

Full Length Research Paper

# Ethnobotanical survey of medicinal plants used by Bapedi traditional healers to manage HIV/AIDS in the Limpopo Province, South Africa

S. S. Semanya<sup>1\*</sup>, M. J. Potgieter<sup>1</sup> and L. J. C. Erasmus<sup>2</sup>

<sup>1</sup>Department of Biodiversity, School of Molecular and Life Sciences, University of Limpopo, Private Bag X1106, Sovenga 0727, South Africa.

<sup>2</sup>Department of Physiology and Environmental Health, School of Molecular and Life Sciences, University of Limpopo, Private Bag X1106, Sovenga 0727, South Africa.

Accepted 6 November, 2012

During the first half of 2012, a semi-structured questionnaire was employed to conduct a survey on medicinal plants used by Bapedi traditional healers in their human immunodeficiency virus/acquired immune deficiency syndrome (HIV/AIDS) management protocol. A total of 26 plant species were used by these healers to treat HIV/AIDS. Majority (96.1%) of the species used were indigenous and only 3.9% were exotic. Most (88.4%) of the indigenous species appear on South African National Red Data List of Plants. *Burkea africana*, *Citrullus lanatus*, *Cinnamomum verum*, *Euclea crispa*, *Elephantorrhiza elephantina*, *Euphorbia maleolens*, *Geigeria aspera*, *Plectranthus ciliatus*, *Sarcostemma viminalis*, *Zanthoxylum capense* and *Zanthoxylum humile* are recorded for the first time as a treatment for HIV/AIDS. The most used species by Bapedi healers to treat this pandemic was *E. maleolens* (11.7%) and *E. elephantina* (8.8%). Roots (66.6%) from 26 species were mostly used to prepare remedies. Twelve (60%) multi extract and eight (40%) single extract preparations were recorded. Extracts were mostly (99%) prescribed orally. The disappearance or improvement of symptoms was considered as indicators of a successful treatment. The present study concludes that Bapedi traditional healers' knowledge can lead to useful medicinal plants to manage and treat HIV/AIDS infections.

**Key words:** Bapedi traditional healers, human immunodeficiency virus/acquired immune deficiency syndrome (HIV/AIDS), Limpopo Province, medicinal plants.

## INTRODUCTION

Human immunodeficiency virus/acquired immune deficiency syndrome (HIV/AIDS) reduces progressively the effectiveness of the immune system and leaves the patient susceptible to opportunistic diseases (Weiss, 1993). In 2007, Joint United Nations Programme on HIV/AIDS (UNAIDS) estimated that 33 million people lived with HIV/AIDS worldwide (Kallings, 2008). In the same year, 2.7 million people became infected with HIV and two million people died of HIV/AIDS related causes (UNAIDS, 2004a). Of these new infections, it was estimated that 1.9 million occurred in sub-Saharan

Africa (UNAIDS, 2004a). In Southern Africa, the situation is even more dire. UNAIDS (2010a) estimated that in 2010, 17.8% of the population in Namibia contracted HIV/AIDS (UNAIDS, 2004a), while Botswana had a 24.1% infection rate (UNAIDS, 2004b), and Zimbabwe 14% (UNAIDS, 2010b). South Africa currently has one of the highest HIV/AIDS prevalence rates in the world (UNAIDS, 2011). Depending on the source consulted, figures range from 24.1%, amongst 20 to 65 year olds (ASSA, 2003) to 20.1% amongst 15 to 49 year olds (UNAIDS, 2002), to 15.5% amongst those older than 25 years (HSRC, 2002). According to UNAIDS (2011) in 2009, an estimated 5.6 million people were living with HIV/AIDS in South Africa, the highest number of people in any country. In the same year, it was estimated that

\*Corresponding author. E-mail: [sebuasemenya@gmail.com](mailto:sebuasemenya@gmail.com).

310,000 South Africans died of AIDS-related causes (UNAIDS, 2010c).

