



Plants used for treating respiratory infections in rural Maputaland, KwaZulu-Natal, South Africa

T. York^a, H. de Wet^{a,*}, S.F. van Vuuren^b

^a Department of Botany, University of Zululand, Private Bag 1001, KwaDlangezwa 3886, South Africa

^b Department of Pharmacy and Pharmacology, Faculty of Health Sciences, University of Witwatersrand, 7 York Road, Parktown, 2193, South Africa

ARTICLE INFO

Article history:

Received 31 December 2010

Received in revised form 28 March 2011

Accepted 31 March 2011

Available online 8 April 2011

Keywords:

Ethnobotany
Maputaland
Respiratory infections
South Africa

ABSTRACT

Ethnopharmacological relevance: Traditional remedies are frequently used in treating various respiratory ailments, and are very important in the primary health care of the people living in rural Maputaland, KwaZulu-Natal, South Africa. Novel information gathered from surveys like the present study is important in preserving indigenous knowledge.

Aim of the study: To explore the knowledge that the lay people of a rural community in northern Maputaland have about medicinal plants used in the vicinity to treat respiratory infections.

Materials and methods: Interviews were conducted among 80 homestead inhabitants, using structured questionnaires where convenience sampling was used. The focus was on plants used in treating respiratory infections. Some of the main topics discussed during the interviews were vernacular plant names, plant parts used, harvested amounts, preparation methods, dosage forms and quantities, use of plants in combination as well as the related symptomatic relief associated with respiratory infections.

Results: The study documented 30 plant species (18 families) which are used to treat respiratory infections by the rural people in the study area. Decoctions made with these plants are mostly taken orally, combined with the use of steaming. To the best of our knowledge, *Acanthospermum glabratum*, *Aloe marlothii*, *Krauseola mosambicina*, *Ozoroa obovata*, *Parinari capensis* and *Plectranthus neochilus* are recorded for the first time globally as medicinal plants used for treating respiratory infections and related symptoms. The indigenous aromatic shrub, *Lippia javanica* was by far the most frequently used plant species, followed by *Eucalyptus grandis* (an exotic), *Tetradenia riparia* and then *Senecio serratulloides*. Twenty-four different plant combinations were used where the most frequently used combination encountered was *Eucalyptus grandis* with *Lippia javanica*.

Conclusion: The large number of different plant species traditionally used against respiratory infections supports previous research on the importance of traditional medicine in the primary health care of this remote area. The finding of new vernacular plant names and plant uses in the current survey shows the importance of the documentation of such ethnobotanical knowledge.

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1. Introduction

In May 2000, the Fifty-Third World Assembly recognized chronic respiratory diseases as a cause of enormous human suffering (WHO, 2005a). Worldwide and specifically in developing countries, infectious diseases are a significant cause of mortality – with acute respiratory infections being the most significant cause of morbidity (Boutayeb, 2006). Due to the high co-occurrence with human immunodeficiency virus (HIV) infections, pneumonia is responsible for a significant amount of adult mortality (Feikin et al., 2004). After

neonatal causes, acute respiratory infections are the largest cause of death worldwide for children under the age of five (WHO, 2005b). In developing countries acute respiratory tract infections kill four million children annually (Shann et al., 1999). Influenza, pneumonia and tuberculosis (TB) are some of the leading causes of death in South Africa (Shann et al., 1999; Statistics South Africa, 2005), while otitis media is one of the most frequently occurring bacterial infections among children (Huebner et al., 2003). Bradshaw et al. (2003) reported that, during the year 2000 in South Africa, 6% of deaths in newborns and children under the age of five were caused by lower respiratory infections such as pneumonia.

Most respiratory illnesses are communicable. Rural Maputaland (KwaZulu-Natal, South Africa) comprise of many small communities living in confined dwellings. These rural communities are at high risk of developing respiratory infections and are of great concern to epidemiologists (Nester et al., 2001). The South African Child

Abbreviations: AIDS, acquired immunodeficiency syndrome; HIV, human immunodeficiency virus; TB, tuberculosis; WHO, World Health Organization.

* Corresponding author. Tel.: +27 035 9026108; fax: +27 035 9026491.

E-mail address: hdewet@pan.uzulu.ac.za (H. de Wet).

Gauge 2009/2010 (Sanders and Bradshaw, 2010) identified exposure to environmental risk factors, such as poorly ventilated and overcrowded living spaces, as risk factor for infectious diseases. This type of lifestyle can be the cause of rapid spread of infections, especially considering that more than 10% of this population shares overcrowded living spaces (Municipal Demarcation Board South Africa, 2001).

Many African communities are still using traditional healing in their primary health care (Louw et al., 2002). These traditional remedies are especially important in the primary health care of people in rural areas (Appidi et al., 2008). In South Africa, traditional healing is widely practiced by approximately 80% of the black population and forms the backbone of rural healthcare (Jäger et al., 1996; Light et al., 2005). Plants used traditionally are not only important for physical well-being, but also for cultural, spiritual and economic benefits (WHO, 2002; Dahlberg and Trygger, 2009). The traditional knowledge systems in Africa are mostly oral, passed to the next generation by word of mouth and personal experience (Louw et al., 2002; Light et al., 2005). According to a recent survey done by Zobolo and Mkabela (2006) the indigenous knowledge of the Zulu tribe is not adequately passed on to the next generation, who seem to disregard this form of health care. Therefore, it is of utmost importance to accurately document such knowledge before it is totally lost to the rest of the world (Hutchings et al., 1996; Van Wyk et al., 2009).

Globally, there have been a number of studies on the traditional use of plants to treat respiratory illnesses. In India, a few such studies have been conducted (Ballabh and Chaurasia, 2007; Gautam et al., 2007; Savithamma et al., 2007). In one such study the use of traditional remedies for colds, cough and fever, by the Buddhists of an Indian tribal community, was investigated. It was found that 56 plant species were used by the local inhabitants of this area (Ballabh and Chaurasia, 2007). In another study the knowledge of traditional healers on plants used to treat asthma were recorded. It was found that nearly 80 plants were used for treating asthma (Savithamma et al., 2007). In Guatemala, 68 of the most commonly used plant species were tested against bacteria that infect the respiratory system (Caceres et al., 1991). In Kenya 67 plant species were found useful in the management of upper respiratory diseases, such as otitis media and tonsillitis. The importance of microbial validation of these and other traditionally used plants were emphasized (Njoroge and Bussmann, 2006). Of the few South African studies

done on plants traditionally used for respiratory infections, the focus has been on species with possible antimycobacterial properties (Lall and Meyer, 1999; Seidel and Taylor, 2004; Bapela et al., 2006; Eldeen and Van Staden, 2007).

The current study is part of a larger project in northern Maputaland, KwaZulu-Natal, South Africa. A number of research projects, forming part of a larger study, are currently underway in the same study area (Fig. 1) and includes both anti-diarrhoeal plants (De Wet et al., 2010), as well as plants used to treat sexually transmitted infections. The current survey focuses specifically on plants used for respiratory infections.

2. Materials and methods

2.1. Study area

Northern Maputaland is an area situated in the province of KwaZulu-Natal, South Africa and has a high concentration of endemism, making it floristically unique (Scott-Shaw, 1999; Van Wyk and Smith, 2001). The homesteads visited during the survey done in northern Maputaland is situated between 32°22' and 32°52' latitudes and 27°15' and 27°30' longitudes (Fig. 1). Within this study area there are a few dominant vegetation types, as discussed by De Wet et al. (2010). The homesteads that were visited are situated in the following regions; Mabibi, Mbazwana, Mseleni and Tshongwe. These regions are all situated in the Umkhanyakude District Municipality at Umhlabuyalingana Local Municipality.

