips (1917), Watt and Breyer-Brandwijk (1962)
Lightfootia sp.(*Wahlenbergia*)	Campanulaceae	Leseli	4	Whole plant	LC	***Syphilis***	Asperient for baby illnesses (phlegm, colic)	No records	Moffett (2010)
Mentha longifolia (L.) Huds. subsp. *longifolia*	Lamiaceae	Koena	4	Leaves, stem, rhizome	LC	**Cervical cancer**, complications associated with pregnancy	Colds, decongestant, coughs, bronchial troubles, fever, chest complains, sore joints, feet sores, improves digestion, heartburn headache, wounds, stomach pains, swollen glands, hysteria, indigestion, menstrual pains, delayed pregnancy, induces labour pains, backache	Terpenoids, flavonoids	Jacot Guillarmod (1971), Maliehe (1997), Moteetee and van Wyk, (2011), Phillips (1917), Pooley (1998), Ramohlabi (1989), Schmitz (1982), Van Wyk et al. (1997), (2009), Watt and Breyer-Brandwijk (1962)
Metalasia muricata (L.) D.Don	Asteraceae	Tee	4	Branches leaves	LC	***TB***	Fumigant during illness (colds or diarrhoea) or after death	No records (Flavonoids, coumarins)	Jacot Guillarmod (1971), Moffett (2010), Phillips (1917), Watt and Breyer-Brandwijk (1962), Zdero and Bohlmann (1990)
Myrsine africana L.	Myrsinaceae	Moroka-pheleu	4	Branches	LC	**Toothache**	Blood purifier, anthelmintic, ringworm, skin disease	Flavonoids, saponins, steroids. Tannins	Abbhi et al. (2011), Watt and Breyer-Brandwijk (1962)
Olea europaea L. subsp. *africana* (Mill) P.S. Green	Oleaceae	Mohloare	4	Leaves, stem (bark)	LC	***Herpes***	Enhance renal and bladder function, infertility, hypertension, headaches, backache, colic, diuretic, purgative, tonic, anti-diarrhoea, sore throat, eye lotion, charm against lightening	Terpenoids, flavonoids	Jacot Guillarmod (1971), Maliehe (1997), Moffett (2010), Moteetee and van Wyk, (2011), Phillips (1917), Van Wyk et al. (1997), (2009), Watt and Breyer-Brandwijk (1962)
[a]*Opuntia ficus-indica (= O. megacantha)*	Cactaceae	Torofeie	4	Stem	Not evaluated	**Piles, toothache**	Constipation	Flavonoids, glycosides, alkaloids	Kaur et al. (2012), Moussa-Ayoub et al. (2014), Watt and Breyer-Brandwijk (1962)
Parapodium costatum E.Mey	Apocynaceae	Sehamela-poli	4	Roots	LC	***HIV*, internal and external tumours, phlegm**	Protective charm against bad omens, pot herb	No records	Jacot Guillarmod (1971), Moffett (2010), Moteetee and van Wyk, (2011)
Phytolacca heptandra Retz.	Phytolaccaceae	Monatja	4	Roots	LC	**Cervical cancer, parasites introduced by witchcraft**	Stomach pains, gonorrhea, taken by pregnant women to prevent birthmarks in their unborn children, snake bites, emetic in chest diseases (however, roots are **poisonous** in case of overdose & are used to get rid of an enemy	No records	Moteetee and van Wyk, (2011), Moffett(2010), Watt and Breyer-Brandwijk (1962)
[a]*Rubus rigidus* Sm.	Rosaceae	Monokots'oai	4	Roots	Not evaluated	**Cervical cancer, complications associated with pregnancy**	Acute pain in any illness, stomach ache, fits, snakebite	Glycosides, flavonoids, terpernoids	Jacot Guillarmod (1971), Nguelefack et al. (2011), Pooley (1998)
Senecio asperulus DC.	Asteraceae	Moferefere	4	Whole plant	LC	*TB*, ***herpes*, *syphilis***	Steam from boiling decoction used for colds, flu, sore throat, mouth ulcers, improves blood circulation, sore joints, itching feet	Glycosides, phytosterols, flavonoinds	Maliehe (1997), Moteetee and van Wyk, (2011), Mugomeri et al. (2014), Schmitz (1982), Watt and Breyer-Brandwijk (1962)
Senecio coronatus (Thunb.) Harv.	Asteraceae	Lehlomane	4	Roots	LC	Intestinal complaints	Wounds, diarrhoea in children, intestinal complains, eases child birth, stomach ache, purification purgative, enema for infants during weaning, tooth ache	Sesquiterpene esters	Jacot Guillarmod (1971), Maliehe (1997), Moffett (2010), Phillips (1917), Pooley (1998), Shakhnoza and Saidkhodzhaev (2012), Watt and Breyer-Brandwijk (1962)
Sisymbrium capense Thunb.	Brassicaceae	Sepaile sa sesotho	4	Leaves	Not evaluated	**Internal tumours**	An excellent pot herb	No records	Jacot Guillarmod (1971), Moffett (2010)
Sisyranthus imberbis Harv.	Apocynaceae	Malla-ntebile	4	Whole plant	LC	***Reduces mother-to-child HIV infection***	Love charm	No records	Jacot Guillarmod (1971), Phillips (1917)
Solanum aculeatissimum Jacq.	Solanaceae	Thola	4		LC				

Table 1 (*continued*)

Scientific (botanical) name	Family	Vernacular (Sesotho) name	Frequency of mention in interviews (%)	Plant part (s) used	Red-data listing	Medicinal uses from interviews	Medicinal use from literature	Chemical compounds	References
				Whole plant		Complications associated with pregnancy	Decoction given after a miscarriage for uterine cleaning. Dry powder rubbed into wounds or placed on painful teeth, snake bites, coughs, dysmenorrhea	Alkaloids, glycosides, saponins, steroids	Moffet (2010), Nabeta (1993), Shale et al. (1999), Watt and Breyer-Brandwijk (1962)
Tephrosia capensis (Jacq.) Pers. var. *capensis*	Fabaceae	Pelo-li-maroba	4	Roots	LC	Heart problems	Heart palpitations, headache biliousness	No records	Jacot Guillarmod (1971), Moffett (2010), Phillips (1917), Watt and Breyer-Brandwijk (1962)
Thesium costatum A. W. Hill var. *costatum*	Santalaceae	Marakalle	4	Whole plant	LC	Asthma	Chest colds, TB	No records	Jacot Guillarmod (1971), Phillips (1917), Ramohlabi (1989), Watt and Breyer-Brandwijk (1962)
Thesium sp. (cf. *T. angulosum* DC.)	Santalaceae	Lentsoe	4	Roots	LC	**Internal tumours**	Heartburn, chest colds	No records	Jacot Guillarmod (1971), Moffett (2010), Phillips (1917), Watt and Breyer-Brandwijk (1962)