Antiretroviral (ARV) drugs are vitally important to improve the quality and prolong the life of HIV/AIDS patients (Department of Health, 2003). In South Africa, ARV are highly recommended as one of the means of managing the HIV/AIDS pandemic, and are available free of charge to any HIV-positive adult or adolescent who meets the CD4 cell count criteria (Department of Health, 2010). However, despite the availability of ARV drug in South Africa, most patients infected with HIV/AIDS still cannot or do not access state-sponsored treatment. Furthermore, ARV drugs have disadvantages that include resistance and toxicity (Sebit et al., 2002). Thus, most South Africans turn to herbal remedies from traditional healers to offset these disadvantages (Walwyn and Maitshotlo, 2010).

Africa has recently exploded with research focussing on the traditional treatment of the debilitating effects of HIV/AIDS. Ethnobotanical studies conducted in different African countries; Langlois-Klassen et al. (2007) for Uganda, Kisangau et al. (2007) for Tanzania, Chinsebu and Hedimbi (2010) for Namibia, Noumi and Manga (2011) for Cameroon, indicated that traditional healers and laypeople extensively utilize medicinal plants to manage the effects of HIV/AIDS. The same trend is apparent in South Africa, with confirmation coming from studies such as Dold and Cocks (2002), Bessong et al. (2005), Bessong et al. (2006), Puranwasi (2006), Theo et al. (2009), Klos et al. (2009), De Wet et al. (2011), Phalandwa (2012) and Tshilande (2012). Some of these studies (Bessong et al., 2005; Bessong et al., 2006; Theo et al., 2009; Klos et al., 2009) noted the effectiveness of a number of species in treating the effects of HIV/AIDS.

Despite a rapidly growing body of evidence regarding the traditional use of plants to manage HIV/AIDS in South Africa, there is no study on the species used by the Bapedi ethnic group to treat HIV/AIDS. This ethnic group is one of the highly recognised cultures in South Africa and constitute 53% of the population of the Limpopo Province (Lodge, 2005). This study thus aims to fill this gap.

## MATERIALS AND METHODS

### Study area

The current study was carried out in 17 local municipalities of the Limpopo province, covering the districts of Capricorn, Sekhukhune and Waterberg (Figure 1 and Table 1).

### Data collection

Information on the use of medicinal plants by Bapedi traditional healers to treat HIV/AIDS was collected from January 2012 to July 2012. Fifty-two traditional healers were selected randomly with the help of local administrators and local elderly people from 17 municipalities (Table 1). Two traditional healers per local

municipality participated in personal interviews, which were conducted in Sepedi, the local language. Semi-structured interviews were employed to obtain ethnobotanical data related to the local names of plants, plant part/s used to treat HIV/AIDS, methods of preparation of remedy, administration and dosages were recorded. Traditional healers were used as guides during field trips to collect plant voucher specimens which were later identified and deposited at the University of Limpopo's Larry Leach Herbarium (UNIN).

