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ORIGINAL ARTICLE

An Ethnobotanical and Ethnomedicinal Survey of Traditionally Used Medicinal Plants in Seymour, South Africa: An Attempt toward Digitization and Preservation of Ethnic Knowledge

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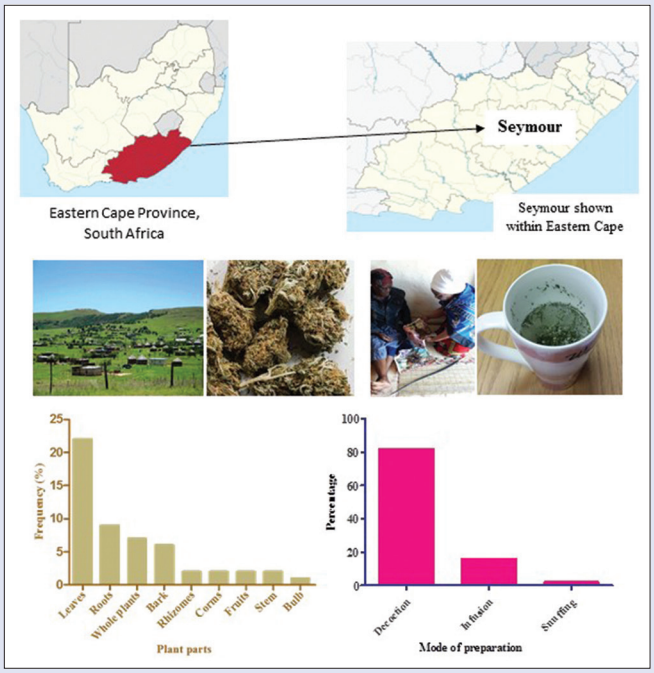
ABSTRACT

Introduction: Medicinal plants have been used for the treatment of both infectious and noninfectious diseases by the majority of the world's population for many years. The low socioeconomic standing of Eastern Cape population suggests that the majority of people use traditional methods of health care. Many of the rural communities in this province have no access to Western medical health care and rely on traditional medicine for their primary health-care needs. **Materials and Methods:** An ethnobotanical survey was conducted from February 2013 to December 2015 to investigate the use of medicinal plants by the people of Seymour in the Eastern Cape Province of South Africa. Information was gathered from nine traditional healers, seven herbalists, and 18 elderly villagers. **Results:** The information collected revealed six ailment categories that were treated with a wide range of medicinal plants. A total of 50 plant species belonging to 29 families were reported to be used in the treatment of various ailments. Members of the family Asteraceae, Euphorbiaceae, Fabaceae, and Rutaceae had the highest number of species used in traditional healing. Leaves were reported to be the most frequently used plant part, followed by roots, bark, stem, and then corms and rhizomes. The survey indicated that the most prominent method of herbal administration used is orally via extracts that were obtained by boiling, either as a decoction or concoction. **Conclusions:** This study has documented important information on medicinal plants used by people, traditional healers, and herbalists of Seymour region in the Eastern Cape Province of South Africa to treat various ailments.

Key words: Ailments, ethnobotanical survey, herbalists, medicinal plants, traditional healers

SUMMARY

- Medicinal plants have been used for ages in the treatment and management of various diseases but many of these plants have been poorly described. In order to optimise the use of these plants, there is a need for proper documentation of the indigenous knowledge that will attract different researchers to scientifically validate and do further exploration of these plants in the development of drugs.



Abbreviations used: ACE: Angiotensin-converting enzyme; CNS: Central nervous system; ENT: Ear, nose and throat; HIV: Human Immunodeficiency virus; ICF: Informant consensus factor; Nur: Total number of use report; Nt: Number of taxa; TB: Tuberculosis

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INTRODUCTION

Plants have been used as drugs for centuries, initially as traditional preparations.[1] It is estimated that about 85% of traditional medicines used for primary health care globally are derived from plants.[2] Even with conventional or orthodox medicine available, most people, especially from rural areas, still prefer using traditional medicine to treat most ailments. The World Health Organization estimated that 80% of the developing world population use traditional medicine.[3] In Africa alone,

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it is estimated that 70%–80% of people still prefer consulting traditional medical practitioners for health care.[4,5]