[a] Marks exotic plant species; LC—Least Concern; newly recorded uses are given in bold, infectious diseases and related infections are italicized.

but may rather be due to their different backgrounds, beliefs and plants available in their various areas. The informants mentioned that they collect the plants from the veld, but most of them are only available in remote and less accessible places. This in part may limit usage of a particular species. Medicinal plants that have become scarce and difficult to find are then bought from pharmacies. A majority of the medicinal plants are reported to cure infectious diseases such as TB, HIV, syphilis, herpes, diarrhoea, blood impurities and skin sores (italicised in Table 1). In fact, 28 of the 80 plants are reported to cure TB. Table 2 further ranks the value of medicinal plants according to their frequency of traditional use for each ailment among interviewed traditional healers and herbalists.

Of the 35 species listed by the second author's previous study (Moteetee and van Wyk, 2011) as the most important and best known medicinal plants of Lesotho, 21 were also recorded in the current study as used in Lesotho's ethnomedicine. Medicinal plants reported to treat a wide range of ailments include; *E. elephantina*, *P. prunelloides, H. hermerocallidea*, *Eriocephalus* sp., *S. runcinata*, *Scabiosa columbaria*, *D. anomala*, *M. serrata*, *X. undulatum,* and *L. lanceolata*. Therefore, the plants are in high demand. In fact, *D. anomala, L. lanceolata*, *Tephrosia capensis*, *E. elephantina*, and *P. prunelloides* are reported by informants as over-harvested, even though none of them are being cultivated to reduce pressure on natural populations. A previous study by Talukdar (2002) listed *D. anomala* as vulnerable in Lesotho's red data list. However, none of the other reportedly over-harvested species are red-data listed by Talukdar (2002). The red-data listing has been compared with that of South Africa in Table 1 [www.redlist.sanbi.org (accessed 30-01-2015)].

Six of the 80 recorded plant species are reported to be poisonous in literature (Jacot Guillarmod, 1971; Ndhlala et al., 2013; Phillips, 1917; Pooley, 2003; Van Wyk et al., 2002; Wink and Van Wyk, 2008), yet they are being used for medicinal purposes. They are *Drimia depressa*, *Phytolacca heptandra*, *Aloe ferox*, *Artemisia afra*, *Eucomis automnalis* and *Withania somnifera*. In fact, numerous plants are reported to have the potential of causing poisoning to humans due to a plethora of compounds they produce as a defense mechanism against invasion by micro-organisms, viruses and herbivores (Wink and Van Wyk, 2008). *D. depressa* has long been known to be toxic to sheep and cattle (Kellerman et al., 2005; Pooley, 2003; Van Wyk et al., 2002), but it is reported in the current study to cure diseases such as cancer, liver problems, HIV and mental illness. Recent studies have confirmed that five homoisoflavonoids urgineanins A–E (1–5), isolated from *D. depressa* showed strong antiproliferative activity against the A2780 ovarian cancer cell line (Dai et al., 2013). Similarly, *P. heptandra* is reported in the current study to cure cancer. It is further reported in the literature to cure stomach pains and gonorrhoea, even though its roots are known to be poisonous (Jacot Guillarmod, 1971; Moffett, 2010; Moteetee and Van Wyk, 2011; Phillips, 1917). Leaves of *A. ferox* are reported to contain aloin which is a toxic principle that induces dose-dependent apoptosis involving mitochondria in Jurkat cells (Buenz, 2008; Wink and Van Wyk, 2008). The nectar in *A. ferox* is said to be a narcotic and produce weakness of the joints if ingested in large amounts (Hutchings et al., 1996). Similarly, the leaves of *A. afra* contain thujone which is dangerous in extremely high doses (above 15 mg), and have been shown to cause convulsions as well as some subtle effects on attention and mood (Pelkonen et al., 2013; Wink and Van Wyk, 2008). Thujone is also said to be responsible for neurotoxic and hallucinogenic effects (Hutchings, et al., 1996). The roots of *W. somnifera* contain withaferin A and withasomninie which induce apoptosis in Caki cells as well as having sedative and hypnotic effects (Van Wyk et al., 2002; Wink and Van Wyk, 2008; Woo et al., 2014).The bulb of *E. automnalis* is also reported to have

Table 2
A summary of frequency of traditional use of medicinal plants for each ailment.