## RESULTS AND DISCUSSION

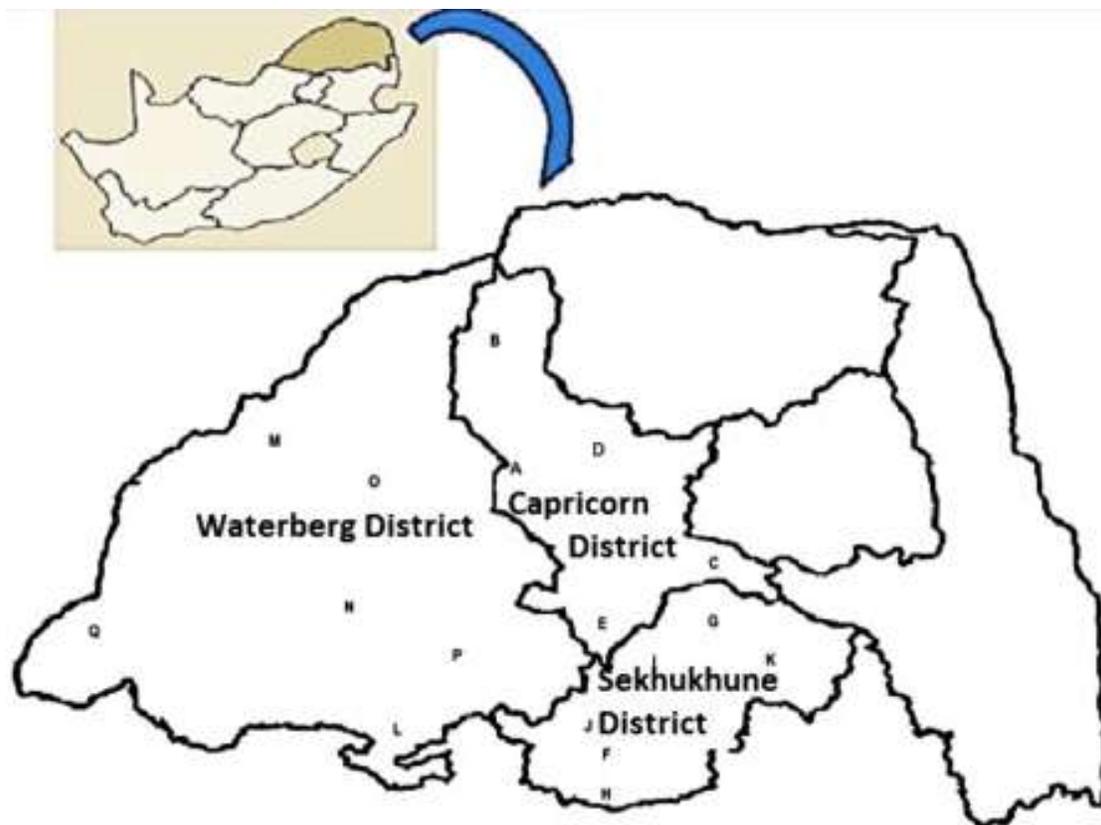
### Diversity of species

The present study revealed that 26 plant species are used by Bapedi traditional healers to treat HIV/AIDS (Table 3). Herbs (50%) and trees (42.3%) were the most used growth forms. Only 7.7% of the species were shrubs. This finding is in accordance with the general pattern observed in other ethno-medicinal inventories in South Africa, such as Van Wyk et al. (1997) and Appidi et al. (2008), and other African countries: Giday et al. (2003) for Ethiopia; Moshi et al. (2009) for Tanzania. According to Thomas et al. (2009), the widespread utilization of herbaceous species is thought to have a linkage with higher likelihood of containing pharmacologically active compounds. The high use of trees by Bapedi healers could be associated with the year round availability of their bark and root.

### Conservation status of species

#### Red data listed and protected species

Of the 26 species documented in this study, 25 (96.1%) are indigenous and 1 (3.8%) exotic (*Cinnamomum verum*). The official status of indigenous species was established using National Red Data List of South African plant (SANBI, 2001). With the exclusion of *Sarcostemma viminale*, all species appear on the National Red Data List of South African plants. Majority (88.4%) of these species appear as least concern, with *Drimia elata* and *Myrothamnus flabellifolius* listed as data deficient and *Hypoxis hemerocallidea* as declining. *Boscia albitrunca*, *Elaeodendron transvaalense* and *Sclerocarya birrea*, listed as least concern on the National Red Data List of South African plants, are also protected by the South Africa National Forest Act (NFA, 1998). Bapedi traditional healers are unaware of the conservation status of the species they use. This is an indication that enforcement of conservation legislation prohibiting the collection and use of threatened and protected species has done little to remedy their over-exploitation as noted by Mander (1997). Therefore, there is an urgent need to raise awareness through targeted educational programs. This will ultimately sustain both the species and accompanying indigenous knowledge.



**Figure 1.** Study area: Capricorn, Waterberg and Sekhukhune districts, Limpopo Province, South Africa. A to Q designates the involved municipalities.