2.2. Ethnobotanical survey

An ethnobotanical study was conducted during February–March 2010 to acquire information on plants that are used to treat respiratory infections. Ethics clearance was obtained from the University of Zululand (Reference number: S548/10) before the onset of the study. The survey was conducted in the four different localities, as indicated in Fig. 1. A total of 80 homesteads were visited, identified by convenience sampling, where people were interviewed using a structured questionnaire. Homesteads across the four areas are very similar according to the Municipal Demarcation Board South Africa (2001) survey in terms of household composition, income levels, access to services and type of housing. Homesteads nearest to the road that lead into an

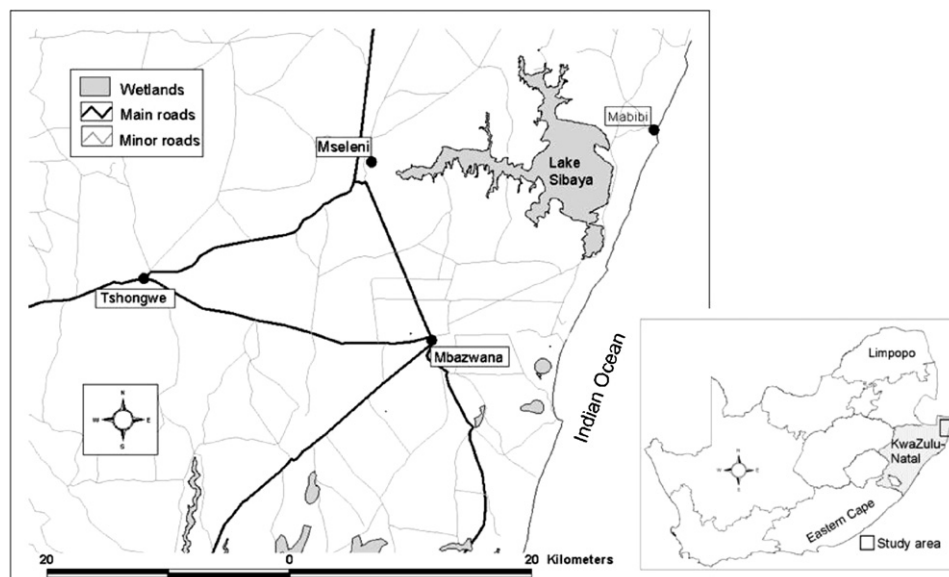


Fig. 1. Study area: northern Maputaland, KwaZulu-Natal province, South Africa.

area (Mabibi, Mbazwana, Mseleni and Tshongwe) were initially approached and thereafter the range extended for approximately 10 km until 20 homesteads from each area were completed. If the homestead inhabitants were unavailable the next nearest homestead was approached for interviewing. The objectives of the study were explained in IsiZulu to each of the interviewees and before conducting the interview, a form of consent was signed. The form of consent stated that the project is for academic purposes only and is of no commercial value. It also informed the interviewee that the results from this study will be presented at conferences and published in academic journals. The interviewee was also assured that he/she was under no obligation to share any information which he/she did not feel comfortable in sharing. Furthermore, the property rights of the community are protected by the Biodiversity Act, Act 10 of 2004 (NEMBA, 2004) and its associated Bioprospecting, Access and Benefit Sharing or BABS Regulations of 2008 (DEAT, 2008). The questionnaire was designed to obtain the following information; locality, sociodemographic data (age, gender and educational background), vernacular plant names, plant parts used, harvested amounts, preparation methods, dosage forms and quantities, use of plants in combination as well as related symptoms. This study focused on the use of plants growing in and around homesteads for treating respiratory infections. The plants mentioned in the interviews were collected from the homesteads at the time of interview and voucher specimens were prepared on site. Voucher specimens are deposited in the herbarium of the Botany Department at the University of Zululand, South Africa. Identity of plant samples was authenticated by Dr. Theo Mostert from the University of Zululand, as well as Mr Mkhiphene Ngwenya from the South African National Biodiversity Institute, KwaZulu-Natal Herbarium.

3. Results

Table 1 gives a list of the plant species used in this study, the frequency of reported plant use in treating respiratory infections, plant parts used, preparation methods, as well as dosages used to treat the various symptoms stated. This study found 30 species in 18 plant families as useful in managing respiratory infections by the rural people in the study area. Due to the fact that some species, namely *Brachylaena* spp. and *Hypoxis* sp., could not be identified to species level (as flowers were not available at the time of collection), there could possibly be more than 30 plant species that forms part of this survey. Included in Table 1 are the reported uses of these plants in the treatment of respiratory infections and related symptoms, as found previously in literature. Although *Acanthospermum glabratum*, *Aloe marlothii*, *Krauseola mosambicina*, *Ozoroa obovata* and *Parinari capensis* have been recorded for their medicinal use, this is the first record of use to treat respiratory infections or related symptoms. No record of any medicinal uses for *Plectranthus neochilus* could be found in the literature. Although the medicinal use of *Parinari capensis* has been recorded (Watt and Breyer-Brandwijk, 1962), *Parinari capensis* subsp. *incohata* is endemic to Maputaland (Van Wyk and Smith, 2001). Ethnobotanical studies in this remote area are uncommon which might explain why there is no information recorded on the medicinal use of this subspecies. The indigenous aromatic shrub, *Lippia javanica* was by far the most frequently used plant species, followed by *Eucalyptus grandis* (an exotic), *Tetradenia riparia* and *Senecio serratuloides* (both indigenous species).

Not only were plants used independently but also in combinations. Twenty-four different plant combinations were used. Table 1 documents these combinations, where plants in combination range from two to four different species. Besides the 24 different plant combinations encountered, there was also a combination in which

the roots and the leaves of the same species (*Lippia javanica*) were mixed. Fifty of the 80 homesteads studied were using plants in different combinations to treat respiratory infections. Combinations of two plants (38 households), three plants (10 households) and four plants (two households) were noted. What is interesting is how frequently *Lippia javanica* and *Eucalyptus grandis* were used in different combinations. In 85% of the time when the use of *Eucalyptus grandis* was mentioned, it was used in combination with *Lippia javanica*.

The plant part predominantly used was the leaves. Other parts used included either bark or their underground parts. Eighty-seven percent of the plant species encountered in the study are indigenous and reports of all underground plants parts were from indigenous species. This is important when looking at the sustainable use of indigenous flora.

The most common way of preparing these herbal medicines is taking a handful of plant material, mixed or alone, adding cold water and bringing the mixture to boil. This decoction is then mostly taken orally while what's left is used for steaming. Steaming had to take place until the decoction cooled down. Children were often not allowed to steam at all, while in some instances steaming was allowed with parental guidance. When a decoction is taken orally, or as an enema, the amount given to small children is usually a little less than half the dosage given to adults. In very few cases there were no differences in dosages given to adults and children. When used as an enema, a decoction was often prepared with warm water. The enema is applied with a bulb style enema syringe. Each syringe has a different number on the bottom of its bulb, ranging from size 1 to size 10. The specific sizes have been measured in volume as accurately as possible. Size one has the volume of approximately 30 mL, while size six is 180 mL and size ten 300 mL. All of the interviewees mentioning the use of such a syringe referred to it as a certain size syringe. There is not much difference between the homesteads in the preparation and method of administration of specific plant combinations. Usually the amount of water added varies a little. For example, in preparing the mixture of *Lippia javanica* and *Eucalyptus grandis*, the method includes mixing a handful of each plant species with water and bringing everything to boil. The amount of water added may vary between 1 L and 5 L (Table 1).

The average age of people being interviewed was 51, with 78% of them being female. Forty-six percent of the interviewees have received no education at all, while only 10% had a senior certificate. The four regions in which our interviews have been conducted are all situated in the Umkhanyakude District Municipality at Umhlabuyalingana Local Municipality. According to the Municipal Demarcation Board South Africa (2001), 31% of the people living in this area have obtained no formal education, while only about 6% have acquired a senior certificate. The majority of the local inhabitants are female (56%). Seventy-two percent of the people living in this area are under the age of 30, while only 8% are over the age of 60. The average highest level of education attained by the interviewees in the current survey was grade four, which is the same average obtained for the people living in this study area (Municipal Demarcation Board South Africa, 2001). Of the people being interviewed, 93% were lay people, while the rest were either a *sangoma* (diviner) or an *inyanga* (herbalist). Recent studies have shown that lay knowledge is central to local health care, and that a proper understanding of this knowledge has rarely been covered in South Africa (Dahlberg and Trygger, 2009). Because of this, the current survey focused on purposely interviewing lay people about their traditional plant knowledge. Six of the 80 interviewees were not lay people, but instead claimed to be a traditional healer. Nearing the end of some interviews it was inadvertently discovered that those people in question were in fact a traditional healer. Because the lay interviewees still formed the greater majority of our study group, we decided to keep these six traditional healers as part of our

Table 1
Medicinal plants used for the treatment of respiratory infections in rural Maputaland.

