

## Medicinal plants and traditional practices in peri-urban domestic gardens of the Limpopo province, South Africa

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Despite the increasing acceptance of traditional medicines in peri-urban areas in South Africa, this rich indigenous knowledge is not adequately documented. Therefore, an ethnobotanical study was undertaken to document medicinal plants grown and maintained in peri-urban domestic gardens in the Capricorn District, Limpopo Province. Semi-structured interviews, observation and guided walks with 62 participants were employed to obtain ethnobotanical data on medicinal plants grown and maintained in peri-urban domestic gardens. Data collected included the names of plant species growing and maintained in domestic gardens as medicines, plant parts used, methods of herbal preparation and administration. A total of 37 species belonging to 34 genera and 27 families were recorded. *Carica papaya*, *Catharanthus roseus*, *Cotyledon orbiculata*, *Crassula capitella*, *Erythrina lysistemon*, *Pelargonium peltatum*, *Pelargonium zonale*, *Sansevieria hyacinthoides*, *Schinus terebinthifolius* and *Sclerocarya birrea* had the highest values of Relative Frequency of Citation (RFC) and widely grown and managed by the inhabitants of the Limpopo Province. Cold, cough, sore throat, gastrointestinal disorders, fever, headache, injuries, circulatory system problems and sexually transmitted infections were treated with at least five species each. This study established that traditional medicines still play an important role in meeting basic health care needs of the local communities in the Limpopo Province.

**Keywords:** Limpopo Province, South Africa, Traditional medicines, Peri-urban domestic gardens

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Traditional medicines are an important source of drugs in developing countries, although there is an increasing adoption of the Western pharmaceutical drugs in the whole world. World Health Organization estimates that between 70-80% of the population in developing countries still depend on local medicinal plants to fulfil their primary healthcare needs and also for income generation and livelihood improvement<sup>1</sup>. In certain African countries, up to 90% of the population still relies exclusively on plants as sources of medicines<sup>2</sup>. Research by Konno<sup>3</sup> for example, showed that easy accessibility, efficacy of treatment and affordable cost in getting primary healthcare service are the main reasons local people in Ethiopia prefer traditional medicines to modern medication. In some other countries, hospital infrastructure is poor, hospitals lack proper equipment and facilities, drugs are expensive and often unavailable; and

modern facilities often inaccessible to many people living away from urban centers. As a result of this, many people will continue to use traditional medicines. Although the majority of these traditional medicinal plants are gathered from the wild, a sizeable proportion is harvested from home gardens<sup>4</sup>.

Fernandes & Nair<sup>5</sup> defined a home garden as an intensively worked land-use system involving deliberate management of multipurpose plants in association with agricultural crops and invariably livestock, within the compounds of individual households. For the purpose of this study, a home garden is defined as an area adjacent to a household dwelling, where the household has control over the area characterized by a diversity of organisms, hereafter referred to as the domestic garden. Relatively little has been researched or published on the importance of peri-urban domestic gardens in South Africa. The peri-urban areas are formerly

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“rural” localities that are now due to the rapid expansion of South Africa’s metros and major towns lie outside the urban edge<sup>6</sup>. The wealth gap between rich and poor in South Africa is most visible on the urban outskirts. Apartheid spatial planning policies was racially-based and segregated black populations in areas some distance from urban cores, while whites resided in suburbs typical of any city in the first world<sup>7</sup>. As a result of this racially-based ideology, South Africa’s urban peripheries are usually occupied by the poor<sup>6</sup>. Most informal settlements evolve on the urban edge and low cost, subsidised housing developments to improve the lives of the poor tend to be located in the same areas<sup>8</sup>. The same author found that the peri-urban poor lead multifaceted livelihoods characterized by small scale farming which contributes to household’s income and nutritional needs. This study was therefore, undertaken within the wider problem of trying to understand how traditional knowledge on medicinal plants in peri-urban domestic gardens is preserved in the Limpopo Province, South Africa. In order to achieve this objective, an ethnobotanical survey was undertaken to document medicinal plants intentionally planted and/or retained and managed in peri-urban domestic gardens in the Capricorn District, Limpopo Province, South Africa.