**Table 1.** Districts and local municipalities included in this study.

Capricorn district		Sekhukhune district		Waterberg district	
Aganang	A	Elias Motsoaledi	F	Bela-Bela	L
Blouberg	B	Fetakgomo	G	Lephalale	M
Lepelle-Nkumpi	C	Groblersdal	H	Modimolle	N
Molemole	D	Makhuduthamaga	I	Mogalakwena	O
Polokwane	E	Marble Hall	J	Mookgophong	P
-	-	Tubatse	K	Thabazimbi	Q

**Traditional healer’s perception**

Seventy three percent of the indigenous species were mentioned by Bapedi healers as still abundant in the wild. However, *B. albitrunca*, *Burkea africana*, *E. transvaalense*, *Sansevieria hyacinthoides* and *Zanthoxylum capense* were mentioned by Bapedi healers to be rare in the wild. *Aloe arborescens* and *Euphorbia maleolens* were reported to be on the verge of extinction. This study unfortunately found a large discrepancy between official documentation such as the National Red Data List of South Africa and healer’s perception of species abundance. This necessitates that healers with their extensive local knowledge play a vital role in assisting

conservators during field surveys and to contribution in setting conservation priorities of species at a local level.

**Inventory of selected species**

The most frequently recorded species in this study to treat HIV/AIDS was *E. maleolens* (11.7%) and *Elephantorrhiza elephantina* (8.8%). As far as our literature review is concern, these species are now reported for the first time to treat HIV/AIDS. No published record regarding the medicinal use of *E. maleolens* in South Africa or elsewhere could be located. The degree of its use by Bapedi traditional healers warrants further

investigation regarding possible anti-HIV/AIDS activities. Related species such as *Euphorbia kansui* (Fujiwara et al., 1996) and *Euphorbia watanabei* (Mekkwaw et al., 1995) showed inhibition of HIV reverse transcriptase. In terms of *E. elephantina*, studies such as Gerstner (1939) and Jacot-Guillardmod (1971) reported that it is used to treat syphilis. It is interesting to note that syphilis is one of the sexually transmitted disease that favours the spread of HIV/AIDS (Paavonen, 2004). Thus, its use could be to stop the spread of syphilis. Furthermore, diarrhoea-focused studies (Mathabe et al., 2006; Appidi et al., 2008) in South Africa noted *E. elephantina* as the most widely used species by traditional healers. It is worth noting that diarrhoea is one of the opportunistic infections prevalent in HIV/AIDS patients. Thus, the use of *E. elephantina* might prevent the occurrence of diarrhoea.

To the best of our knowledge, the use of *B. africana*, *C. verum*, *Citrullus lanatus*, *Euclea crispa*, *Geigeria aspera*, *Plectranthus ciliatus*, *S. viminalis*, *Z. capense* and *Zanthoxylum humile* to manage HIV/AIDS is reported for the first time via this study. These species are reported in the literature to be used to treat ailments commonly experienced by HIV/AIDS patients. For instance, *B. africana* is used to treat chronic dysentery (Kisangau et al., 2007) and herpes zoster (Chinsebu and Hedimbi, 2010). *C. verum* was reported by Van Wyk and Wink (2004), as a remedy to stimulate appetite. It is worth noting that poor appetite is one of the most common problems in people infected with HIV/AIDS (Department of Health, 2001). Furthermore, Bellakhdar et al. (1991) noted the use of *C. verum* as a remedy for headaches, colds and loss of memory by Moroccan healers. According to Health24 (2012), persistent headaches and depression are common during the latent stage of HIV/AIDS. Based on the aforementioned studies, it is reasonable to postulate that the use of some of the aforementioned species as herbal remedies for HIV/AIDS by Bapedi traditional healers might have an element of scientific validity. However, there is a need to scientifically rationalize the efficacy of these species against HIV/AIDS.