Category of ailment	Ailment	Medicinal plants used	Frequency of traditional use of medicinal plant for each ailment
Circulatory	Blood impurities	*Bulbine narcissifolia*	1
		Elephantorrhiza elephantina	1
		Eragrostis curvula	1
		Gunnera perpensa	1
		Ipomoea oblongata	1
		Ledebouria cooperi	1
		Pentanisia prunelloides	1
		Tephrosia capensis	1
		Trifolium burchellianum subsp. *burchellianum*	3
	High blood pressure	*Eriocephalus* sp.	1
		Euphorbia clavarioides var. *clavarioides*	1
		Pentanisia prunelloides	1
		Scabiosa columbaria	1
	Numbness in limbs/swollen limbs	[a]*Agave americana* subsp. *americana*	1
		Aloe maculata	1
		Ipomoea oblongata	1
		Malva parviflora	1
Degenerative	Breast cancer	*Aloe maculata*	1
		Cussonia paniculata subsp. *sinuata*	1
		Dicoma anomala subsp. *anomala*	2
		Drimia depressa	1
		Elephantorrhiza elephantina	2
		Gunnera perpensa	1
		Hermannia depressa	1
		Ipomoea oblongata	1
		Leobordea lanceolata	1
		Pentanisia prunelloides	3
		Salvia runcinata	1
		Selaginella caffrorum	1
		Withania somnifera	1
	Cervical cancer	*Buddleja salviifolia*	1
		Cussonia paniculata subsp. *sinuata*	1
		Mentha longifolia	1
		Phytolacca heptandra	1
		Scabiosa columbaria	1
		[a]*Rubus* sp.	1
		Xysmalobium undulatum var. *undulatum*	2
	Diabetes	*Bulbine narcissifolia*	1
		Clutia natalensis	1
		Dicoma anomala subsp. *anomala*	3
		Eriocephalus sp.	4
		Euphorbia clavarioides var. *clavarioides*	2
		Pentanisia prunelloides	1
		Rhamnus prinoides	1
		Rumex lanceolatus	1
		[a]*Searsia lancea*	1
		Xysmalobium undulatum	1
	Internal tumours	*Haplocarpha scaposa*	1
		Parapodium costatum	1
		Phygelius capensis	1
		Salvia runcinata	1
		Sisymbrium thellungii	1
		Thesium sp. (cf. *T. angulosum*)	1
		Withania somnifera	1
	Liver	*Drimia depressa*	1
		Helichrysum caespititium	1
		Pentanisia prunelloides	1
Digestive	Constipation	*Euclea coriacea*	1
		Haplocarpha scaposa	1
		Ledebouria cooperi	1
		Pelargonium sidoides	1
		Rumex lanceolatus	1
	Diarrhoea	*Pelargonium sidoides*	1
	Gall sickness	*Cyathula uncinulata*	1
		Dicoma anomala subsp. *anomala*	3
	Hiccups	*Aristida congesta*	1
		Cephalaria pungens	1
		Eucomis autumnalis subsp. *autumnalis*	1
	Intestinal disorders	*Bulbine narcissifolia*	1

Table 2 (*continued*)

Category of ailment	Ailment	Medicinal plants used	Frequency of traditional use of medicinal plant for each ailment
		Elephantorrhiza elephantina	1
		Eragrostis curvula	1
		Leobordea lanceolata	2
		Senecio coronatus	1
	Phlegm	*Aristida congesta*	1
		Ledebouria cooperi	1
		Parapodium costatum	1
		Xysmalobium undulatum var. *undulatum*	1
	Piles	*Elephantorrhiza elephantina*	1
		[a]*Opuntia ficus-indica*	1
		Rumex lanceolatus	1
	Stomach disorders	*Dicoma anomala* subsp. *anomala*	1
		Euclea coriacea	1
		Elephantorrhiza elephantina	1
		Gunnera perpensa	1
		Ipomoea oblongata	1
		Leobordea lanceolata	1
	Vomiting	*Pennisetum glaucum*	1
Other ailments	Internal parasites introduced by witchcraft	*Dianthus basuticus*	1
		Phytolacca heptandra	1
		Tulbaghia acutiloba	1
	Mental illness	*Drimia depressa*	1
		Morella serrata	1
		Othonna natalensis	1
		Zantedeschia albomaculata subsp. *albomaculata*	1
Pain	Abdominal pains	*Elephantorrhiza elephantina*	1
		Salvia runcinata	1
		Selaginella caffrorum	1
	Headache	*Morella serrata*	3
		Selaginella caffrorum	1
		Xysmalobium undulatum	2
		Zantedeschia albomaculata subsp. *albomaculata*	1
Pain	Toothache	*Myrsine africana*	1
		[a]*Opuntia ficus-indica*	1
Reproductive	HIV	[a]*Agave americana subsp. americana*	1
		Aloe maculata	1
		Aloe striatula var.striatula	1
		Berkheya setifera	1
		Dicoma anomala subsp. *anomala*	1
		Drimia depressa	1
		Euphorbia clavarioides var. *clavarioides*	1
		Haplocarpha scaposa	1
		Hypoxis hemerocallidea	2
		Leucosidea sericea	1
		Parapodium costatum	1
		[a]*Populus sp.*	1
		Phygelius capensis	1
		Rhamnus prinoides	1
		Scabiosa columbaria	1
		Sisyranthus imberbis	1
		Tulbaghia acutiloba	1
	Difficult pregnancy/labour	*Berkheya setifera*	1
		Buddleja salviifolia	1
		Cephalaria pungens	1
		Gunnera perpensa	1
		Mentha longifolia subsp. *longifolia*	1
		[a]*Rubus* sp.	1
		Scabiosa columbaria	1
		Solanum aculeatissimum	1
	Infertility	*Anthospermum rigidum* subsp. *pumilum*	1
		Bulbine narcissifolia	1
		Cephalaria pungens	2
		Elephantorrhiza elephantina	1
		Gerbera ambigua	1
		Eucomis autumnalis subsp. *autumnalis*	1
		Hypoxis hemerocallidea	1
		Salvia runcinata	2
		Scirpus falsus	2

Table 2 (*continued*)