## Methodology

### Study area

The study was conducted in Seshego (23°15'S29°23'E) and Lebowaikgomo (24°31'S29°57'E) (Fig. 1), two peri-urban areas in the Capricorn District, Limpopo Province, South Africa. Polokwane municipality is located at the centre of the Limpopo Province and it is situated at the core of the province’s economic development. Situated on the outskirts of Polokwane municipality are Seshego and Lebowaikgomo, which are less formal settlements experiencing enormous influx of people from rural to urban migration trends. Seshego is located 13 km North of Polokwane and the township was planned as a dormitory town for workers in Polokwane city<sup>9</sup>. Lebowaikgomo is located 55 km South of Polokwane. The studied areas are semi-arid, susceptible to frequent droughts and characterized by summer rainfall. Mean annual rainfall ranges from 300 to 500 mm<sup>10</sup>. Daily temperatures vary from mid-20°C to mid-30°C, with an average range of between 17°C

and 27°C in summer and 4°C to 20°C in winter<sup>11</sup>. According to the vegetation classification of Mucina and Rutherford<sup>12</sup>, the study areas have a semi-arid savanna, characterized by a mixture of trees, shrubs and grasses. Dominant tree species include *Acacia* spp., *Albizia* spp., *Combretum* spp. and *Sclerocarya birrea*, with patches of *Hyparrhenia* spp., *Eragrostis* spp., *Heteropogon* spp. and *Digitaria* spp. grasses.

### Data collection

Data on medicinal plants grown and maintained in domestic gardens of Seshego and Lebowaikgomo were collected by means of semi-structured and structured interviews and personal observation. Thirty one randomly selected individuals from each study area were interviewed between May and October 2012 (Table 1). Verbal informal consent was obtained from each individual who participated in the study, and the researchers adhered to the ethical guidelines of the International Society of Ethnobiology ([www.ethnobiology.net](http://www.ethnobiology.net)). The questionnaire used during interviews was designed to gather data on medicinal plants grown and maintained in domestic gardens, diseases treated, plant parts used and herbal preparation and administration. The voucher specimens were processed using standard taxonomic procedures<sup>13,14</sup>. Each herbarium specimen included important parts such as leaves, stems, flowers and fruits whenever available. For small herbaceous plants, the whole plants were collected. These specimens were deposited for future reference at the Larry Leach Herbarium (UNIN) of the University of Limpopo. The International Plant Name Index ([www.ipni.org](http://www.ipni.org)) and the Royal Botanic Garden and Missouri Botanic Garden plant name database ([www.theplantlist.org](http://www.theplantlist.org)) were used to validate plant scientific names, plant families and plant authorities.

Furthermore, we determined the Relative Frequency of Citation (RFC) of reported medicinal plant species using the following formular:

$$RFC = FC/N; (0 < RFC < 1)$$

This index shows the local importance of each medicinal plant species and is given by the frequency of citation (FC, the number of informants mentioning the use of the medicinal plant species) divided by the total number of informants participating in the survey (N)<sup>15</sup>.