Botanical name (voucher no.)	Family	Common name	Plant part(s) used	Number of times quoted	Methods of preparation and administration	Other reported uses for respiratory infections or related symptoms
<i>Acanthospermum glabratum</i> (DC.) Wild (TYORK 19)	Asteraceae	Isihlaza ^{a,b} Nkunzana ^b Inkonzana ^b Isibambaphansi ^b Isichathabantwana ^b	Whole plant	7	(a) Crush handful of whole plant ^c and mix with half to one cup of warm water. Sieve and take whole decoction as an enema once a day ^g /take 1 tbsp three times a day orally to treat chills fever, runny nose, chest pain sore throat and/or headaches. Children take only a quarter of a cup of the decoction once a day as an enema ^g /take one teaspoon orally three times a day. One interviewee mentioned that children are not allowed to take the decoction as an enema. (b) Boil a handful of the whole plant with a handful of leaves ^d each of <i>Tetradenia riparia</i> and <i>Lippia javanica</i> in 1.5 L of water. Steam once a day and take 1 tbsp three times a day to treat coughs and tiredness. Children under the age of three are not allowed to steam, while children over the age of three steam with parental supervision. (c) Crush handful of the whole plant and add 1 L of warm water. Take a size 6–10 syringe (180–300 mL) daily as an enema, while children only use a syringe size one (± 30 mL). This decoction is used to treat coughs, fever, chills and a runny nose. One interviewee mentioned that you only take this decoction once, and that you should not take it again the following day.	None found
<i>Aloe marlothii</i> A.Berger (TYORK 42)	Asphodelaceae	Inhlaba Umhlaba	Leaves	1	Chop one leaf and mix it with the chopped bulb of <i>Hypoxis</i> sp., chopped underground parts of <i>Scadoxys puniceus</i> and a handful of crushed <i>Erythrina caffra</i> root. Add 1 L of boiling water and drink half a cup of the decoction once a day to treat chest pain, fever and a blocked nose. Children take 1 tbsp of the decoction once daily.	None found
<i>Brachylaena discolor</i> DC.	Asteraceae	Ipahla Iphahla Isiduli Isiphaluga Umduli Umphaphla	Leaves	1	Crush a handful of leaves and add one cup of warm water. Take a size 1 syringe (30 mL) once a day as an enema and take one teaspoon three times a day to treat cough and a runny or blocked nose. Children take the same amount when an enema is used, but only drink one teaspoon twice daily ^g .	Cough and fever (Pujol, 1990)
<i>Brachylaena</i> spp.	Asteraceae	Iphahla	Leaves		(a) Mix a handful of leaves from both <i>Eucalyptus grandis</i> and <i>Lippia javanica</i> . Bring to boil with 2 L of water and drink one cup of this decoction three times a day to treat cough, chest pain, runny nose and fever. Children take one teaspoon of the decoction three times a day. (b) Mix 3–4 leaves with two cups of water and bring the mixture to boil. Take 1 tbsp daily to treat flu symptoms. Children only take one teaspoon daily. (c) Mix two handfuls with two handfuls of <i>Lippia javanica</i> leaves and bring to boil with 5 L water. Steam twice a day for 10 min and drink half a cup twice a day/use half a cup as an enema twice a day to treat chills, coughs and blocked nose. Children take it as an enema in the same way as the parents, but must steam with parental supervision. Children only drink half a cup once a day.	
<i>Bridelia cathartica</i> Bertol.f. subsp. <i>cathartica</i> (TYORK 27)	Euphorbiaceae	Umkhawulangazi Umnangasi Umngwangazi Umnwangazi Umthundangazi Umzilanyoni	Leaves	1	Mix a handful of leaves with a handful of <i>Lippia javanica</i> leaves with 2 L water, and bring to boil. Steam, until the decoction cools down, twice a day to treat chills, headache, cough and a runny nose. Children under the age of four can steam only with adult supervision.	Asthma and fever (Chhabra et al., 1990); headache (Gelfand et al., 1985); headache and influenza (Kokwaro, 1976)
<i>Citrus limon</i> (L.) Burm.f. (TYORK 36)	Rutaceae	Lemon tree	Leaves	1	Boil a handful of leaves for 10 min with 1 L of water. Drink half a cup of this decoction three times a day to treat a blocked nose and fatigue. Children take 1 tbsp of the decoction three times a day.	Cough (Chinemana et al., 1985; Watt and Breyer-Brandwijk, 1962; Tabuti et al., 2003; Ajibesin et al., 2008; Focho et al., 2009; Mesfin et al., 2009; Šarić-Kundalić et al., 2010); cold (Camejo-Rodrigues et al., 2003; Scarpa, 2004); fever and headache (El-Hilaly et al., 2003); unspecified respiratory symptoms (Frei et al., 1998; Heinrich et al., 1998); TB (Kisangau et al., 2007)

Table 1 (Continued)

Botanical name (voucher no.)	Family	Common name	Plant part(s) used	Number of times quoted	Methods of preparation and administration	Other reported uses for respiratory infections or related symptoms
<i>Clausena anisata</i> (Willd.) Hook. F. ex Benth. (TYORK 7)	Rutaceae	Isifudu Isifuthu Umnukambhiba Umnukelambiba <u>Umsanka</u> Umwashampunzi	Leaves	2	(a) Mix a handful of leaves with a handful of leaves from both <i>Lippia javanica</i> and <i>Eucalyptus grandis</i> and bring to boil with 4 L of water. Boil for 40 min before taking 1 tbsp of the decoction twice a day to treat a cough, runny and blocked nose. Children take one teaspoonful three times a day. (b) Mix a handful of leaves with a handful of leaves from both <i>Lippia javanica</i> and <i>Eucalyptus grandis</i> and boil for 10 min with 5 L of water. Drink half a cup of this decoction three times a day and steam once a day to treat cough and fever. For children, only a few leaves of each plant are boiled with 2 L of water. Children take 1 tbsp three times a day. Instead of steaming, two cups of this decoction may be splashed over a bathing child.	Chest pain, cough, eye infections and headache (Watt and Breyer-Brandwijk, 1962); ear infections (Teklehaymanot and Giday, 2007); fever (Hutchings et al., 1996; Palgrave, 2002); influenza and headache (Kokwaro, 1976)
<i>Clematis brachiata</i> Thunb. (TYORK 26)	Ranunculaceae	Ihlonzo leziduli Inhlabahlanzi Inhlongo <u>Umdlatho</u> ^b Umdlatho <u>Umdlono</u> Umdlono <u>Umfufuna</u>	Leaves and stem	3	(a) Rub a little bit of stems and leaves ^c between your hands and inhale to treat headaches, coughs and a runny nose. (b) Mix a handful of leaves and stems with a handful of <i>Lippia javanica</i> leaves and bring to boil with 4 L of water. Steam for 4 min once a day. The interviewee stated that the plant is very strong, and one shouldn't steam for longer. Children are not allowed to steam. The decoction is used to treat coughs, chest pain and a runny or blocked nose. (c) Bring a handful of leaves and stems to boil with 2 L of water. Steam for 5 min once a day to treat headaches, coughs and a runny nose. The interviewee also mentioned that steaming for longer is bad for you and children are not allowed to steam. (d) Mix a handful of stems and leaves with a handful of <i>Lippia javanica</i> leaves and bring to boil with 5 L of water. Steam, until the decoction cools down, twice a day or take 1 tbsp three times a day to treat chest pain, cough, headaches and a runny nose. Children only take one teaspoon of the decoction three times a day, and are not allowed to steam.	Asthma, chest complaints, cold, cough and sinusitis (Roberts, 1990); blocked nose, cold, cough and fever (Neuwinger, 1996); chest complaints cold, cough and headache (Watt and Breyer-Brandwijk, 1962); cold (Njoroge and Bussmann, 2006); cold and headache (Mabogo, 1990); sore eyes (Von Koenen, 1996); headache (Arnold and Gulumian, 1984; Kokwaro, 1976); head colds (Pooley, 1998)
<i>Combretum molle</i> R. Br. ex G. Don (TYORK 23)	Combretaceae	<u>Umbondo</u> Umbondwe (-omhlope)	Leaves	4	(a) Mix a handful of leaves with a handful of leaves both from <i>Lippia javanica</i> and <i>Eucalyptus grandis</i> and boil with 1.5 L of water until 0.5 L has evaporated. Drink half a cup three times a day to treat cough and fever. Children take 1 tbsp of the decoction three times a day. (b) Mix a handful of leaves with a handful of <i>Lippia javanica</i> leaves and bring to boil with 2 L of water. Steam, until the decoction cools down, twice a day to treat chills, cough and a blocked nose. Children only steam with parental supervision. (c) Take two handfuls of leaves and boil with 2 L of water until the water colours. Steam once a day until the decoction cools down. Used to treat chills, coughs and a blocked nose. Children are not allowed to steam. (d) Mix a handful of leaves with a handful of leaves each of <i>Lippia javanica</i> and <i>Terminalia sericea</i> and bring to boil with 1 L of water. Take 1 tbsp daily to treat a chronic cough. If the cough is really severe, drink the decoction more often. Children take one teaspoon of the decoction per day.	Asthma (Amusan et al., 2002); chest complaints and fever (Kokwaro, 1976); cold (Mabogo, 1990); fever (Abbiw, 1990; Hutchings et al., 1996; Van Wyk, 1996; Palgrave, 2002); headache (Grønhaug et al., 2008); influenza (Fyhrquist et al., 2002); unspecified respiratory problems (Koné et al., 2004); TB (Asres et al., 2001)