Category of ailment	Ailment	Medicinal plants used	Frequency of traditional use of medicinal plant for each ailment
	Menstrual pains	*Scabiosa columbaria*	1
	Prostrate	*Artemisia afra*	1
	Swollen testicles	*Hypoxis hemerocallidea*	1
	Syphilis	*Buddleja salviifolia*	1
		Elephantorrhiza elephantina	2
		Hypoxis hemerocallidea	1
		Lightfootia sp.	1
		Malva parviflora var. *parviflora*	1
		Populus sp.	1
		Rumex lanceolatus	1
		Salvia runcinata	1
		Selaginella caffrorum	1
		Senecio asperulus	1
	Uterine disorder	*Berkheya setifera*	1
		Dicoma anomala subsp. *anomala*	1
		Scabiosa columbaria	1
Respiratory	Acute respiratory infections	*Helichrysum caespititium*	1
		Scabiosa columbaria	1
	Asthma	*Gerbera piloselloides*	1
		[a]*Eucalyptus* sp.	1
		Leobordea lanceolata	1
		Pennisetum glaucum	1
		Thesium costatum	1
	Colds/coughs	*Eucalyptus* sp.	1
	Tuberculosis	*Ajuga ophrydis*	1
		Buddleja salviifolia	1
		Clematis brachiata	1
		Dianthus basuticus	1
		Dicoma anomala subsp. *anomala*	2
		Drimia depressa	1
		Elephantorrhiza elephantina	2
		Eragrostis plana	1
		Eriocephalus sp.	1
		Gazania krebsiana subsp *krebsiana*	2
		Helichrysum caespititium	1
		Helichrysum odoratissimum	2
		Helichrysum pallidum	2
		Hypoxis hemerocallidea	2
		Leobordea lanceolata	1
		Malva parviflora var. *parviflora*	1
		Metalasia muricata	1
		Morella serrata	1
		Othonna natalensis	3
		Pennisetum glaucum	1
		Pentanisia prunelloides	4
		Senecio asperulus	1
		Trifolium burchellianum subsp. *burchellianum*	1
		Withania somnifera	1
		Xysmalobium undulatum	1
		Zantedeschia albomaculata subsp. albomaculata	2
Skin infections	Herpes	[a]*Agave americana* subsp. *Americana*	1
		Aloe ferox	1
		Berkheya setifera	1
		Buddleja salviifolia	1
		Cheilanthes hirta	2
		Elephantorrhiza elephantina	1
		Euphorbia clavarioides var. *clavarioides*	1
		Leucosidea sericea	1
		Olea europaea	1
		Malva parviflora	2
		Parapodium costatum	1
		[a]*Populus* sp.	1
		Phygelius capensis	1
		Rhamnus prinoides	1
		[a]*Searsia lancea*	1
		Selaginella caffrorum	1
	Sores	*Aster bakerianus*	1
		Withania somnifera	1
	Wounds	*Aster bakerianus*	1
		Cussonia paniculata subsp. *sinuata*	1

[a] Marks exotic plants.

Table 3
New records of medicinal plants used in Lesotho.

Scientific (botanical) name	Family	Vernacular (Sesotho) name	Plant part used	**Medicinal use** (infectious diseases are in italics)
Cephalaria pungens Szabó	Dipsacaceae	ts'oene	Whole plant	Colic, *Human Immunodeficiency Virus* (HIV), complications associated with pregnancy
Eragrostis curvula (Schrad.) Nees	Poaceae	seritsoana	Whole plant	*Stomach ailments*
Ipomoea oblongata E.Mey. ex Choisy	Convolvulaceae	mothokho	Roots	Cancer, *stomach ailments*, swollen feet
Myrsine africana L.	Myrsinaceae	moroka-pheleu	Whole plant	Toothache
[a]*Opuntia ficus-indica (=O. megacantha)*	Cactaceae	torofeie	Stem	Piles, toothache
Pennisetum glaucum (L.) R. Br.	Poaceae	nyalothi	Whole plant	*Tuberculosis*, asthma
[a]*Populus* sp.	Salicaceae	popoliri ea thaba	Branches	*Syphilis*, *HIV*, *herpes*
Scirpus falsus C.B. Clarke	Cyperaceae	loli	Rhizome	Infertility

[a] Marks exotic plants.

Table 4
A summary of animal products added to medicinal plants to enhance their curative abilities.

Animal product	Medicinal plants added	Medicinal uses (infectious diseases and related illnesses are italicized)
Animal dung (cow, dog, pig) milk	*Morella serrata*, *Xysmalobium undulatum*, *Dianthus basuticus*, *Phytolacca heptandra*	Insects introduced by witchcraft
Animal dung (pig, dog)	*Drimia depressa*, *Zantedeschia albomaculata*	Mental illness
Animal fat (goat, chicken), snake venom	*Cheilanthes hirta*, *Aloe ferox*, *Berkheya setifera*, *Cussonia paniculata*, *Malva parviflora* (medicinal plants ground into powder)	Used as lotion to treat *skin diseases* such as *herpes* and *wounds*, cancer
Chicken gizzard	*Drimia depressa*, *Helichrysum caespititium*	Liver ailments
Milk	*Cephalaria pungens*, *Aristida congesta*	Infertility in women
Milk from a young cow	*Eriocephalus* sp., *Euphorbia clavarioides*, *Searsia lancea*	Diabetes
Milk, ostrich egg	*Hypoxis hemerocallidea*, *Clematis brachiata*, *Drimia depressa*, *Elephantorrhiza elephantina*	*Tuberculosis*
Milk, Rock hyrax urine	*X. undulatum*	Phlegm in children
Ostrich egg, Rock hyrax urine	*Artemisia afra*	Prostate
Rock hyrax urine	*Selaginella caffrorum*, *Salvia runcinata*, *E. elephantina*	abdominal pains
Rock hyrax urine	*Hypoxis hemerocallidea*, *Parapodium costatum*	*HIV*
Rock hyrax urine	*E. elephantina*, *Selaginella caffrorum*	*Syphilis*

toxic effects due to presence of haemolytic toxin (Taylor and Van Staden, 2001). We therefore recommend that none of these plants should be used without proper supervision or knowledge.

A majority of the medicinal plants are ingested as decoctions, teas and juices for the treatment of internal infections (digestive, respiratory, reproductive and degenerative ailments). In some cases plants such as *Morella serrata* and *X. undulatum* are ground into powder and taken as a snuff to cure headache. For the treatment of external ailments such as wounds, sores and skin rashes, ground plant parts are made into a paste and often mixed with animal fat and applied directly onto the infected skin. The most commonly used plant parts were found to be roots, followed by stems (bark, rhizome, bulbs) and to a lesser extent leaves. In some cases the whole plant is used (Table 1).