In South Africa, like in other African countries, traditional medicine has a very deep-rooted and rich cultural heritage.[6,7] An estimate of about 3000 plant species are used by approximately 200,000 traditional healers in this country.[8] More than 60% of South Africans consult these traditional healers for their health-care needs and cultural practices on a regular basis.[9,10] The Eastern Cape Province of South Africa has high plant species richness, and the low socio-economic standing of this large, predominantly rural province suggests that the majority of people use traditional methods of health care.[11,12] Conventional medicines, although helpful, are not easily accessible to many people in rural communities where there is limited access to medical facilities as well as increasing rates of unemployment and rising medical costs.[13]

In South Africa, there is great cultural diversity and several ethnic groups. This has resulted in massive use of medicinal plants throughout the provinces. Each cultural group has different medicinal solutions for the management of same diseases.[14-16] The Seymour area of the Eastern Cape Province is made up of the Xhosa tribes of South Africa and embedded with a strong tradition of using medicinal plants to cure different diseases.

Few researchers have conducted different researches in Eastern Cape Province including survey-based methodology, but mostly focus on single ailment such as diarrhea; reproductive system diseases; mental illness; respiratory infections; skin ailments; and ear, nose, and throat (ENT) infections.[16-21] There is, however, a need to collect more data from the knowledge holders of their use of diverse plants in the management of different kinds of diseases. These undisclosed ethnobotanical data are important to be collected and urgently documented as the traditional knowledge about plants and their medicinal use is fast disappearing due to socioeconomic change, land use, climate change, and plant overexploitation.

Ethnobotanical studies encourage the continuous search for natural products for use as medicines. Ethnobotanical surveys have been found to be one of the reliable approaches of discovering new drugs and new drug development.[22] The decline on the knowledge of medicinal plant usage is a concern in Africa. This decline is due to the fact that this significant knowledge is often transmitted from the older generation to the younger via word of mouth and most of it has not been documented.[23] This is worsened by the increase of Western lifestyle among communities and the lack of interest of the younger generation to carry on the tradition, which leads to the reduction in the number of traditional healers.[24] Therefore, to protect our ancestral knowledge of medicinal plants from completely being lost, we need to record it. One of the best modern approaches to the preservation of traditional knowledge is documentation in some permanent form and public accessibility. Documentation and digitization of traditional medicine knowledge is the surest means of preservation; it ensures preservation of the delicate knowledge and ensures wider dissemination. It will also result in codification of best practices which can be transmitted across communities in developing countries.[25] It is an effective tool for defensive protection from biopiracy as well as expropriation without compensation by multinational pharmaceutical companies. It is a veritable tool for checking any attempt by multinational corporations to privatize such knowledge via Intellectual Property Right mechanisms such as patent. Hence, when considering the patentability of any claimed subject matter, availability of traditional medicine knowledge database enables patent examiners all over the world to effectively and efficiently evaluate the novelty of the claim.

The majority of the inhabitants of Seymour in the most rural areas rely on traditional medicine for their health-care problems, and there is no documented information about the traditional medicinal plants and associated indigenous uses in the area. Accordingly, this article was aimed at collecting, documenting, and digitalizing the information for future referencing.

MATERIALS AND METHODS

Study area

The study was conducted among elderly villagers, traditional healers, and herbalists in four villages (Phakamisa, Old location, Izinyoka, and Joza) of Seymour. Seymour is a poor undeveloped rural area located between latitude 32°37′18″ S and longitude 26°48′48″ E in the Eastern Cape Province of South Africa. The altitude is approximately 1300 m above the sea level and the vegetation is Veld type 7.[26] The ethnic group in this area is Xhosa speaking.

Data collection

Data were collected between February 2013 and December 2015. Following the methods of Jovel *et al.*,[27] information was compiled through general conversations with the informants, while structured questionnaires [Table 1] were used to obtain additional information about the methods of treatment. The information that was recorded included local names of the plants used, their local uses, parts of the plants used, the mode of preparation and forms of administration of the medicinal plants, age group, and gender of the persons interviewed.

A total of 34 informants, comprising nine traditional healers, seven herbalists, and 18 elderly villagers were interviewed. Eighteen of the interviewees were male and were between the ages of 39 and 70 years, while the remaining 16 were female whose ages ranged between 35 and 67 years. Figure 1 shows a female traditional healer being consulted by one of the inhabitants of Seymour. All the interviewees orally consented, without any financial compensation, to share their knowledge with us for the purpose of the study. Arranging the interviews was not a hassle as the researchers are familiar with the location and its residents.