<i>Cyperus articulatus</i> L. (TYORK 4)	Cyperaceae	<u>Incethe</u> ^b	Pseudo-bulbs	3	(a) Crush four pseudo-bulbs and add half a cup of cold water and soak. Take one sip of this three times a day to treat chest pain, chills, cough and a blocked nose. For children the mixture is made a little bit weaker ^g . (b) Crush two corm-like rhizomes and add 2 tbsps of cold water. Take 1 tbsp of this decoction twice a day to treat a blocked nose and shortness of breath. In one household this infusion is only used for children. (c) Remove the skin from one corm-like rhizome, chew and swallow once a day to treat a cough, blocked nose and shortness of breath. To treat a small child, an adult will chew the corm and blow it into the child's nostrils once a day.	Cough and headache (Abbiw, 1990)
<i>Ekebergia capensis</i> Sparrr. (TYORK 20)	Meliaceae	Isimanaye Umahunzi wentaba Umahunzini Umahunzini- wezintaba Umgwenyana wezinja Umnyamathi Umthoma Usimanaye Uvungu	Leaves	1	Crush a handful of leaves, add boiling water and sieve. Take 1 tbsp of the decoction, or take a size eight syringe (± 240 mL) as an enema once a day to treat a cough, chest pain and a runny nose. Not to be used by children.	Chest complaints and cough (Bryant, 1966); cough (Palgrave, 2002; Pooley, 2003); headache (Mabogo, 1990)
<i>Erythrina caffra</i> Thunb. (TYORK 38)	Fabaceae	<u>Umsinsi</u>	Root	1	It is used in combination with <i>Aloe marlothii</i> , <i>Scadoxys puniceus</i> and <i>Hypoxis</i> sp. as described above (at <i>Aloe marlothii</i>) to treat chest pain, fever and a blocked nose.	Ear ache (Van Rensburg, 1982; Hutchings et al., 1996)
<i>Eucalyptus grandis</i> W.Hill ex Maiden (TYORK 33)	Myrtaceae	<u>Gum tree</u> <u>Gum bush</u> Impiskayihlangulwa Umdlavusa Umdlabe	Leaves	33	(a) Boil a handful of leaves with a handful of <i>Lippia javanica</i> leaves in 2–5 L of water. Take 1 tbsp to half a cup of this decoction three times a day ^g , while using what's left to steam once or twice daily. Steam until the water cools down. When the decoction is made with more than 2 L of water, it can be used for bathing, once a day. Used to treat chills, coughs, a runny nose, headache, chest pain, tonsillitis, sore throat, fatigue, fever, or even ear ache. Some interviewees only drink half a cup of the decoction once a day. Children can drink the decoction, but at half the dosages used for adults and no steaming should be used. (b) Take a handful of a leaf filled branch tip and bring to boil with one cup of water. Boil for 20 min and take one teaspoon of this decoction four times a day to treat chest pain and cough. When making a large amount of this decoction (about 5 L) it can also be used for steaming. Steam for 30 min. Young children take one teaspoon twice a day. (c) Mix two handfuls of leaves with one handful of <i>Lippia javanica</i> leaves and bring to boil with 2 L of water. Drink a quarter cup three times a day to treat chest pain, cough, headaches and a runny nose. Children take only 1 tbsp of the decoction three times a day. (d) Mix three handfuls of leaves with one handful of <i>Lippia javanica</i> leaves and bring to boil with 4 L of water. Steam until the water cools down, twice a day, to treat chest pain, cough, headaches and a runny nose. (e) It is used in combination with <i>Clausena anisata</i> and <i>Lippia javanica</i> , as previously described (at <i>Clausena anisata</i>), to treat cough, fever and a runny or blocked nose. (f) It is used in combination with <i>Combretum molle</i> and <i>Lippia javanica</i> , as previously described (at <i>Combretum molle</i>), to treat cough and fever. (g) It is used in combination with <i>Brachylaena</i> spp. and <i>Lippia javanica</i> , as previously described (at <i>Brachylaena</i> spp.), to treat a cough, chest pain, a runny nose and fever. (h) Mix a handful of leaves with a handful of leaves from <i>Ozoroa obovata</i> and bring to boil with 2 L of water. Steam until the decoction cools down, once a day, to treat chest pain, cough, fever and a blocked or runny nose. Children can steam only for 5 min per day with parental supervision.	Cough (Ssegawa and Kasenene, 2007)

Table 1 (Continued)