The ethno-medicinal uses of some species by Bapedi traditional healers are consistent with data reported previously and some have been culturally-validated. For instance, VhaVenda traditional healers also use *Peltophorum africanum* (Theo et al., 2009) and *Elaeodendron transvaalense* (Bessong et al., 2006) to treat HIV/AIDS. It is interesting to note that oxidized gallotannin from the stem-bark of *P. africanum* demonstrated a strong activity against HIV-1 reverse transcriptase and integrase in an enzyme cell-free system (Bessong et al., 2005; Theo et al., 2009). This suggests that an extract from this species could be used as a potential therapeutic for HIV-1 infection. Both Bapedi (this study) and Ethiopian healers (Asres et al., 2001) use *Dodonaea viscosa* to treat HIV/AIDS. The chemical profile of this species has not been tested against known HIV/AIDS ailments, as such,

its action in the treatment of disorders commonly experienced by HIV/AIDS patients is unknown.

Another species used by Bapedi traditional healers is *H. hemerocallidea*, commonly known as the “wonder herb”. The use of its  $\beta$ -sitosterol and  $\beta$ -sitosterol glycoside resulted in a significant decrease in plasma viral loads and stabilized CD4 cell counts over 40 months in HIV positive patients (Bouc et al., 1996). This finding supports its use by both Bapedi and Zulu (Puranwasi, 2006) traditional healers to treat HIV/AIDS.

### Knowledge of HIV/AIDS

Majority (88.2%) of the traditional healers in this study were in agreement that unprotected sexual intercourse with an infected person or the partner of a person who died of HIV/AIDS would increase the likelihood of being infected. Other (8.8%) healers mentioned that unprotected sex with many partners lead to HIV/AIDS, while 2.9% claimed that exposure to contaminated blood (cultural notions of sickness which require the performance of a cleansing ceremony for healing) lead to infection. These findings are an indication that majority of Bapedi healers have a generally sound knowledge of HIV/AIDS transmission. It is not surprising that unprotected sexual intercourse, either with an infected person or with multiple partners, was mentioned by a large number of interviewees as many initiatives in the media promote the use of condoms to counter promiscuous sexual acts.

### Diagnoses

Bapedi traditional healers diagnose HIV/AIDS according to symptomatic presentation (Table 2). Weight loss, coloured (green) ligaments, feeling of dizziness on hot days and prolonged flu-like symptoms were the most commonly cited diagnostic criteria. These symptomatic presentations were taken on an individual basis and not in combinations. Thus, if you lost weight, it could be diagnosed as HIV/AIDS. These symptoms are also commonly used as diagnostic criteria for HIV/AIDS patients by traditional healers of other ethnic groups in South Africa (Walwyn and Maitshotlo, 2010) and Tanzania (Kayombo et al., 2007). The consistent use of weight loss (wasting syndrome), as a diagnostic criteria by Bapedi traditional healers, is disappointing. This disappointment stems from the fact that firstly many HIV/AIDS symptoms exist, as such, it is difficult to understand why healers would base the diagnosis on a single symptom, and secondly, the fact that weight loss can result from any number of conditions, but not limited to HIV/AIDS. It seems reasonable to state that the coloured ligaments and dizziness does not make sense, and that the prolonged flu-like symptoms can at least

**Table 2.** Diagnosis methods of HIV/AIDS mentioned by traditional healers.

Symptoms and signs	No. of traditional healers*
Weight loss	34
Coloured (green) ligaments	21
Feeling of dizziness on hot days	11
Prolonged flu-like symptoms	9

\*Note that this is not a frequency table, as some traditional healers indicated more than one diagnostic criterion and ultimately the species than harvesting their roots or even the entire plant.

partially be accepted as part of the diagnostic criteria.

### Plant part used

Root (66.6%) was the most used plant organ by Bapedi healers in preparing herbal remedies for HIV/AIDS (Table 3). This was followed by using the entire plant (12.8%), tuber and stem bark (7.6% each), bulb and twig (2.5% each). The widespread use of root to prepare medicine is based on the perception that it contains more healing power than other plant parts. This follows the scientific reasoning that roots generally contain high concentrations of bioactive compounds (Moore, 1994). The use of small herbaceous plants, which inevitably include their levels, is in line with the findings of Kisangau et al. (2007) and Chinsebu and Hedimbi (2010); they noted the dominance of leaves in the preparations of medicine for HIV/AIDS opportunistic infections. Sheat and Schofield (1995) noted that the leaves are known to be primary producer of nutrients. However, the extensive use of roots and whole plant by Bapedi traditional healers need urgent attention as these destructive harvesting methods might threaten the survival of important species. These healers should be encouraged to pick leaves for medicine as it has less of a detrimental effect on the survival of an individual plant.