3.4. New records of medicinal plants and new uses

Medicinal uses gathered from 80 recorded plants were compared with their reported traditional use in literature. Consequently, a total of 146 new medicinal uses (indicated in bold in Table 1) are reported here for 34 plant species. For example, *E. elephantina* has been reported in literature to cure chest complaints, stomach and intestinal disorders (Jacot Guillarmod, 1971; Pooley, 1998). However, the current study has revealed that it is also been used to cure cancer, infertility, TB, herpes, piles, abdominal pains and removes blood impurities. Eight plants are reported here for the first time as being used for medicinal purposes in humans in Lesotho. These are *Cephalaria pungens*, *Scirpus falsus*, *Ipomoea oblongata*, *Populus sp.*, *Myrsine africana*, *Eragrostis curvula*, *Opuntia ficus-indica,* and *Pennisetum glaucum*. Interestingly, *O. ficus-indica* is reported to cure piles, a newly mentioned ailment in Lesotho's *materia medica. M. africana* is known in Sesotho as *moroka-pheleu* (meaning "the one which sews the ram") in relation to its administration to rams "to prevent their covering the ewes before the proper time" (Phillips, 1917). The plant is however used elsewhere for the treatment of a number of human ailments. These include TB, rheumatism and diarrhoea in Pakistan (Azam et al., 2011); intestinal worms and chest pains in East Africa (www.directory.abcic.org); and as a blood purifier in southern Africa (Watt and Breyer-Brandwijk, 1962). *O. ficus-indica* is reportedly used for horses' hoofs pain in Italy (Menale and Muoiu, 2014) while *P. glaucum* is used for toothache, stomach pains, gonorrhoea, and inflammations in Kenya (Wambugu et al., 2011). A summary of the newly recorded medicinal plants and their uses is given in Table 3.

3.5. Animal products

It was noted in the current study that animal products are sometimes added to the plant medicine to enhance its curative abilities (Table 4). For example, animal fat (mostly goat, chicken) is added to ground medicinal plants such as *A. ferox* and used as a lotion to treat skin diseases. Milk is widely used in various medicinal preparations. For example, milk from a young cow is mixed with *Eriocephalus* sp., *Euphorbia clavarioides* and *Searsia lancea* to cure diabetes. Milk is mixed with *Hypoxis hemerocallidea*,

Clematis brachiata, *D. depressa* and *E. elephantina* to treat TB. Milk is also used to curb infertility in woman by mixing with *C. pungens* and *Aristida congesta*. Surprisingly, animal dung (cow, dog, pig) is also reported to be medicinally important. It is mixed with *D. depressa* and *Zantedeschia albomaculata* to cure mental illness. Rock hyrax urine (known as *moroto-oa-pela* in Sesotho) appears to be an important ingredient used in many medicinal preparations, so much so that it was mistakenly recorded by Moffett (2010) as "an identified plant" due to the frequency of reference. It is reported to cure prostrate (when mixed with *A. afra*), excessive phlegm in children (when mixed with *X. undulatum*), syphilis (when mixed with *Selaginella caffrorum* and *E. elephantina*), HIV (when mixed with *H. hemerocallidea* and *Parapodium costatum*, and abdominal pains (when mixed with *S. caffrorum*, *S. runcinata* and *E. elephantina*).

4. Conclusions

A total of 80 plants were recorded in the study as treating 38 common ailments in the Maseru district of Lesotho. Commonest ailments include TB and HIV. The most frequently used medicinal plants were found to be *E. elephantina* and *P. prunelloides*, mentioned ten and seven times respectively. Records of eight medicinal plants and 146 new medicinal uses of 34 plants that were not recorded elsewhere in literature are reported in the current study for the first time. This is an indication that gaps still exist in the recorded ethnobotanical data of Lesotho medicinal plants. Six plant species namely; *D. depressa Phytolacca heptandra*, *A. ferox*, *A. afra*, *Eucomis autumnalis* and *W. somnifera* are reported in the literature to contain some potentially toxic compounds, yet they are being used for medicinal purposes. As a result herbal medicines should not be presumed ubiquitously safe and should be used with caution. It is therefore important to generate pharmacological data to validate the dose at which cytotoxicity of these plants become evident. Some medicinal plants such as *E. elephantina*, *D. anomala* and *P. prunelloides* are over-harvested due to high demand. Long term conservation mechanisms such as establishment of communal botanical gardens for propagation of commonly used medicinal plants, which to our knowledge are currently not in place, can help reduce pressure on the wild populations. Interestingly, it appears that traditional healers are becoming more aware of certain illnesses which were previously never recorded in traditional medicine. These include; herpes, HIV, high blood pressure, diabetes, asthma and piles.

The wealth of new knowledge gained with the current study reinforces the importance of extending the study to other parts of Lesotho. A comparative survey is planned for the highland areas. Furthermore, antimicrobial, phytochemical screening and cytotoxicity studies of some of the medicinal plants used in Lesotho is underway, in order to validate the claims of their medicinal potential to treat infectious diseases.

Acknowledgements

The President and Secretary of LTMPC (M. Lepheana and M. Tjopa respectively) are thanked for their assistance in liaising and setting up meetings with resource persons. The interviewed traditional healers, herbalists and pharmacist are appreciated for the willingness to share their knowledge (C. Ndaba, T. Seboka, M. Sepipi, A. Mosi, P. Poone, M. Mafeto, N. Kapeso, T. 'Muso, M. Lesenyeho, M. Motanyane, M. Masotsa, M. Sello, M. Molefi, M. Mokokoane, M. Lifefo, M. Mosenene, M. Mafeto, M. Matebele, P. Khiba, Z. Zoza, M. Mofoka, M. Lepheana, L. Moeketsi, P. Mokhoiting, M. Masilo, F. Ts'iane and M. Ndabe). Mr M. Kobisi is acknowledged for his guidance during field trips and plant identification. This work is based on the research supported in part by the National Research Foundation of South Africa for the Grant number 93625. The University of Johannesburg (UJ), National University of Lesotho (NUL) and the Lesotho Government (National Manpower Development Secretariat) are also acknowledged for financial assistance.