Botanical name (voucher no.)	Family	Common name	Plant part(s) used	Number of times quoted	Methods of preparation and administration	Other reported uses for respiratory infections or related symptoms
					(i) Mix a handful of leaves with a handful of leaves each from <i>Lippia javanica</i> , <i>Psidium guajava</i> and <i>Senecio serratuloides</i> and bring to boil with 6L of water. Use this decoction to steam twice a day to treat a cough, fever and runny nose. Children don't steam but they get bathed in this decoction. (j) Mix a handful of leaves with a handful of leaves each from <i>Senecio serratuloides</i> and <i>Lippia javanica</i> with 5 L of water and bring to boil. Drink one cup daily to treat a cough and blocked nose. Children take 2 tbsps three times a day. (k) Mix a handful of leaves with a handful of leaves each from <i>Lippia javanica</i> and <i>Senecio serratuloides</i> and bring to boil with 1.5 L of water. Drink half a cup three times a day to treat chest pain, cough, headache and a runny nose. Children only take 1 tbsp of this decoction three times a day. (l) Mix a handful of leaves with a handful of leaves from <i>Lippia javanica</i> and <i>Tetradenia riparia</i> and bring to boil with 2 L of water. Boil until 1 L of the decoction is left and drink half a cup three times a day to treat chills, coughs, sleepless nights, fever and headaches.	
<i>Euphorbia tirucalli</i> L. (TYORK 37)	Euphorbiaceae	<u>Inhlonhlwane</u> ^b <u>Umduze</u> Umsululu	Stem	1	Boil a handful of modified stem ^f in two cups of water until one cupful is left. Apply two drops of this decoction per affected ear once at night to treat earache. Children only take one drop of the decoction per affected ear.	Asthma (Savithramma et al., 2007); asthma, cold, earache and headache (Neuwinger, 1996); ear problems (Upadhyay et al., 2010); eye infection (Maregesi et al., 2007); headache (Mahishi et al., 2005); sore throat (Kokwaro, 1976)
<i>Helichrysum kraussii</i> Sch.Bip. (TYORK 12)	Asteraceae	<u>Isilelevu</u> ^b Isipheshane Isiqoqo	Leaves and stem	1	Mix a handful of leaf filled branches ^e with a handful of <i>Lippia javanica</i> leaves and three leaflets from <i>Trichilia emetica</i> and boil for 10 min in 1 L of water. Sieve the decoction and take one teaspoonful each day to treat chest pain, cough and a blocked nose.	Cough and pulmonary TB (Lourens et al., 2008)
<i>Hypoxis</i> sp. L (TYORK 30)	Hypoxidaceae	<u>Inkomfe</u> Inkomge enkula	Corm	2	(a) It is used in combination with <i>Aloe marlothii</i> , <i>Scadoxis puniceus</i> and <i>Erythrina caffra</i> , as described previously (at <i>Aloe marlothii</i>), to treat chest pain, fever and a blocked nose. (b) Chop the corms and mix one handful of this with a handful of <i>Lippia javanica</i> leaves and bring to the boil with one cup of water. Sieve and take one cupful a day as an enema to treat flu symptoms. Children only take a quarter cup of the decoction per day.	Asthma (Shale et al., 1999); cold and influenza (Owira and Ojewole, 2009); cough (Roberts, 1990); cough and fever (Watt and Breyer-Brandwijk, 1962); headache (Hutchings et al., 1996)
<i>Krauseola mosambicina</i> (Moss) Pax & K.Hoffm. (TYORK 21)	Caryophyllaceae	<u>Isihlaza</u> Isihlazi	Leaves and stem	2	Mix a handful of stems and leaves with a handful of <i>Lippia javanica</i> leaves, crush and bring to boil with 0.5 L of water. Take half a cup of the decoction as an enema once a day to treat cough and a runny or blocked nose. Children take only a quarter cupful of the decoction as an enema.	None found
<i>Lippia javanica</i> (Burm.f.) Spreng. (TYORK 1)	Verbenaceae	<u>Umsuzwane</u> Umswazi	Leaves or leaves and roots	58	(a) Rub a few leaves between your hands and inhale the vapours to relieve cold and flu symptoms ^g .	Asthma, chest ailments, cold, cough and fever (Roberts, 1990); asthma, headache and other respiratory complaints (Gelfand et al., 1985); bronchial complaints, cold, cough, influenza and fever (Watt and Breyer-Brandwijk, 1962); bronchitis, cold, cough and fever (Van Wyk and Gericke, 2000; Green et al., 2010); bronchitis and eye problems (Hedberg and Staugård, 1989); common cold (Bussmann et al., 2006; Njoroge and Bussmann, 2006); cold and cough (Hutchings et al., 1996); cold, cough, influenza and headache (Mabogo, 1990); headache (Chinemana et al., 1985; Purkayastha et al., 2005); influenza (Manenzhe et al., 2004); influenza and fever, when combined with <i>Artemisia afra</i> (Watt and Breyer-Brandwijk, 1962); TB-related symptoms (Green et al., 2010); use of essential oil for respiratory infections, colds and influenza (Makunga et al., 2008)

- (b) Add a handful of leaves to 0.5 L water and bring to boil. Take 1–2 tbsps three times a day, or one cupful once a day (the decoction must be warm) to treat cough, aching muscles, a sore throat and fever. Children only take one teaspoon of the decoction twice a day.
- (c) Bring to boil a handful of leaves in 10 L of water. Steam until the decoction cools down and drink a quarter cup full twice a day to treat a cough and blocked nose. Children take one teaspoonful three times a day.
- (d) Bring to boil two handfuls of leaves in 2 L of water. Steam, until the water cools down, once or twice a day to treat coughs, chest pain, headaches, fever, chills, a sore throat or a blocked nose^g. This decoction can also be taken orally by drinking half a cup daily, but it is mostly used for steaming. Young children are not allowed to steam, and only take one teaspoon of the decoction daily^g. One interviewee mentioned that young children steam for a maximum of 3 min each day.
- (e) Bring to boil a handful of leaves with 2 L of water. Steam, until the water cools down, once or twice a day or take 1 tbsp of the decoction once or twice a day to treat cough, headaches, fever, sore muscles, a runny nose or a blocked nose. The decoction can also be splashed over yourself while in the bath. Children are generally not allowed to steam. When steaming takes place it is only for a few min, and with parental guidance. Children take one teaspoon of the decoction once a day.
- (f) Bring to boil two handfuls of leaves in 5 L of water. Steam twice a day for 10 min to treat flu symptoms. Children are not allowed to steam^g.
- (g) Crush a handful of leaves and mix it with one cup of warm water. Soak the decoction until the water turns green and sieve. Take 1 tbsp of the decoction four times a day to treat flu symptoms. Children only take one teaspoon of this four times a day^g.
- (h) Chop the root and mix a handful of this with a handful of leaves and one cup of hot water. Take 1 tbsp of the decoction three times a day or steam with it three times a day to treat tonsillitis, or a cough and runny nose.
- (i) Crush a handful of leaves and mix it with two cups of warm water. Take a size eight syringe (± 240 mL) of this decoction, once a day, as an enema to treat tonsillitis, coughs and a runny nose. Children take half the dosage of adults.
- (j) Mix one to two handfuls of leaves with an equal amount of *Trichilia emetica* leaves and bring to boil with 4–5 L of water. Steam, until the decoction cools, twice a day to treat headache, fever, cough and a runny nose. Not to be used by children.
- (k). Mix one handful of leaves with one handful of *Tetradenia riparia* leaves and add a cup of warm water. Take 2 tbsps of this whenever you feel very ill. Used to treat coughs, sore throat and fever. Children take only 1 tbsp three times a day.
- (l) It is used in combination with *Helichrysum kraussii* and *Trichilia emetica*, as described previously (at *Helichrysum kraussii*), to treat chest pain, cough and a blocked nose.
- (m) Used in combination with *Clausena anisata* and *Eucalyptus grandis*, as described previously (at *Clausena anisata*).
- (n) Used in combination with *Combretum molle* and *Eucalyptus grandis*, as described previously (at *Combretum molle*), to treat coughs and fever.
- (o) Used in combination with *Combretum molle* and *Terminalia sericea*, as described previously (at *Combretum molle*), to treat a chronic cough.
- (p) It is used in combination with *Hypoxis* sp. (described previously) to treat chills and a runny nose.
- (q) Used in combination with *Bridelia cathartica*, as previously described to treat chills, headaches, coughs and a runny nose.
- (r) It is used in combination with *Clematis brachiata* (previously described) to treat headache, coughs, chest pain and a runny or blocked nose.
- (s) Used in combination with *Krauseola mosambicina* (previously described).
- (t) It is used in combination with *Acanthospermum glabratum* and *Tetradenia riparia*, as previously described (at *Acanthospermum glabratum*), to treat cough and tiredness.

Table 1 (Continued)