### Preparation of remedy

Twelve (60%) multi extract and eight (40%) single extract preparations were recorded in this study (Table 3). From the 26 species, 19 (73%) were used exclusively for multi extracts. These species include: *Aloe falcata*, *B. albitrunca*, *B. africana*, *C. verum*, *C. lanatus*, *D. viscosa*, *D. elata*, *E. transvaalense*, *E. elephantina*, *E. crispa*, *G. aspera*, *M. flabellifolius*, *P. africanum*, *Plectranthus ciliatus*, *S. viminalis*, *S. birrea*, *Triumffeta* species, *Z. humile* and *Z. capense*. Amongst these species, *E. elephantina*, *E. maleolens* and *P. africanum* were more often used as part of a multi extract preparation. The dominance of multi-extract preparations came as no surprising as traditional healers are still experimenting with combinations that might increase the efficacy of their

remedies. The use of multi extract preparations is not unique to the Bapedi as Noumi and Manga (2011) also noted the use of multi extracts to treat HIV/AIDS opportunistic infections by Mezam healers in Cameroon. Both Bapedi and Mezam healers claim that combining different species reinforce the effectiveness of their medicine.

Five species (19.2%); *A. arborescens*, *Callilepis salicifolia*, *Dolichos falciformis*, *Pelargonium* species and *S. hyacinthoides* were only used in single extract preparations by Bapedi healers. According to Saikia et al. (2006), a remedy that involves the use of a single species, would be of great interest for the development of novel drugs, as the exploration of therapeutic activity-bearing ingredients from a single species may be easier.

### Administration and dosage

Except the remedies prepared from *D. falciformis*, which were administered anally (via a rectal bulb syringe), all preparations were prescribed orally with a tin cup (300 ml) or a bowl (Table 3). The preferred vehicle for administration of pounded/powdered oral medicine was either warm water or soft porridge. Same medicinal remedies were taken until a patient report a positive feedback. The disappearance or the improvement of symptoms was perceived as independent indicators of a successful treatment of HIV/AIDS.

### Side effects

Sixty percent of the traditional healers in this study claimed that their prescriptions are side effect free. This was based on the fact that none of their patients reported side effects post treatment. However, this will remain a challenge as alternative medicine is mostly based on historical or cultural traditions, rather than on scientific evidence. Only 40% of the traditional healers in this study indicated that some of the preparation has side effects. These included dysentery, vomiting and an upset stomach. Indeed Van Wyk et al. (1997) noted that side effects of remedies are known by experienced traditional healers. In the Kilombero- and Ulanga districts of

**Table 3.** Plants that are used by Bapedi traditional healers to treat and manage HIV/AIDS infection in the Limpopo province, South Africa.