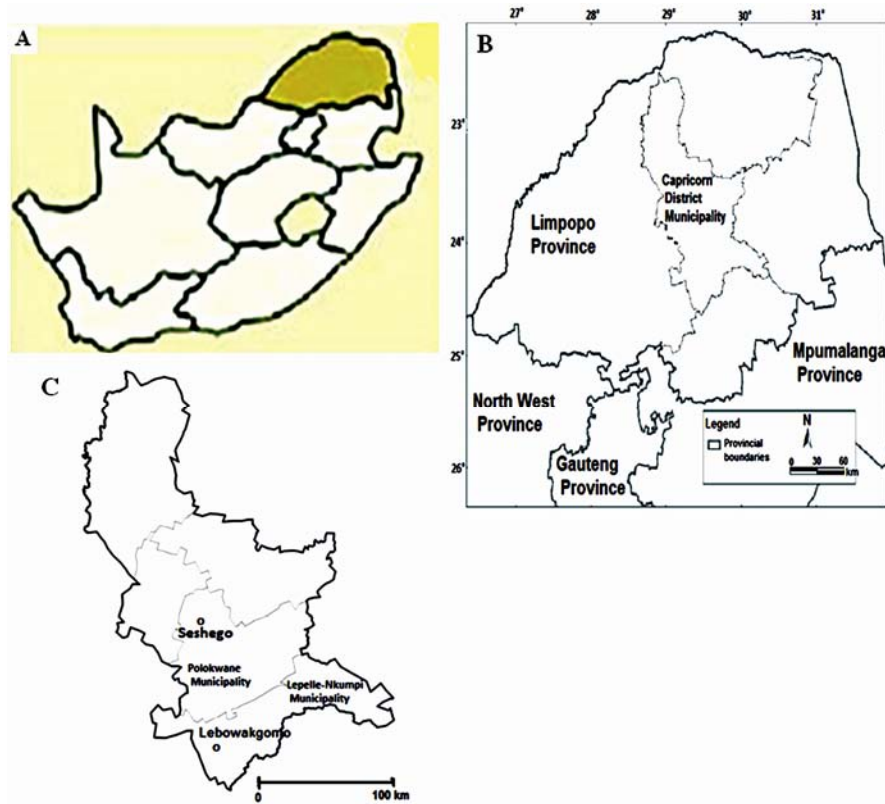


Fig. 1—A: Geographical location of the study area in South Africa. B: Map of Limpopo Province, showing the geographical position of Capricorn District. C: Detailed map of the study area

**Results**

**Medicinal plant diversity**

A total of 37 species belonging to 34 genera and 27 families were recorded from 62 domestic gardens in Lebowakgomo and Seshego in the Limpopo Province (Table 2). More than half of the species (57.9%) grown and maintained in domestic gardens are indigenous to South Africa (Table 2). About 40% of the species found in the surveyed peri-urban domestic gardens are exotic to South Africa, among them were: *Agave americana*, *Aloe vera*, *Artemisia vulgaris*, *Cannabis sativa*, *Carica papaya*, *Catharanthus roseus*, *Coriandrum sativum*, *Echinopsis spachiana*, *Lavandula angustifolia*, *Moringa oleifera*, *Ocimum basilicum*, *Rosmarinus officinalis*, *Ruta graveolens*, *Schinus terebinthifolius*, *Symphytum officinale* and *Tagetes erecta* (Table 2).

A large number of medicinal plants in peri-urban domestic gardens (43.2%) are from 6 families (Table 3). The other 20 families were represented by 1 species each. Plant families with the highest

Table 1—Age and sex characteristics of participants interviewed in the peri-urban domestic gardens of the Limpopo Province, South Africa

	Age (yrs)						Total	%
	<20	20-29	30-39	40-49	50-59	>60		
Female	1	8	6	11	8	9	43	69.4
Male	0	3	4	6	3	3	19	30.6

number of medicinal plants were: Asteraceae and Lamiaceae (4 species each), Anacardiaceae, Crassulaceae, Geraniaceae and Hypoxidaceae (2 species each). Plant species with the highest values of Relative Frequency of Citation (RFC) included (Table 3): *Carica papaya*, *Catharanthus roseus*, *Cotyledon orbiculata*, *Crassula capitella*, *Erythrina lysistemon*, *Pelargonium peltatum*, *Pelargonium zonale*, *Sansevieria hyacinthoides*, *Schinus terebinthifolius* and *Sclerocarya birrea*. All these species were also grown and maintained as ornamentals, except *Carica papaya* and *Sclerocarya birrea* cultivated and maintained as fruit trees (Table 2).

Table 2—Medicinal plants grown and maintained in peri-urban domestic gardens in the Limpopo Province.  
Species marked with asterisk (\*) are exotic