Botanical name (voucher no.)	Family	Common name	Plant part(s) used	Number of times quoted	Methods of preparation and administration	Other reported uses for respiratory infections or related symptoms
					(u) Used in combination with <i>Eucalyptus grandis</i> and <i>Senecio serratulooides</i> , as previously described (at <i>Eucalyptus grandis</i>), to treat coughs and a blocked nose. (v) It is used in combination with <i>Eucalyptus grandis</i> , <i>Senecio serratulooides</i> and <i>Psidium guajava</i> , as previously described (at <i>Eucalyptus grandis</i>), to treat coughs, fever and a runny nose. (w) Used in combination with <i>Brachylaena discolor</i> and <i>Eucalyptus grandis</i> , as previously described (at <i>Brachylaena discolor</i>), to treat chest pain, fever and a runny nose. (x) It is used in combination with <i>Eucalyptus grandis</i> , as previously described to treat chest pain, cough, headaches, a runny nose, chills, fatigue, fever, a sore throat or ear ache. (y) Used in combination with <i>Eucalyptus grandis</i> and <i>Tetradenia riparia</i> , as previously described (at <i>Eucalyptus grandis</i>), to treat chills, coughs, sleepless nights, headaches and fever. (z) Mix a handful of leaves with a handful of leaves from <i>Plectranthus neochilus</i> and bring to boil with 2 L of water. Add sugar to taste and take 1 tbsp of the decoction three times a day to treat chills, cough and a runny or blocked nose. Children only take one teaspoon three times a day. (aa) It is used in combination with <i>Eucalyptus grandis</i> and <i>Senecio serratulooides</i> , as described at <i>Eucalyptus grandis</i> , to treat chest pain, cough, headache and a runny nose. (ab) Used in combination with <i>Brachylaena</i> spp., as previously described to treat chills, cough and a blocked nose.	
<i>Ozoroa obovata</i> (Oliv.) R.Fern. & A.Fern. (TYORK 34)	Anacardiaceae	<u>Isifice</u>	Leaves	1	Mix a handful of leaves with a handful of <i>Eucalyptus grandis</i> leaves and bring to boil with 2 L of water. Steam once or twice daily (depending on the severity) to treat chest pain, cough, fever and a runny- or blocked nose. Children are only allowed to steam for 5 min with parental supervision.	None found
		Isifici				
<i>Parinari capensis</i> Harv. subsp. <i>incohata</i> F.White (TYORK 3)	Chrysobalanaceae	Amabhulwa	Root	1	Take a handful of roots, scrape off the outer layer, and chop before bringing to the boil with 2 L of water. Boil until 0.5 L evaporates and drink half a cup of the decoction a day to treat TB-like symptoms. Children are not allowed to use this medicine until they are “spiritually mature”.	None found
		<u>Ibulwa</u> ^b				
<i>Plectranthus neochilus</i> Schltr. (TYORK 24)	Lamiaceae	<u>Ibozane</u> ^b	Leaves	1	Mix one handful of leaves with a handful of <i>Lippia javanica</i> leaves and bring to boil with 2 L of water. Sugar can be added to taste. Take 1 tbsp three times a day to treat chills, cough and a runny or blocked nose. Children take one teaspoon three times a day.	None found
<i>Psidium guajava</i> L. (TYORK 16)	Myrtaceae	<u>Uguava</u>	Leaves	2	(a) Take two handfuls of leaves and boil for 30 min after adding 2 L of water. Drink half a cup of this decoction three times a day to treat cough, fever, chills, sore throat and a blocked nose. Children only take 1 tbsp three times daily. (b) It is used in combination with <i>Eucalyptus grandis</i> , <i>Senecio serratulooides</i> and <i>Lippia javanica</i> , as described previously (at <i>Eucalyptus grandis</i>), to treat cough, fever and a runny nose.	Allergy and headache in children (Harsha et al., 2002); asthma (Njoroge and Bussmann, 2006) asthma and bronchitis (Abdelrahim et al., 2002); bronchial allergies and influenza, when combined with <i>Allium cepa</i> and <i>Citrus sinensis</i> (Ceuterick et al., 2008); cold and cough (Upadhyay et al., 2010); cold, cough, fever, sore throat and other respiratory complaints (Gutiérrez et al., 2008); cough and pulmonary disorders (Watt and Breyer-Brandwijk, 1962); cough (Chinemana et al., 1985; Abbiw, 1990; Girón et al., 1991; Tabuti et al., 2003; Gautam et al., 2007; Ssegawa and Kasenene, 2007); cough and sore throat (Pradhan and Badola, 2008); fever in babies (Ruysschaert et al., 2009); headache and throat problems (Albuquerque et al., 2007); Unspecified respiratory problems (Cano and Volpato, 2004); TB (Kisangau et al., 2007; Chinsebu and Hedimbi, 2010)

<i>Sansevieria hyacinthoides</i> (L.) Druce (TYORK 8)	Dracaenaceae	Isikholokotho <u>Isikwendle</u> Isitokotoko Isikhotakhota	Leaves	1	Take one whole leaf, and heat on the stove until extremely hot. Let it cool down before squeezing out the juice and applying one drop per affected ear (accompanied by a discharge) at least three times a day. After applying the decoction, the ear must be sealed with a piece of cotton wool.	Ear ache (Watt and Breyer-Brandwijk, 1962; Bryant, 1966; Roberts, 1990)
<i>Scadoxis puniceus</i> (L.) Friis & Nordal (TYORK 5)	Amaryllidaceae	<u>Idumbelentaba</u> Idumbi likanhloyile Umphompo Umgola Idumbe-lika-nhloyile Idumbe-likahlonyile Isiphompo	Bulb	1	Used in combination with <i>Aloe marlothii</i> , <i>Erythrina caffra</i> and <i>Hypoxis</i> sp., as described previously (at <i>Aloe marlothii</i>), to treat chest pain, fever and a blocked nose.	Cough (Bryant, 1966)
<i>Sclerocarya birrea</i> (A.Rich.) Hochst. (TYORK 9)	Anacardiaceae	<u>Unganu</u>	Bark	2	(a) Half a handful of bark from the young branches is soaked in half a cup of cold water. Take 1 tbsp of this infusion three times a day to treat a dry cough. Children take only one teaspoon three times a day. (b) Chop a piece of mature bark, as well as the bark of <i>Syzygium cordatum</i> and mix a handful of each with 2 L of water before bringing to the boil. Take 2 tbsps of this decoction twice a day to treat cough, fever and a runny nose. Children only take one teaspoon twice a day.	Cold and headache (Mabogo, 1990); fever (Palgrave, 2002); fever and sore eyes (Ojewole et al., 2010)
<i>Senecio deltoideus</i> Less. (TYORK 41)	Asteraceae	<u>Ulambula^f</u>	Leaves	1	Mix a handful of leaves with a handful of leaves from <i>Senecio serratulooides</i> and bring to boil with 1 L of water. Drink half a cup twice a day to treat chest pain, cough, fever and a runny nose. Children only take 1 tbsp twice a day ^g .	Sore eyes (Watt and Breyer-Brandwijk, 1962)
<i>Senecio serratulooides</i> DC. (TYORK 35)	Asteraceae	Ichazampukane <u>Insukumbili</u> Intsukumbili-umahanya Umaphozisa umkutelo	Leaves	6	(a) Mix a handful of leaves with 1 L of water and bring to boil. Steam, until the decoction cools, twice a day or drink about half a cup once to three times daily to treat chest pain, fever, sore throat and a runny nose. Children are not allowed to steam, and only take one teaspoon of the decoction once to three times a day. (b) Used in combination with <i>Eucalyptus grandis</i> and <i>Lippia javanica</i> , as described previously (at <i>Eucalyptus grandis</i>), to treat chest pain, cough, headache and a runny or blocked nose. (c) Used in combination with <i>Eucalyptus grandis</i> , <i>Lippia javanica</i> and <i>Psidium guajava</i> , as described previously (at <i>Eucalyptus grandis</i>), to treat cough, fever and a runny nose. (d) It is used in combination with <i>Senecio deltoideus</i> , as previously described to treat chest pain, cough, fever and a runny nose.	Chest pain (Hutchings et al., 1996); TB symptoms (Lall and Meyer, 1990)
<i>Syzygium cordatum</i> Hochst. ex C.Krauss. (TYORK 29)	Myrtaceae	<u>Umdoni</u>	Bark	2	(a) Mix half a handful of chopped bark with half a handful of chopped bark from <i>Terminalia sericea</i> , as well as the chopped up underground parts of a plant known as 'intolwane'. Add 2 L of water and boil for 30 min. Sieve the decoction and take 1 tbsp three times a day to treat cough, sleepless nights and a runny or blocked nose. Children only take one teaspoon three times a day. (b) It is used in combination with <i>Sclerocarya birrea</i> , as described above, to treat cough, fever and a runny nose.	Cold and fever (Mabogo, 1990); headache (Arnold and Gulumian, 1984); unspecified respiratory problems (Pooley, 2003); TB (Watt and Breyer-Brandwijk, 1962)
<i>Terminalia sericea</i> Burch. ex DC. (TYORK 6)	Combretaceae	Amangwe (amanyama,-amhlophe,-amnyama) Ikonono <u>Inkonono^b</u>	Leaves or bark	2	(a) Used in combination with <i>Syzygium cordatum</i> and a plant known as 'intolwane', as previously described, to treat coughs, sleepless nights and a runny or blocked nose. (b) Its leaves are used in combination with <i>Combretum molle</i> and <i>Lippia javanica</i> , as described at <i>Combretum molle</i> , to treat a chronic cough.	Asthma, eye infection, headache and pneumonia (Neuwinger, 1996); eye problems and pneumonia (Palgrave, 2002); fever (Fyhrquist et al., 2002); respiratory problems, not specified (Pooley, 2003); sore throat (Gelfand et al., 1985); TB-related symptoms (Green et al., 2010)

Table 1 (Continued)