Informants offered to collect plant specimens they use and those they know to be of medicinal value in the area. They accompanied the researchers to the field to identify the various plant species which were not growing or cultivated near their homes. In the process, plant specimens concerned were collected. The plants were initially identified by their common names (Xhosa) and later validated at Giffen Herbarium

Table 1: A questionnaire used during an ethnobotanical study

Parameter	Information/Questions
Informants' details	Name: _____
	Gender: _____
	Age: _____
	Occupation: _____
	Education: _____
	Location/residence: _____
Questions	For how long have you been a traditional healer?
	Which plants or plant products have you used for medicinal purposes, if any?
	What ailments do you use?
	Which part of the plant do you use?
	How is it used? (dried or fresh)
	How do you prepare it for use? (tea, infusion, topical application, etc.)
	Describe in detail how do you prepare for each ailment
	How is the preparation administered?
	For how long do you have to take the preparation?

Figure 1: A patient in consultation with a traditional healer

at the University of Fort Hare. Voucher specimens (Makinana 01–50) were prepared and deposited at the Giffen Herbarium.

Data analysis

Quantitative indices such as informant consensus factor (ICF) were calculated on Microsoft Excel 2013 spreadsheet and GraphPad Prism software version 5 (GraphPad Software, Carlifonia, USA).

Informant consensus factor

ICF was calculated thus as follows: $(N_{ur} - N_t)/(N_{ur} - 1)$.

Where N_{ur} = Total number of use report for each ailment category: N_t = Number of taxa used in the category.[28]

RESULTS AND DISCUSSION

The survey established that people of Seymour are still making use of medicinal plants. The gathered information was processed and analyzed in order to get the data in these aspects. A total of 34 informants, comprising nine traditional healers (26%), seven herbalists (21%), and 18 elderly villagers (52%) were interviewed. Eighteen of the interviewees comprised 52% of males and 48% of females. Their respective age range was 39–70 years and 35–67 years for the male and female respondents. In the Eastern Cape Province, the care of family is a shared responsibility between the father and mother, hence the observed equal representation of gender involved in the knowledge of different recipes that can be used to manage different ailments and take care of the family. This result is consistent with other surveys with similar societal belief.[29,30] The results obtained from this survey [Table 2] indicated that 50 plant species belonging to 29 families were used in the treatment of various ailments by the people of Seymour. The results from the study also showed that members of the family Asteraceae (six species) were the most commonly used plants in this area, followed by Euphorbiaceae (four species), Fabaceae (four species), Rutaceae (four species), Apiaceae (three species), Alliaceae (two species), Amaryllidaceae (two species), Asclepiadaceae (two species), Polygonaceae (two species), and Solanaceae (two species), while the remaining 19 families had one species each.