Family and species name	Life form	Part(s) used	Use category	RFC <sup>#</sup>
Agapanthaceae				
<i>Agapanthus africanus</i> (L.) Hoffmanns	Herb	Root/leaf	Headache and induce labour: infusion taken orally	0.23
Agavaceae				
* <i>Agave americana</i> L.	Shrub	Leaf sap	Wounds: washed with sap	0.07
Alliaceae				
<i>Tulbaghia violacea</i> Harv.	Herb	Bulb/flower/leaf	Cough and colds: bulb decoction taken orally. Snake repellent: leaf and flower pieces left around homestead	0.05
Amaryllidaceae				
<i>Ammocharis coranica</i> (Ker Gawl.) Herb.	Herb	Bulb	Mental illness: decoction taken orally	0.15
Anacardiaceae				
* <i>Schinus terebinthifolius</i> Raddi	Tree	Leaf	Cough, colds and hypertension: decoction taken orally	0.5
<i>Sclerocarya birrea</i> (A. Rich.) Hochst.	Tree	Bark	Diarrhea and haemorrhoids: decoction taken orally	0.57
Apiaceae				
* <i>Coriandrum sativum</i> L.	Herb	Leaf	Stimulant: decoction taken orally	0.02
Apocynaceae				
* <i>Catharanthus roseus</i> (L.) G. Don.	Shrub	Root	Digestive problems and STI: decoction taken orally	0.65
Asteraceae				
<i>Artemisia afra</i> Jacq. ex Willd.	Herb	Whole plant	Cough, colds, fever, headache and diarrhea: decoction taken orally	0.08
* <i>Artemisia vulgaris</i> L.	Herb	Whole plant	Cough, colds, fever and headache: decoction taken orally	0.11
<i>Kleinia longiflora</i> DC.	Shrub	Root	STI: decoction taken orally	0.08
* <i>Tagetes erecta</i> L.	Shrub	Whole plant	Diarrhea: decoction taken orally	0.03
Boraginaceae				
* <i>Symphytum officinale</i> L.	Herb	Leaf/root	Burns and wounds: root powder mixed with Vaseline applied on burns and wounds. Stomachache: decoction taken orally	0.02
Cactaceae				
* <i>Echinopsis spachiana</i> (Lem.) Friedrich & G.D. Rowley	Shrub	Root	Diarrhea: decoction taken orally	0.03
Cannabaceae				
* <i>Cannabis sativa</i> L.	Herb	Leaf/twig	Cough, colds and fever: smoked as cigarette	0.07
Caricaceae				
* <i>Carica papaya</i> L.	Shrub	Root	STI: decoction taken orally	0.69
Crassulaceae				
<i>Cotyledon orbiculata</i> L.	Shrub	Leaf sap	Skin rash: leaf sap applied on affected body parts	0.48
<i>Crassula capitella</i> Thunb.	Shrub	Root	Wounds: root powder applied on wounds	0.40
Dracaenaceae				
<i>Sansevieria hyacinthoides</i> (L.) Druce	Shrub	Leaf/root	Burns and wounds: Leaf/root powder applied on burns and wounds. Diarrhea: infusion taken orally	0.45
Geraniaceae				
<i>Pelargonium peltatum</i> (L.) L'Hér	Shrub	Leaf	Cold, cough and sore throat: decoction taken orally	0.31
<i>Pelargonium zonale</i> (L.) L'Hér	Shrub	Leaf	Diarrhea, respiratory ailments and stomachache: decoction taken orally	0.40
Hyacinthaceae				
<i>Drimia elata</i> Jacq. ex Willd.	Herb	Bulb	Female infertility: decoction taken orally	0.05
Hypoxidaceae				
<i>Hypoxis hemerocallidea</i> Fisch., C.A. Mey. & Avé-Lall	Herb	Bulb	Cleansing blood and immune system booster: decoction taken orally	0.05
<i>Hypoxis obtusa</i> Burch. ex Ker Gawl.	Herb	Bulb	Cold and cough, pneumonia and STI: decoction taken orally	0.02
Kirkiaceae				
<i>Kirkia wilmsii</i> Engl.	Tree	Bark/leaf	Malaria: decoction taken orally	0.02
Lamiaceae				
* <i>Lavandula angustifolia</i> Mill.	Shrub	Leaf/twig	Headache: decoction taken orally	0.10

Contd.

Table 2—Medicinal plants grown and maintained in peri-urban domestic gardens in the Limpopo Province.  
Species marked with asterisk (\*) are exotic (Contd.)

Family and species name	Life form	Part(s) used	Use category	RFC <sup>#</sup>
<i>Mentha longifolia</i> L.	Herb	Leaf	Fever, headache, indigestion and menstrual pains: infusion taken orally	0.03
* <i>Ocimum basilicum</i> L.	Herb	Leaf	Cold, cough, diarrhea and headache: infusion taken orally	0.02
* <i>Rosmarinus officinalis</i> L.	Herb	Leaf/twig	Arthritis, diarrhea and gout: decoction taken orally	0.03
Mesembryanthemaceae				
<i>Carpobrotus edulis</i> (L.) L. Bolus	Herb	Leaf	Diarrhea, oral thrush and tuberculosis: decoction taken orally. Wounds: leaf powder applied on wounds	0.29
Moringaceae				
* <i>Moringa oleifera</i> Lam.	Tree	Leaf	Diarrhea and immune system booster: decoction taken orally	0.11
Myrothamnaceae				
<i>Myrothamnus flabellifolius</i> Welw.	Shrub	Whole plant	Asthma, backache, cold and cough: decoction taken orally	0.07
Papilionaceae				
<i>Erythrina lysistemon</i> Hutch.	Tree	Bark	Enlargement of birth canal: vagina washed with bark powder	0.32
Polygalaceae				
<i>Securidaca longepedunculata</i> Fresen	Tree	Leaf	Aphrodisiac, male infertility and STI: infusion taken orally	0.26
Rutaceae				
* <i>Ruta graveolens</i> L.	Herb	Leaf	Cough, colds, headache and stomachache: decoction taken orally	0.02
Verbenaceae				
<i>Lippia javanica</i> (Burm. f.) Spreng	Shrub	Leaf/twig	Asthma, cold, cough, fever: decoction taken orally	0.10
Xanthorrhoeaceae				
* <i>Aloe vera</i> (L.) Burm. f.	Herb	Leaf	Arthritis, cough, cold, earache, fever intestinal worms and stomachache: maceration taken orally	0.29