Botanical name (voucher no.)	Family	Common name	Plant part(s) used	Number of times quoted	Methods of preparation and administration	Other reported uses for respiratory infections or related symptoms
<i>Tetradenia riparia</i> (Hochst.) Codd (TYORK 14)	Lamiaceae	Iboza <u>Ibozane</u>	Leaves	10	<p>(a) Soak a handful of leaves in half to full cup of warm water. Take 2 tbsps of this decoction three times a day, or whenever you feel sick. Used to treat coughs, fever, sore throat and a runny nose. This decoction can also be taken as an enema. Adults take a size six syringe full (180 mL) twice a day, while children take a size two (60 mL) syringe full once a day. Children only take one teaspoon of this decoction three times a day.</p> <p>(b) Soak a handful of leaves (or about five leaves) in half a cup to a full cup of boiling water for about 5 min. Take 1 tbsp of the decoction three times a day to treat coughs, chest pain, sore throat, or a blocked nose. One interviewee mentioned that it gives immediate relief to a sore throat. Children can only take one teaspoon twice to three times a day.</p> <p>(c) Bring to boil one handful of leaves in two cups of water and drink about half a cup twice to three times a day to treat cough, chest pain, headache and a blocked or runny nose. Children take one teaspoon twice to three times daily.</p> <p>(d) Put a handful of leaves in 1 L of water and boil the mixture until the water colours. Drink half a cup of the decoction three times a day to treat chest pain and fever. Children take only 1 tbsp of the decoction three times daily.</p> <p>(e) Crush a handful of leaves and mix with two cups of cold water. Drink half a cup of this decoction three times a day to treat chest pain, cough, headache, shortness of breath and a runny or blocked nose. Children take one teaspoon of this infusion three times a day.</p> <p>(f) Used in combination with <i>Eucalyptus grandis</i> and <i>Lippia javanica</i>, as described previously (at <i>Eucalyptus grandis</i>), to treat chills, cough, sleepless nights, fever and headaches.</p> <p>(g) It is used in combination with <i>Acanthospermum glabratum</i> and <i>Lippia javanica</i>, as described previously (at <i>Acanthospermum glabratum</i>), to treat cough and tiredness.</p> <p>(h) Used in combination with <i>Lippia javanica</i>, as described previously to treat cough, sore throat and fever.</p>	Cold, cough, chest complaints and influenza (Crouch et al., 2006); cold, cough, influenza and fever (Van Wyk and Gericke, 2000); chronic cough (Bryant, 1966); cough, when combined with <i>Artemisia afra</i> (Hutchings et al., 1996); cough, fever, influenza (Pujol, 1990); cough, fever, headache and other respiratory problems (Scott et al., 2004); cough and other respiratory problems (Watt and Breyer-Brandwijk, 1962); fever (Palgrave, 2002)
<i>Trichilia emetica</i> Vahl subsp. <i>emetica</i> (TYORK 13)	Meliaceae	Ixolo Umathunzini Umkhuhla <u>Umkhuhlu</u> Umkhuhluwa	Leaves	3	<p>(a) It is used in combination with <i>Helichrysum kraussii</i> and <i>Lippia javanica</i>, as described previously (at <i>Helichrysum kraussii</i>), to treat chest pain, cough and a blocked nose.</p> <p>(b) Used in combination with <i>Lippia javanica</i>, as previously described to treat headache, fever, cough and a runny nose.</p>	Chest pain, cough, eye infection, headache, pneumonia and tiredness (Togola et al., 2005); cough (Abbiw, 1990); fever (Hutchings et al., 1996); TB (Moshi et al., 2009); whooping cough (Chhabra et al., 1990)

^a Underlined local names were mentioned by the interviewee in the current study.

^b Common name recorded for the first time.

^c The average mass of a handful of whole plant was 28 g.

^d The average mass of a handful of leaves was 40 g.

^e The average mass of leaves and stems, used together, was 39 g.

^f The average mass of a handful of stems was 48 g.

^g Remedies given by a traditional healer.

Table 2

Most commonly given answers from interviewees when questioned about preference to use traditional medicine.

Answers descending in how frequently it was given (often more than one answer was given by the same interviewee)	Number of times the specific answer was given
Traditional medicine is part of the interviewee's culture and it's what he/she's used to because of growing up with it	36
Traditional medicine works faster and/or is more effective than western medicine	15
Uses traditional medicine first, but if the symptoms persist he/she will go to the clinic or hospital	13
Traditional medicine is easily accessible and free	7
Traditional medicine is easily accessible and free	4
Some diseases can't be cured with western medicine	3
You usually wait long at the clinic, and sometimes they're out of medicine	3

survey, indicating which remedies were in fact suggested by them (Table 1). Most of the species used, as well as the preparation methods, were similar between these two types of interviewees. During an interview with one of the healers we received information on the use of one plant species (*Senecio deltoideus*) not mentioned by any of the other interviewees. It is interesting to find that 15% of the lay people interviewed had either a *sangoma* or an *inyanga* in the family from whom they learned some medicinal plant uses.

When asked about their preferred type of medical care (traditional- vs. western medicine), most interviewees' preference was for the traditional use of medicinal plants. There were a variety of reasons given when asked about their choice (Table 2). Although a large proportion of interviewees said that they chose traditional medicine because it is more effective than western medicine, the majority use traditional medicine because it is part of their culture and base knowledge. Another interesting result was the fact that even though such plant remedies were free and easily accessible (growing in and around the homesteads) this convenience was not the main motivation toward the use of traditional medicine. Some of the interviewees, who have previously used western medicine for their primary health care, went back to using traditional medicine because there are often long queues or shortages of medicine at the clinics. These people only return to the clinic or the hospital as a last resort when the traditional medicine proves ineffective. One person admitted that she sometimes used traditional medicine to show respect to her culture. Since her parents used traditional medicine she had some knowledge on the use thereof, and shared the information of one such remedy with us. What is very interesting with this specific interviewee is that the remedy she shared with us (Table 1; *Bridelia cathartica*) was not given by any of the other interviewees, and is thus unique in the current study. There were also a few other interesting responses to this question. Two of the interviewees stated that they have recently converted to the Christian religion, and because they felt that the use of traditional medicine went against this belief they decided to no longer use this form of health care. One interviewee stated that she was actually scared of using traditional medicine due to its spiritual connotation. According to traditional African belief the physical, psychological, spiritual and ancestral worlds are all connected. African healers are known to move between these different worlds to receive guidance from their ancestors. In this belief disease is often associated with evil spirits (Dugmore and Van Wyk, 2008).

4. Discussion

A few of the plant species recorded in the current survey have also been recorded for their medicinal use in other countries. In the study done by Savithramma et al. (2007) *Euphorbia tirucalli* was recorded as one of the plants used in treating asthma in India, while *Psidium guajava* was one of the plants found to be used against asthma, bronchitis, cold and cough in a Guatemalan study (Caceres et al., 1991). *Psidium guajava* is also used worldwide against respiratory infections and fever (Jaiarj et al., 1999; Cano and Volpato, 2004;

Gautam et al., 2007; Ruyschaert et al., 2009). In an Ethiopian study, seven plant species were tested for antimycobacterial activity and the species showing the most significant activity was *Combretum molle* (Asres et al., 2001), which is also recorded in our study. Of the 67 species found to be used against respiratory afflictions in a Kenyan study (Njoroge and Bussmann, 2006), three of the species (*Clematis brachiata*, *Lippia javanica* and *Psidium guajava*) are also used in the present survey.