References

Abbhi, V., Joseph, L., George, M., 2011. Phytochemical analysis of fruit extract of *Myrsine africana*. Int. J. Pharm. Pharm. Sci. 3, 427–430.
Abegaz, B.M., Peter, M.G., 1995. Emodin and emodinathrone rhamosided acetates from fruits of *Rhamnus prinoides*. Phytochemistry 39, 1411–1414.
Aganga, A.A., Mosase, K.W., 2001. Tannin content, nutritive valve and dry matter digestibility of *Lonchocarpus capassa*, *Zizyphus mucronata*, *Sclerocarya birrea*, *Kirkia acuminate* and *Rhus lancea* seeds. Anim. Feed Sci. Technol. 91, 107–113.
Almeida, J.R.G., de Sá, P.G.S., Macedo, L.A.R., Filho, J.A., de Oliveria, V.R., Filho, J.M.B., 2013. Phytochemistry of the genus *Selaginella* (Selaginellaceae). J. Med. Plant Res. 7, 1858–1868.
Aremu, A.O., Fawole, O.A., Chukwujekwu, M.E., Light, M.E., Finnie, J.P., Van Straden, J., 2010. *In vitro* antimicrobial, anthelmintic and cyclooxygenase-inhibitory activities and phytochemical analysis of *Leucosidea sericea*. J. Ethnopharmacol. 131, 22–27.
Ashafa, A.O.T., 2013. Medicinal potential of *Morella serrata* (Lam.) Killick (Myricaceae) root extracts: biological and pharmacological activities. BMC Complimentary Altern. Med. 13, 163.
Azam, S., Bashir, S., Bashir, A., 2011. Anti-spasmodic action of crude methanolic extract and a new compound isolated from aerial parts of *Myrsine africana*. BMC Complementary Altern. Med. 11, 55.
Natural Compounds: Natural Sesquiterpene Esters Part 2. In: Azimova, S.S., Saidkhodzhaev, A.I. (Eds.), Springer, New York Heidelberg, p. 663.
Becker, J.V., Van der Merwe, M.M., Van Brummelen, A.C., Pillay, P., Crampton, B.G., Mmutlane, E.M., Parkinson, C., Van Heerden, F.R., Crouch, N.R., Smith, P.J., Mancama, D.T., Maharaj, V.J., Malar, J., 2011. *In vitro* anti-plasmodial activity of *Dicoma anomala* subsp. *gerradii* (Asteraceae): identification of its active constituent, structure-activity relationship studies and gene expression profiling. Malar. J. 10, 295.
Bohlmann, F., Le Van, N., Pham, T.V.C., Jacupovic, J., Schuster, A., Zabel, V., Watson, W.H., 1979. β-Isocomen, ein neues sesquiterpen aus *Berkheya-arten*. Phytochemistry 18, 1831–1834.
Bohlmann, F., Wallmeyer, M., 1982. Occurrence of sesquiterpenes esters in plant species. Phytochemistry 21 (5), 1157–1952.
Buenz, E.J., 2008. Aloin induced apoptosis in Jarkat cells. Toxicol. In Vitro 22, 422–429.
State of Environment Report Lesotho. In: Chakela, Q. (Ed.), 1999. National Environment Secretairat, Maseru, Lesotho.
Cholich, L.A., Márquez, M., Batle, M.P., Gimeno, E.J., Teibler, G.P., Rios, E.E., Acosta, O. C., 2013. Experimental intoxication of guinea pigs with *Ipomoea camea*: Behavioural and neuropathological alterations. Toxicon 76 28-26.
Cooper-Driver, G., Lets'ela, T., Polaki, M., 2008. Searching for Ferns in Lesotho. Ashworth Publishing Co, UK.
Crouch, N.R., Langlois, A., Mulholland, D.A., 2007. Bufadienolides from southern African *Drimia depressa* (Hyacinthaceae): urgineoideae. Phytochemistry 68, 1731–1734.
Dai, Y., Harinantenaina, L., Brodie, P.J., Goetz, M., Shen, Y.Y., Ten Dyke, K., David, G.I., Kingston, D.G.I., 2013. Antiproliferative homoisoflavonoids and bufatrienolides from *Urginea depressa*. J. Nat. Prod. 76 (5), 865–872.
Daniel, M., Denne, D., Cahuhan, D., 2012. Polyphenosl, *phospholipids* and fixed oil composition of pearl milled (*Pennisetum glaucum*) (L.)R.Br. Int. J. Pharmacy Life Sci. 3, 2098–2102.
Dovgii, I., Grishkovets, V., Kachala, V., Shashkov, A., 2005. Triterpene glycosides from *Cussonia paniculata*. Isolation and sturcture determination of glycosides A, B1, B2, C,D, G2, HI and H2 from leaves of *Cussonia paniculata*. Chem. Nat. Compd. 41, 200–204.
Greca, M.D., Ferrara, M., Fiorentino, A., Monaco, P., Previtera, L., 1998. Antialgal compounds from *Zantedeschia aethiopica*. Phytochemistry 49, 1299–1304.
Gopi, K., Redu, K., Vishwanath, B.S., Jayaraman, G., 2015. Protective effect of *Euphorbia hirta* and its components against snake venom induced lethality. J. Ethnopharmacol. , http://dx.doi.org/10.1016/j.jep.2015.02.044, In press.
Hutchings, A., Scott, A.H., Lewis, G., Cunningham, A.B., 1996. Zulu Medicinal Plants: An Inventory. University of Natal Press, Pietermaritzburg.
Ibrahim, B., Sowemimo, A., Van Rooyen, A., Van der Venter, M., 2012. Anti-inflammatory, analgesic and antioxidant activities of *Cyathula prostrata* (Linn.) Blume (Amaranthaceae). J. Ethnopharmacol. 141, 282–289.
Imperato, F., 1989. Flavonol glycosides from ferns of the genera *Asplenium* and *Cheilanthes*. Biochem. Syst. Ecol. 17, 161–166.
Imperato, F., 1992. Kaempferol 3-(2″-p-coumaroylrhamnoside)-rhamnoside from *Cheilanthes fragrans*. Phytochemistry 31, 3291–3992.
Inomata, Y., Terahara, N., Kitajima, J., Kokubugata, G., Iwashina, T., 2013. Flavones and anthocyanins from the leaves and flowers of Japanese *Ajuga* species (Lamiaceae). Biochem. Syst. Ecol. 52, 123–129.
Jacot Guillarmod, A., 1971. Flora of Lesotho. Cramer, Lehre.