<sup>#</sup> = RFC (Relative Frequency of Citation)

### Plant parts used and diseases treated

Herbs were the main growth forms of medicinal plants grown and maintained in peri-urban domestic gardens in the Limpopo Province (46%), followed by shrubs (38%) and trees (16%) (Fig. 2 A). The plant parts used for making herbal preparations were leaves (54.1%), root (21.6%), bulb (13.5%), twigs (10.8%), bark and whole plant (8.1% each), leaf sap (5.4%) and flowers (2.7%) (Fig. 2 B). The use of whole plant as herbal remedy was administered for herbaceous plants and small shrubs (Table 2). A total of 15 medical conditions were treated using remedies made from medicinal plants grown and maintained in peri-urban domestic gardens in the Limpopo Province (Fig. 3). Cold, cough, sore throat, gastro-intestinal disorders, fever, headache, injuries, circulatory system problems and sexually transmitted infections were treated with the highest number of medicinal plant species (Fig. 3).

Table 3—Families with the largest number of medicinal plants (with more than 2 species each) in the Limpopo Province peri-urban domestic gardens

Family	No. of species	%
Asteraceae	4	10.8
Lamiaceae	4	10.8
Anacardiaceae	2	5.4
Crassulaceae	2	5.4
Geraniaceae	2	5.4
Hypoxidaceae	2	5.4

### Discussion

Best representation of medicinal plant species from families Asteraceae and Lamiaceae families could be related to their wider distribution and use in South Africa<sup>16-18</sup>. Apart from being a reflection of the worldwide high number of species found in these families, this is also a reflection of the medicinal properties in the families<sup>19,20</sup>. This study

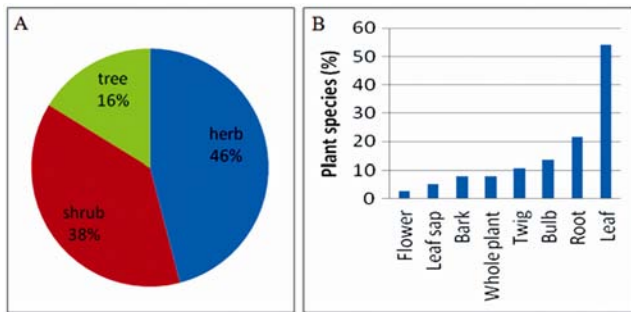


Fig. 2—Characteristics of medicinal plants grown and maintained in peri-urban domestic gardens of the Limpopo Province. (A) Growth form habit represented in pie diagram and (B) plant parts used represented in bar chart

also noted that *Carica papaya*, *Catharanthus roseus*, *Cotyledon orbiculata*, *Crassula capitella*, *Erythrina lysistemon*, *Pelargonium peltatum*, *Pelargonium zonale*, *Sansevieria hyacinthoides*, *Schinus terebinthifolius* and *Sclerocarya birrea* were rated as the most important medicinal plants in peri-urban domestic gardens in the Limpopo Province (Table 2). All these species have been documented as valuable medicinal plants in most provinces of South Africa with at least three medicinal applications each<sup>16,18</sup>.

About 10% (3 species) of the total medicinal plant species recorded in this study are declared weeds and invaders in South Africa, listed under the Conservation of Agricultural Resources Act (1983) No. 43 of 1983<sup>21</sup>. Among these were: *Agave americana*, *Catharanthus roseus* and *Schinus terebinthifolius*. These species pose an immediate and significant threat by virtue of their aggressive qualities and having the capacity to invade natural habitats and overwhelm some of the indigenous species<sup>21</sup>. Due to the ecological effect invasive species have on the environment with regard to their serious health risk to humans or livestock, causing serious financial losses to land users, their ability to invade undisturbed environments and transform or degrade natural plant communities, use more water than the plant communities they replace or be particularly difficult to control, Regulation 15, Act No. 43 of 1983 was enacted<sup>21</sup>. Previous studies<sup>22-28</sup> showed that invasive plants may also have positive economical, social and ecological significance and these need to be taken into account when assessing the costs resulting from invasions.