In South Africa most of the studies done on plants traditionally used in treating respiratory infections focused on tuberculosis-related uses (Lall and Meyer, 1999; Seidel and Taylor, 2004; Mativandlela et al., 2006; Eldeen and Van Staden, 2007; McGaw et al., 2008; Green et al., 2010). Many of these studies done on traditional plant use against respiratory ailments are based on previously recorded uses in South Africa (Watt and Breyer-Brandwijk, 1962; Hutchings et al., 1996). In one of the studies, conducted on plants traditionally used to treat tuberculosis, plants were not selected based on previous literature but on the responses of two traditional healers. These healers were interviewed based on the plants they used for treating TB patients (Green et al., 2010). Novel information gathered from surveys like this, and the present study, is important in preserving indigenous knowledge. Few studies like these have been done specifically on plants used in treating respiratory infections in South Africa. The current survey revealed nine new vernacular plant names, not previously documented. This includes the vernacular names of *Acanthospermum glabratum*, *Clematis brachiata*, *Cyperus articulatus*, *Euphorbia tirucalli*, *Helichrysum kraussii*, *Parinari capensis*, *Plectranthus neochilus*, *Senecio deltoideus* and *Terminalia sericea*. In addition to this, the fact that six plant species were documented here for the first time for their use against respiratory infections shows that there is still a lot of undocumented knowledge available in this area. This therefore puts emphasis on the importance of documenting such knowledge. Table 1 documents local plant names found in the current survey as well as previously recorded local plant names (Hutchings et al., 1996; Pooley, 1998; Von Ahlefeldt et al., 2003; Pooley, 2003; De Wet et al., 2010). In a study done by McGaw et al. (2008), the importance of the documentation of existing ethnobotanical knowledge was emphasized. The authors summarized all available knowledge on South African plants used to treat tuberculosis symptoms based on recorded information documented in Watt and Breyer-Brandwijk (1962). Nine of the plant species (*Combretum molle*, *Ekebergia capensis*, *Lippia javanica*, *Psidium guajava*, *Scadoxys puniceus*, *Senecio serratulloides*, *Syzygium cordatum*, *Terminalia sericea* and *Tetradenia riparia*), recorded in McGaw et al. (2008) were also recorded in this study.

In studies like the current survey, where information was gathered on traditional therapies against respiratory ailments, traditional healers or Ayurvedic doctors are often interviewed (Savithramma et al., 2007; Green et al., 2010), while in other studies the interviewees are randomly selected (Caceres et al., 1991; Njoroge and Bussmann, 2006). Most studies do not state clearly whether the information obtained came from a lay person or a traditional healer (Dahlberg and Trygger, 2009). Similar to Dahlberg

and Trygger (2009), a Kenyan study suggested that field work focusing on professional knowledge only, misrepresented the use of traditional medicine in that area (Geissler et al., 2002). Although a few interviewees were healers, the current study focused on lay knowledge, which makes the found information invaluable.

A specific Zulu vernacular name can be given to a number of different plant species (Hutchings et al., 1996). In the current study it was found that *Plectranthus neochilus* share its local vernacular name (*ibozane*) with *Tetradenia riparia*. During our survey this has made us very aware that one cannot ever assume the identity of a plant species based on the given vernacular name only. Plant species were thus only identified based on collected plant material. For this reason, as can be seen in Table 1, we did not identify the plant that was given the vernacular name of *intolwane*.

Of the 24 different types of plant combinations (Table 1), 10 are combined from three or more plant species. None of these complex remedies were given by any of the six healers that were also interviewed. This is interesting, due to the fact that previous research has found that lay people do not have the knowledge to mix remedies of more than two plant species (Dahlberg and Trygger, 2009). What Dahlberg and Trygger (2009) did mention though, was the combined use of *Eucalyptus* spp. and *Lippia javanica* in the treatment of flu and headache. This supports the frequent use of the mentioned combination in the current study. Both *Eucalyptus grandis* (Ssegawa and Kasenene, 2007) and *Lippia javanica* (Watt and Breyer-Brandwijk, 1962; Gelfand et al., 1985; Roberts, 1990; Purkayastha et al., 2005) have also been documented for their independent use in the treatment of respiratory infections. In studies done on plants used against respiratory infections, a few mentioned the use of plant combinations (Ballabh and Chaurasia, 2007; Gautam et al., 2007; Savithramma et al., 2007; McGaw et al., 2008; Green et al., 2010), while other research done in this field only mention plant species used singularly (Caceres et al., 1991; Rojas et al., 2001; Njoroge and Busmann, 2006). The study done by Ballabh and Chaurasia (2007) is one of a few studies discussing the use of plant combinations; however, the focus was on combinations where plants have been mixed with minerals and rock salts. Combinations in the current study are combinations comprising of different plant species or plant parts. Another difference between the combinations recorded in the current survey and that of Ballabh and Chaurasia (2007) is the fact that they have recorded combinations of up to seven different plant species, while four species in a combination was the majority reported in the current survey.

In this study leaves were found to be the preferred plant part used in the treatment of respiratory ailments. This could be because of the strong aromatic properties of certain leaves, as found in *Lippia javanica*, *Eucalyptus grandis*, *Citrus limon* and *Tetradenia riparia*. In the case of the highly aromatic *Clematis brachiata* and *Lippia javanica*, plant parts can be rubbed between the hands and inhaled for immediate relief of symptoms. The aromatherapeutic potency of plants is mainly in the leaves (Pujol, 1990), but can also be found in one of the other plant organs. The essential oils of such aromatic plants are produced and stored in the secretory cells, cavities, canals, epidermic cells or glandular trichomes of these various plant organs (Bakkali et al., 2008). Use of medicinal plants common to both the current survey and the anti-diarrhoeal survey by De Wet et al. (2010), in the same geographical area include; *Acanthospermum glabratum*, *Brachylaena* sp., *Krauseola mosambicina*, *Lippia javanica*, *Psidium guajava*, *Sclerocarya birrea*, *Syzygium cordatum*, *Terminalia sericea* and *Trichilia emetica*. There are eight aromatic plants used in the current survey, and only one of these (*Lippia javanica*) was also reported for its use in the anti-diarrhoeal survey. This might indicate that people in this area prefer the use of aromatic plants in treating respiratory conditions. Worldwide aromatic plants have been used medicinally for thousands of years (Steflitsch and Steflitsch, 2008). When inhaled, the essential oils of

such aromatic plants can be absorbed through the mucous membranes of the nose and lungs (Van Wyk and Wink, 2004). This is possibly why many interviewees prepare inhalations containing volatile substances from the aromatic plants such as *Eucalyptus grandis* and *Lippia javanica*. When inhaling these vapours, the volatile constituents come into direct contact with the lining of the respiratory tract (Van Wyk et al., 2009). What might seem contradictory to this is the fact that there were a few interviewees who preferred taking plant decoctions orally instead of orally or through inhalations. What is also interesting is the fact that the highly aromatic *Lippia javanica* forms part of some of these enema decoctions. According to Van Wyk et al. (2009) it is believed that certain plant extracts are more effective when applied through an enema. According to literature, the use of an enema in the treatment of respiratory infections is not common, but it has been documented by Watt and Breyer-Brandwijk (1962) (*Senecio* sp. applied as an enema against chest complaints).

5. Conclusion

This study documented 30 plant species which were used to treat respiratory infections by the rural people in northern Maputaland. To the best of our knowledge, *Acanthospermum glabratum*, *Aloe marlothii*, *Krauseola mosambicina*, *Ozoroa obovata*, *Parinari capensis* and *Plectranthus neochilus* are recorded for the first time globally as medicinal plants used in treating respiratory infections or related symptoms. Twenty-four different plant combinations were mentioned, ranging from a combination of two to four plant species. The use of these complex plant combinations by lay people, when compared to previous research, is new information that brings an interesting new perspective on lay people's use of traditional medicine. The preferred use of traditional medicine by the people in the current survey supports previous research on the importance of traditional medicine in the primary health of rural inhabitants. Few studies, like the current survey, have focused on finding information directly from the lay people using such plant remedies. The finding of new vernacular plant names and plant uses in the current survey shows the importance of the documentation of such ethnobotanical knowledge.

In further studies it would therefore be important to evaluate the safety and efficacy of such natural medications. The fact that these indigenous plants are used on such a regular basis should also put focus on the importance of the sustainable use of these species. Conservation strategies need to be understood and planned for a better understanding of indigenous knowledge and practices.

Further studies are underway to establish the antimicrobial efficacies of these plant species against pathogens responsible for respiratory infections. Due to the fact that so many of these plant species are used in combination, studies on the efficacy of these plant combinations and their possible synergistic effects are currently also in progress.

Acknowledgements

Firstly, the authors would like to thank the Research Committee of the University of Zululand as well as the National Research Foundation for providing financial support. We also thank Dr. T.C.H. Mostert, who constructed the site map, and assisted us in the identification of most of the voucher specimens. Mr. S. Khumalo's help in acting as interpreter is highly appreciated, and we would like to thank him as well. Lastly, this project would not have been possible if it were not for the hospitality of the interviewees who willingly shared their traditional knowledge with us.

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