In this survey, nine ailment categories were frequently mentioned and are treated with a wide range of medicinal plants. These are respiratory system diseases; reproductive system diseases; musculoskeletal disorder; gastrointestinal diseases; ulcer, wound, and sores; ENT problems; fever; infectious diseases; and circulatory system diseases which are documented in Table 3. Twenty-three species belonging to 18 families were reported for the treatment of these ailments, with members of the families Asteraceae (three species) and Rutaceae (three species) as the most commonly used. Respiratory system diseases included shortness of breath, asthma, and bronchitis, which had the highest ICF value of 0.65 followed by reproductive system diseases and musculoskeletal system of 0.60 and 0.57, respectively [Table 3]. The higher ICF values observed could be due to the ability of the respondents to easily diagnose and treat with the available medicinal plants. Studies undertaken in Morocco and Turkey agree with our finding that respiratory system diseases had the highest ICF values.[31,32] Reports on pharmacological activities of Asteraceae and Rutaceae included inhibition of rotavirus, antileishmanial, antidiabetic, antioxidant, antimycobacterial, antimalarial, antibacterial, and antifungal activities.[33-37] *Aloe ferox, Alepidia amatymbica, Arctotis arctotoides, Taraxacum officinale, Strychnos henningsii* and *Tulbaghia violacea* were reported to be used in the treatment of digestive system disorders, which included indigestion, constipation, stomach aches, diarrhea, and vomiting. Twenty-one species in 15 families were mentioned to be used in this category, with members of families Asteraceae (three species), Fabaceae (two species), Polygonaceae (two species), Asclepiadaceae (two species), and Euphorbiaceae (two species) as the most commonly used. Gynecological problems included infertility, dysmenorrhea, and menorrhagia. Nine plant species were reported to be effective in treating these ailments. The wounds' category included severe wounds, cuts, ulcers, sores, rashes, and warts. Seven species in six families were reportedly sought for their effective medicinal curative properties in this category. Six species including *Helychrisum odoratissimum, Ricinus communis,* and *Leonotis leonurus* were reported to be used for headaches. Most of the plant species discovered in this survey were used to treat more than one ailments. For example, *Strychnos henningsii* was reported to be used in the treatment of tuberculosis (TB), dysmenorrhea, constipation, and rheumatism. Pharmacological activities reported for Euphorbiaceae families included antidepressant, aphrodisiac, antidiarrheal, antibacterial, anthelmintic, deticking, and antimalarial properties and depression of central nervous system (CNS),[38-40] while Fabaceae properties included antimicrobial, antidiabetic, cardioprotective, antiviral, anti-inflammatory, anticancer, antihypertensive, and antiparasitic.[41-43] Medicinal plants from Apiaceae, Polygonaceae, and Solanaceae families were reported by researchers to possess numerous pharmacological activities, including CNS effect, antioxidant, antipyretic, antiathric, anti-inflammatory, antimicrobial, antidiarrheal, anticancer and angiotensin-converting enzyme (ACE) inhibitory activities, and effectiveness on serotonin reuptake transport protein.[44-48]

Leaves were reported to be the most commonly used part of the plants (22%) as depicted in Figure 2. This was followed by roots, bulbs, corms, and rhizomes, and then bark and stem. Fruits were reported as the least used part of the plants. The level of consumption of these parts for medicinal purpose may be due to the presence of active metabolites present in them. The leaves is the center of biosynthesis of different metabolites, which may contain many bioactive principles that have good medicinal properties.[49-51] Different methods of herbal preparation

Table 2: List of medicinal plants used for the treatment of various ailments common in the Seymour region of the Eastern Cape Province

Family	Scientific name	Common name (Xhosa)	Uses	Plant part(s) used	Methods of preparation and administration
Alliaceae	*A. sativum* L.	Ivimbampunzi	Sore throat TB	Whole plant	Decoction of leaf and bulb is taken orally. Cloves of the bulb may be chewed four times a day to treat sore throat A fresh plant is crushed, boiled, and ¼th of a cup is taken twice a day
	T. violacea Harv.	Itswele lomlambo	Influenza, fever, sore throat, asthma, constipation	Bulb	Fresh bulbs are boiled and a ¼th cup of the decoction is taken orally three times a day
Aloaceae	*A. ferox* Mill.	Ikhala	Constipation, stomach ache, toothache	Leaves and roots	Mucilaginous sap is collected from the leaves, mixed with hot water, and ½ cup of infusion is taken three times a day before meals. Leaves are also boiled in hot water, cooled, and filtered, and ½ cup is taken three times a day before meals Roots are soaked in hot water and allowed to cool. A ¼th of a cup is used to rinse the mouth four times daily, for toothache
Amaryllidaceae	*Brunsvigia sp*.	Umayime	Women infertility	Leaves and roots	Roots and leaves are soaked in cold water and ½ of the infusion is taken orally, once a day
	C. obliquus (L.f.) Aiton	Umathunga	Wounds stomach ache	Roots	Dried roots are burnt and ash is mixed with a small amount of water and used as a wound dressing for fast healing. The bandage is changed daily. Roots are crushed and then soaked in cold water and two tablespoons are taken three times a day before meals
Anacardiaceae	*S. molle* L.	Ipepile	Cough and colds	Leaves and fruits	Leaves and fruits are soaked in hot water and one tablespoon of the infusion is taken orally before going to bed. The vapor from the leaf decoction is used as a nebulizer before bedtime
Apiaceae	*A. amatymbica* Eckl. and Zeyh.	Iqwili	Colds, coughs, influenza, chest pains, constipation	Roots and rhizomes	Fresh roots and rhizomes may be chewed three times a day for common cold and cough. Dried roots are also boiled and ½ cup of the decoction is taken twice daily for constipation
	C. asiatica (L.) Urb.	Ithangazana	Infertility, dysmenorrhea	Roots	Roots are crushed and then soaked in cold water. The infusion (½ cup) is taken twice daily
	H. arborescens (Spreng.) Cham. and Schltdl.	Umbangandlala	Headaches, fever, and shortness of breath	Leaves and roots	Leaves or roots are boiled and decoction (1 cup) is taken orally three times a day
Araceae	*Z. aethiopica* (L.) Spreng.	Inyibiba	Sore throat Wounds	Rhizomes and leaves	Rhizomes are dried and ground into fine powders, mixed with cold water, and administered by gargling three times a day Fresh leaves are crushed and mixed with little water. Then, the poultice is used for wounds. Fresh leaves are also used as poultice
Asclepiadaceae	*A. fruticosa* L.	Igwada	Blocked nose, diarrhea, stomach aches, influenza	Leaves	Leaves are dried and ground into fine powder, and a pinch of powdered plant material is snuffed. One cup of leaf decoction or infusion is taken three times a day
	X. undulatum (L.) W.T.Aiton	Itshongwe	Headaches, stress stomach aches, diarrhea, dysmenorrhea, high and low blood pressure	Roots and leaves	Dried roots are ground into fine powders and used as snuff. Roots or leaves are boiled and the decoction (1 cup) is taken orally three times a day
Asphodelaceae	*B. frutescens* (L.) Willd.	Ibhucu	Fever, TB, diarrhea, vomiting	Roots and leaves	Roots or leaves are boiled and about ½ cup of the decoction is taken three times a day