The role of cultivated and exotic plants in domestic gardens have been discussed by many authors who have interpreted their diversity of uses in some

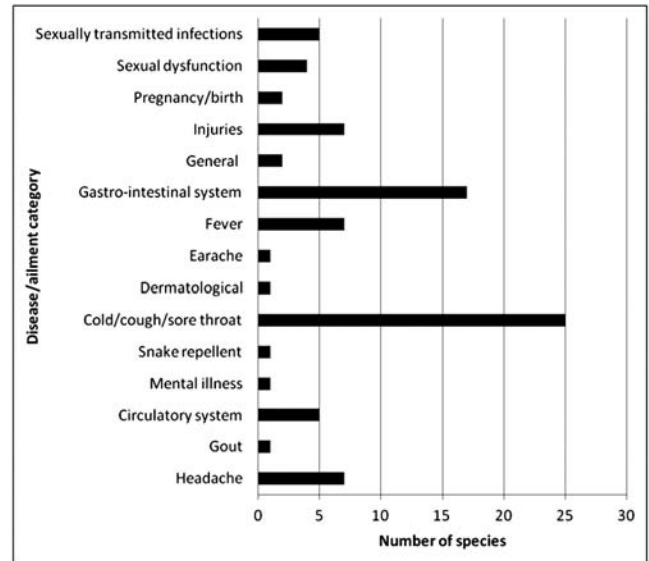


Fig. 3—Major ailments and disease categories. Most species were reported in more than one ailment and disease category

cultures as a sign of acculturation<sup>29,30</sup>. While other workers have pointed out that domestic garden plants, particularly weeds and invasive plants have played important roles in traditional pharmacopoeia throughout the world<sup>31</sup> and also South Africa<sup>26</sup>. Some of the plants discussed in this study have been used for centuries as traditional medicines and the knowledge accumulated in their utilization over generations will assist in identification and isolation of active principles in medicinal preparations. Therefore, it is necessary to assess these plants for phytochemical analyses and ethnopharmacological screenings so as to validate their efficacy as herbal medicines.

The documented medicinal plants in this study were used for a number of diseases, ranging from simple headache or stomachache to complicated conditions like mental illness and sexual dysfunction (Table 2). Cold, cough and sore throat were treated with the highest number of species (Fig. 3), followed by gastro-intestinal disorders, particularly diarrhea. These results correlate strongly with the findings of Maroyi<sup>32</sup>, who found gastro-intestinal disorders, sexually transmitted infections, cold, cough and sore throat and gynaecological problems treated with the highest number of medicinal plants in south-central Zimbabwe. Gastro-intestinal disorders, particularly cholera, diarrhea and dysentery are a major concern not only in South Africa<sup>33-37</sup>, but southern Africa in general where a dysentery and cholera usually result in high mortality rates if not treated promptly<sup>32,38</sup>.

The continued use of garden plants in traditional medicine is probably due to the fact that they are within easy reach of the community and as such they remain the best alternative to cope with primary healthcare needs of the community. The results documented in this study contribute to a growing body of literature that expands our understanding of traditional knowledge on medicinal plants grown and maintained in peri-urban domestic gardens. Documentation of medicinal plant diversity and understanding of traditional knowledge and practices in peri-urban domestic gardens is crucial to design and implementation of policies on planting and management of the relevant municipal and government agencies. Although it is difficult for public authorities to influence the management of peri-urban gardens but local authorities can educate communities on the services and goods that can be derived from plant species grown and maintained in domestic gardens.

The importance of medicinal plants for primary healthcare resulted in the management and tolerance as well as cultivation of key medicinal plants in domestic gardens in the Limpopo Province, South Africa. Cultivation and management of medicinal plants in domestic gardens have conservation impacts as this usually result in reduced demand for medicinal plants harvested from the wild. This small scale cultivation of medicinal plants documented in this study does not require large capital investment, and therefore, the poorest members of the community can participate in this initiative. The short to medium term benefits of such initiatives include the use of medicinal plants in domestic gardens to meet livelihood and healthcare needs of the local people. The long-term effects include the provision of goods and services, i.e. the benefits that humans obtain from natural or semi-natural ecosystems<sup>39</sup>. These include provisioning services such as medicines and food; regulating services; cultural services and support services such as nutrient cycling<sup>39</sup>.

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