Kamatou, G.P.P., Makunga, N.P., Ramogola, W.P.N., Viljoen, A.M., 2008. South African Salvia species: a review of biological activities and phytochemistry. J. Ethnopharmacol. 119, 664–672.
Kaur, M., Kaur, A., Sharma, R., 2012. Pharmacological actions of *Opuntia ficus-indica*: a review. J. Appl. Pharm. Sci. 2, 15–18.
Kayce, P., Sarikahya, N.B., Kimizigul, S., 2014. Two novel saponnins from *Cephalaria davisiana* (Dipsaceae). Phytochem. Lett. 10, 324–329.
Kellerman, T.S., Coetzer, J.A., Naude, T.W., Botha, C.J., 2005. Plant Poisonings and Mycotoxicoses of Livestock in South Africa, second ed. Oxford University Press, Cape Town.
Keshavjee, S., Seung, K., Satti, H., Furin, J., Farmer, P., Yong Kim, J., Becerra, M., 2007. Building capacity for multidrug resistant tuberculosis treatment: health systems strengthening in Lesotho. Fall 2 (4), 87–106.
Lamula, S.Q.N., Ashafa, A.O.T., 2014. Antimicrobial ad cytotoxic potential of *Dianthus basuticus* used in Basotho traditional practice. Bangladesh J. Pharmacol. 9, 105–111.
Lourens, A.C.U., Viljoen, A.M., Van Heerden, F.R., 2008. South African *Helichrysum* species: a review of the traditional uses, biological activity and phytochemistry. J. Ethnopharmacol. 119, 630–652.
Maliehe, E.B., 1997. Medicinal Plants and Herbs of Lesotho (in Sesotho). Mafeteng Development Project, Lesotho.
Mathekga, A.D.M., Meyer, J.J.M., Horn, M.M., Drewes, S.E., 2000. An acylated phloroglucinol with antimicrobial properties from *Helichrysum caespititium*. Phytochemistry 53 (1), 93–96.
Menale, B., Muoiu, R., 2014. Use of medicinal plants in the South-Eastern area of the Partenio Regional Park (Campania, Southern Italy). J. Ethnopharmacol. 153, 297–307.
Moffett, R., 2010. Sesotho Plant and Animal Names and Plants Used by the Basotho. Sun Press, Bloemfontein, South Africa.
Molefe, N.I., Tsotetsi, A.M., Ashafa, A.O.T., Thekisoe, O.M.M., 2013. In vitro anthelmintic activity of *Cotyledon orbiculata*, *Hermannia depressa* and *Nicotiana glauca* extracts against parasitic gastrointestinal nematodes of livestock. J. Med. Plants Res. 7 (9), 536–542.
Mostafa, M., Appidi, J.R., Yakubu, M.T., Afolayan, A.J., 2010. Anti-inflammatory, antinociceptive and antipyretic properties of the aqueous extract of *Clematis brachiata* leaf in male rats. Pharm. Biol. 48 (6), 682–689.
Moteetee, A., Van Wyk, B-E., 2007. The concept of '*musa-pelo* and the medical use of shrubby legumes (Fabaceae) in Lesotho. Bothalia 37, 75–77.
Moteetee, A., van Wyk, B-E., 2011. The medical ethnobotany of Lesotho: a review. Bothalia 41 (1), 209–228.
Moussa-Ayoub, T.E., El-Hady, E.A.A., Omran, H.T., El-Samahy, S.K., Kroh, L.W., Rohn, S., 2014. Influence of cultivar and origin on the flavonol profile of fruits and cladodes from cactus *Opuntia ficus-indica*. Food Res. Int. 64, 864–872.
Mpofu, S.J., Msagati, T.A.M., Krause, R.W.M., 2014. Cytotoxicity, phytochemical analysis and antioxidant activity of crude extracts from rhizomes of *Elephantorrhiza elephantina* and *Pentanisia prunelloides*. Afr. J. Tradit. Complement. Altern Med. 11 (1), 34–52.
Mugomeri, E., Chatanga, P., Hlapisi, S., Rahlao, L., 2014. Phytochemical characterization of selected herbal products in Lesotho. Lesotho Med. Assoc. J. 12 (1), 38–47.
Mulholland, D.A., Schwikkard, S.L., Crouch, N.R., 2013. The chemistry and biological activity of the Hyacinthaceae. Nat. Prod. Rep 30, 1165–1210.
Nabeta, K., 1993. *Solanum aculeatissimum* Jacq. *In vitro* culture and the production of secondary metabolites. Medicinal and Aromatic Plants, vol 5. Springer, Berlin Heidelberg, pp. 329–341.
Nair, A.G.R., Kotiyal, J.P., Bhardwaj, D.K., 1983. Myricetin 7,4′-dimethyl ether and its 3-galactosides from *Rhus lancea*. Phytochemistry 22, 318–319.
Ncube, B., Ngunge, V.N.P., Finnie, J.F., Van Staden, J., 2011. A comparative study of antimicrobial and phytochemical properties between outdoor grown and micropropagated *Tulbaghia violacea* Harv. plants. J. Ethnopharmacol. 134, 775–780.
Ncube, B., Ndhlala, A., Okem, A., Van Staden, J., 2013. *Hypoxis* (Hypoxidaceae) in African medicine. J. Ethnopharmacol. 150, 818–827.
Ndhlala, A.R., Ncube, B., Okem, A., Mulaudzi, R.B., Van Staden, J., 2013. Toxicology of some important medicinal plants in southern Africa. Food Chem. Toxicol. 62, 609–621.
Nguelefack, T.B., Mbakam, F.H., Tapondjou, L.A., Watcho, P., Nguelefact-Mbuyo, E.P., Ponou, B.K., Kamanyi, A., Park, H.J., 2011. A dimeric triterpenoid glycoside and flavonoid glycosides with free radical-scavenging activity isolated from *Rubus rigidus* var. *camerunensis*. Arch. Pharm. Res. 34, 543–550.
Pelkonen, O., Abass, K., Weisner, J., 2013. Thujone and thujone-containing herbal medicinal and botanical products: toxicology assessment. Regul. Toxicol. Pharmacol. 65 (1), 100–107.
Pendota, S.C., Aderogba, M.A., Ndhlala, A.R., Van Staden, J., 2013. Antimicrobial and acetylcholinesterase inhibitory activities of *Buddleja salviifolia* (L.) Lam. leaf extracts and isolated compounds. J. Ethnopharmacol. 148, 515–520.