Contd...

Table 2: Contd...

Family	Scientific name	Common name (Xhosa)	Uses	Plant part(s) used	Methods of preparation and administration
Asteraceae	*A. arctotoides* (L.f.) O.Hoffm.	Ubushwa	Indigestion and stomach aches	Leaves	Leaves are boiled in water and ½ cup of the decoction is taken three times a day
	A. afra Jacq. ex Willd.	Umhlonyane	Ear aches, coughs and cold, blocked nose	Leaves	Leaves are boiled, then the warm brew is dropped into ears. Leaves are boiled and decoction (1 cup) is taken orally three times a daily. Fresh leaves are inserted into the nostrils
-	*B. pinnata* Noronha	Uvelemampondweni	Diarrhea, influenza, fever, cold, hemorrhage	Leaves	Leaves are soaked in hot water and the infusion (1 cup) is taken three times daily
	E. munitus (L.f.) B.Nord.	Umsola	Management of cancer	Leaves	Leaves are boiled in water and 1 cup is taken orally, once a day
	H. odoratissimum (L.) Sweet	Impepho	Ulcers, insomnia, low sex drive, coughs, and chest pains Headaches	Leaves	Leaves are boiled and decoction (1 cup) is taken two times per day. For insomnia, 1 cup of the decoction is taken at night Leaves are boiled and the vapor is inhaled
	T. officinale (L.) Weber ex F.H.Wigg.	Ihlaba	Constipation	Leaves	½ cup of leaf decoction or infusion is taken orally two times a day
Cactaceae	*O. vulgaris* Mill.	Itolofiya	Wounds	Stem	Fleshy stem is cut open, gently heated over open fire, and applied over wounds once a day
Cannabaceae	*C. sativa* L.	Intsangu	Coughs and chest pains Respiratory ailments	Leaves	Fresh leaves are boiled in water and a cup of the decoction is taken as tea three times a day Dried leaves are pound and smoked three times a day
Celastraceae	*M. heterophylla* (Eckl. and Zeyh.) N.Robson	Umqaqoba	Respiratory ailments, dysmenorrhea	Leaves	A cup of leaf decoction or infusion is taken orally three times a day
Crassulaceae	*C. orbiculata* L.	Imphewula	Earaches Warts	Leaves	Leaves are boiled in hot water and then allowed to cool. The filtered mixture is used as eardrops three times a day to treat inflammation. A leaf is heated until very hot and placed on the swollen part of the body to remove warts
Euphorbiaceae	*C. pulchella* L.	Umbheso	Blocked nose	Bark	Dried bark is ground into fine powders and snuffed
	E. cooperi N.E.Br. ex A.Berger	Umhlontlo	Diarrhea, stomach disorders	Bark	Dried bark is ground, mixed with a sachet of Epsom salt and boiled. The mixture is then cooled, mixed with vinegar, and taken orally three times a day
	E. hirta L.	Intsema	Wounds	Roots	Fresh roots are crushed and used as wound dressing daily
	R. communis L.	Umhlakuva	Stomach aches, headaches, wounds, and sores	Leaves and roots	Leaf infusion is prepared and 1 cup is drank three times a day. Roots and leaves are used as poultice in wounds and sores
Fabaceae	*A. caffra* (Thunb.) Willd.	Umnyamanzi	Fever and colds	Leaves	Leaves are boiled in hot water, cooled, and filtered. Decoction is taken as tea, a cup full twice daily
	A. karroo Hayne.	Umnga	Stomach aches	Bark	Bark is ground and infused into water and a cup full is taken twice daily
	A. mearnsii De Wild.	Idywabasi	Diarrhoea	Bark	A cup full of bark infusion is taken orally three times a day
	E. caffra Thunb.	Umsintsi	Ear aches	Leaves	Infusion of the leaves is used as eardrops three times a day
Hypoxidaceae	*H. colchicifolia* Baker	Inongwe	Urinary tract infection	Corms	Fresh corms are crushed, boiled, and a cup full is taken three times daily
Iridaceae	*Gladiolus* sp.	Umnunge	Colds, stomach aches, dysmenorrhea, TB	Corms	A cupful of corm decoction is taken three times daily
Lamiaceae	*L. leonurus* (L.) R.Br.	Imficamficane	Coughs, sore throat, cold, influenza, fever and headaches	Whole plant	Leaves, stem, and roots are boiled in water and a cupful of decoction is taken three times daily