Scientific name	Parts used	Preparation, dosage and administration of remedy
<i>A. aborescens</i> Mill.	Root	Boiled for 20 min and one tin cup of extract is taken orally, thrice daily
<i>B. albitrunca</i> (Burch.) Gilg & Gilg-Ben.	Root	Mixed with <i>E. elephantina</i> (root), <i>P. ciliatus</i> E.Mey. (root), <i>P. africanum</i> (root) and boiled for 20 min. One tin cup of the extract is taken orally, thrice daily
<i>C. salicifolia</i> Oliv.	Tuber	Boiled for 5-20 minutes and one tin cup of extract is taken orally, thrice daily
<i>C. verum</i> J. Presl	Root	Mixed with <i>B. africana</i> Hook. (root), <i>H. hemerocallidea</i> (tuber), <i>G. aspera</i> Harv. (entire plant) and boiled for 5 min. One tin cup of the extract is taken orally, thrice daily
<i>D. viscosa</i> var. <i>angustifolia</i>	Root	Mixed with <i>C. lanatus</i> (Thunb.) Matsum. & Nakai. (root), <i>E. crispa</i> (root) and boiled for 20 min. One cup of the extract is taken orally, thrice daily
<i>D. falciformis</i> E. Mey.	Root	Macerated in warm water for 24 h and one tin cup of warm decoction is administered by healer anally via bulb syringe. Twice a week
<i>E. elephantina</i> (Burch.) Skeels	Root	Mixed with <i>P. africanum</i> (bark) and boiled for 20 min and one tin cup of extract is taken orally, thrice daily
<i>E. crispa</i> (Thunb.) Gürke subsp. <i>crispa</i>	Root	Mixed with <i>A. falcata</i> Baker. (root) and boiled for 20 min. One tin cup of the extract is taken orally, thrice a day
<i>E. maleolens</i> E. Phillips	Entire plant	Mixed with <i>Triumfetta</i> spp. (root), <i>Z. humile</i> (root); pounded and 5 teaspoons taken orally with a bowl of soft porridge, thrice a day
		boiled for 20 min and one tin cup of the extract is taken orally, thrice a day
		Mixed with <i>M. flabellifolius</i> Welw. (entire plant); pounded and 5 teaspoons taken orally with a bowl of soft porridge, thrice daily
<i>H. hemerocallidea</i> (Fisch.) Mey. & Avé-Lall	Tuber	Mixed with <i>Triumfetta</i> spp. (root) and <i>Z. humile</i> (root); pounded and 5 teaspoons taken orally with a bowl of soft porridge, thrice daily
<i>H. hemerocallidea</i> (Fisch.) Mey. & Avé-Lall	Tuber	Pounded and 5 teaspoons taken orally with warm water (one tin cup), thrice daily
<i>Pelargonium</i> spp.	Root	Boiled for 20 min and an undisclosed volume is taken orally, thrice daily
<i>P. africanum</i> Sond.	Bark	Mixed with <i>E. elephantina</i> (root) and boiled for 20 min. One tin cup of the extract is taken orally, thrice daily
<i>S. hyacinthoides</i> (L.) Druce	Root	Boiled for 20 min and one tin cup of the extract is taken orally, thrice daily
<i>S. birrea</i> sub sp. <i>birrea</i>	Bark	Mixed with <i>D. elata</i> Jacq. (bulb), <i>E. elephantina</i> (root), <i>E. transvaalense</i> (Burt Davy) R.H. Archer. (root), <i>Z. capense</i> Harv. (root) and <i>S. viminalis</i> Wall. ex Decne. (twigs) and boiled for 10 min. One tin cup of the extract is taken orally, thrice a day
<i>Triumfetta</i> spp.	Root	Mixed with equal parts of <i>E. maleolens</i> (entire plant), and <i>Z. humile</i> (root) and pounded; 5 teaspoons taken orally with a bowl of soft porridge, three times a day
<i>Z. humile</i> (E.A.Bruce) P.G. Waterman	Root	Mixed with <i>E. maleolens</i> (entire plant), <i>Triumfetta</i> spp. (root), <i>Z. humile</i> (root) and pounded; 5 teaspoons is taken orally with a tin cup of warm water, three times a day.

\*Note that the 26 recorded species in this study include those (10 species) used in combination (under third column).

Tanzania, Gessler et al. (1995) found out that of 25 questioned traditional healers, only two were aware of the side effects resulting from their remedies. According to majority of these healers, side effects normally are consequence of over dosage.

## Conclusion

Traditional healers' knowledge can lead to useful medicinal plants used to manage and treat HIV/AIDS. Further research is also needed to isolate the plants' active chemical compounds, in order to understand their modes of action. However, there is an urgent need to document medicinal plant species that are used traditionally to treat HIV/AIDS in the Limpopo Province by other cultures. This is because a selected number of species are becoming rare in the wild, thereby threatening the possibility of discovering their potential against HIV/AIDS.

## ACKNOWLEDGEMENTS

The authors are grateful to the traditional healers in the surveyed districts for sharing their knowledge on herbal medicine.

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