Phillips, E.P., 1917. A contribution to the flora of the Leribe Plateau and environs. Ann. South Afr. Mus. 16, 1–379.
Pooley, E., 1998. A Field Guide to Wild Flowers of KwaZulu-Natal and the Eastern Regions. Natal Flora Publication Trust, Durban, South Africa.
Pooley, E., 2003. Mountain Flowers: A Field Guide to the Flora of the Drakensberg and Lesotho. The Flora Publication Trust, Durban, South Africa.
Qhotsokoane-Lusunzi, M.A., Karuso, P., 2001. Secondary metabolites from Basotho medicinal plants. I. *Bulbine narcissifolia*. J. Nat. Prod. 64 (10), 1368–1372.
Ramohlabi, E.N., 1989. Selected Plants of Medicinal Importance in Lesotho. Unpublished Undergraduate Degree Research Project. Roma, Lesotho.
Reid, K.A., Jäger, K.A., Light, M.E., Mulholland, D.A, Van Staden, J., 2005. Phytochemical and pharmacological screening of Sterculiaceae species and isolation of antibacterial compounds. J. Ethnopharmacol. 97, 285–291.
Rosoarivelo, S.T., Grougnet, R., Vérité, P., Lecsö, M., Butel, M.J., Tillequin, F., Guillou, C.R., Deguin, B., 2011. Chemical composition and antimicrobial activity of the essential oils of *Anthospermum emimense* and *Anthospermum perrieri* (Rubiaceae). Chem. Biodivers. 8, 145–154.
Sandasi, M., Kamatou, G.P.P., Viljoen, A.M., 2011. Chemotaxonomic evidence suggests that *Eriocephalus tenuifolius* is the source of Cape chamomile oil and not *Eriocephalus punctulatus*. Biochem. Syst. Ecol. 39 (328-338).
Satti, H., Motsamai, S., Chetane, P., Marumo, L., Barry, D., Riley, J., McLaughlin, M., Seung, K., Mukherjee, J., 2012. Scaling up a comprehensive approach to improving maternal health in the mountains of Lesotho. Int. J. Gynecol. Obstet. 119, S472–S473.
Schmelzer, G.H., Gurib-Fakim, A., Arroo, R.R.J., Bosch, C.H., Ruijter, Simmonds, M.S.J., Lemmens, R.H.M.J., Oyen, L.P.A, 2008. Plant resources of tropical Africa. Med. Plants 11 (1), 270–271.
Schmitz, M.O., 1982. Wild Flowers of Lesotho. ESSA, Roma, Lesotho.
Shale, T.L., Stirk, W.A., Van Staden, J., 1999. Screening of medicinal plants used in Lesotho for anti-bacterial and anti-inflammatory activity. J. Ethnopharmacol. 67, 347–354.
Shakhnoza, S.S.A., Saidkhodzhaev, A.I., 2012. Natural Compounds: Natural Sesquiterpenoids, Part 1 and 2. Springer-Verlag, New York Inc.
Talukdar, S.. In: Golding J.S. (Ed.), 2002. Southern African Botanical Diversity Network Report No.14, 21–30 SABONET, Pretoria.
Taylor, J.L.S., Van Staden, J., 2001. Cox-1 inhibitory activity in extracts from *Eucomis* L'Herit. species. J. Ethnopharmacol. 75, 257–265.
Tinto, W.F., Simmons-Boyce, J.L., McLean, S., Reynolds, W.F., 2005. Constituents of *Agave americana* and *Agave barbadensis*. Fitoterapia 76, 594–597.
Tulloch, A.P., 1982. Epicuticular wax of *Eragrastis curvula*. Phytochemistry 21 (3), 661–664.
Van Wyk, B-E., Van Oudtshoorn, B., Gericke, N., 1997. Medicinal Plants of South Africa. Briza Publications, Pretoria, South Africa.
Van Wyk, B-E., Gericke, N., 2000. People's Plants: A guide to Useful Plants of Southern Africa. Briza Publications, Pretoria, South Africa.
Van Wyk, B-E., Verdoorn, G.H.,, 1989. Alkaloids of the genera Aspalathus, Rafnia and Wiborgia (Fabaceae - Crotalarieae). S. Afr. J. Bot 55, 520–522.
Van Wyk, B-E., Van Heerden, F., Van Oudtshoorn, B., 2002. Poisonous Plants of South Africa. Briza Publications, Pretoria, South Africa.
Waigh, R.D., Zerihum, B., Melvin, R., 1990. Three diterpenes with a secolabdance skeleton from *Clutia abyssinica*. Phytochemistry 29, 2935–2938.
Waigh, R.D., Zerihum, B., Maitland, D.J., 1991. Ten 5-methylcoumarins from *Clutia abyssinica*. Phytochemistry 30, 333–335.
Wambugu, S.N., Mathia, P.M., Gakuya, D.W., Kanui, T.I., Kabasa, J.D., 2011. Medicinal plants used in the management of chronic joint pains in Machakos and Makueni countries, Kenya. J. Ethnopharmacol. 137, 945–955.
Watt, J.M., Breyer-Brandwijk, M.G., 1962. The Medicinal and Poisonous Plants of Southern and Eastern Africa. Livingstone, Edinburgh.
Wink, M., Van Wyk, B-E., 2008. Mind-Altering and Poisonous Plants of the World. Briza Publications, Pretoria, South Africa.
Woo, S.M., Min, K-j., Kim, S., Park, J-W., Kim, D.E., Kim, S.H., Choi, Y.H., Kwon, T.K., 2014. Axl is a novel target of withaferin A in the induction of apoptosis and the suppression of invasion. Biochem. Biophys. Res. Commun. 451, 455–460.
World Health Organization (WHO), 2011. World Health Rankings. Lesotho Total Deaths by Cause. Percent top 50 Causes-2010. ⟨http://www.worldlifeexpectancy.com/country-health-profile/lesotho⟩ (accessed 18-03-2014).
World Health Organization (WHO), 2012. Policy on Collaborative TB/HIV Activities: Guidelines for National Programmes and other Stakeholders. Geneva, Switzerland. WHO/HTM/TB/2012.1 (accessed 20-08-2014).
www.directory.abcic.org (accessed 22-10-14).
Xao, Y., Lee, J.B., Ding, Y., 2002. Studies on the chemical constituents from the roots and rhizomes of *Gerbera piloselloides*. Zhongguo Zhong Yao Za Zhi 27, 595–596.
Zdero, C., Bohlmann, F., 1990. Glycerol derivatives and other constituents from *Metalasia* species. Phytochemistry 29, 2179–2180.