Contd...

Table 2: Contd...

Family	Scientific name	Common name (Xhosa)	Uses	Plant part(s) used	Methods of preparation and administration
Oleaceae	*O. europaea* L.	Umnquma	Sore throat Diarrhea	Leaves and bark	Leaves are boiled. Then the tea from the leaves is used to gargle four times a day. 1 cup of bark decoction is taken orally, twice daily
Poaceae	*Eragrostis plana* Nees	Umtshiki	Menorrhagia	Roots	1 cup of root infusion is taken orally, twice daily.
Polygonaceae	*E. australis* Steinh.	Inkunzane	Laxative for infants, body pains	Roots	Roots are crushed and soaked in cold water. One tablespoon of the infusion is taken orally, twice daily
	R. lanceolatus Thunb.	Idololenkonyane	Coughs, diarrhea, infertility, dysmenorrhea	Whole plant	A cupful of leaf or stem decoction is taken orally, three times a day. A cupful of root infusion is taken orally, three times daily
Rhizophoraceae	*C. flanaganii* (Schinz) Alston	Ummemezi	Protect the skin from sunburn	Bark	A bark is rubbed on a stone with a little amount of cold water. The paste is applied on the face daily as a cosmetic.
Rutaceae	*C. anisata* (Willd.) Hook.f. ex Benth.	Umfutho	Headaches, fever, sore throat, sinusitis, wounds	Leaves and roots	Decoction of leaves and roots (½ cup) is taken orally, thrice daily. Fresh leaves are crushed and used as wound dressing daily
	P. obliquum (Thunb.) Radlk.	Umthathi	Headaches	Stem	Stem is ground into fine powders and snuffed
	Z. capense (Thunb.) Harv.	Umlungumabele	Severe coughs and colds, sore throat, chest pain, fever	Whole plant	A stem bark is crushed and cooked and then chewed thrice daily. Decoction of leaves, fruits, bark, and roots is used for gargling four times a day. Infusion or decoction of leaves (1 cup) is taken orally as tea three times a day
	Z. davyi Waterm.	Umlungumabele	Cough, sore throat, and fever	Whole plant	It is prepared and used the same way as *Z. capense*
Salicaceae	*S. babylonica* L.	Umngcunube	Wounds	Bark	A dry bark is burnt and then the ash is mixed with a small amount of water and used as a wound dressing daily
Salvadoraceae	*A. tetracantha* Lam.	Igcegceleya	Coughs, asthma, bronchitis, diarrhea	Whole plant	Decoction (cupful) is taken thrice daily
Solanaceae	*L. ferocissimum* Miers	Umbhovu	Stomach complaints, asthma, chest complaints	Whole plant	A decoction is prepared and a cupful is taken thrice daily
	S. aculeastrum Dunal	Umthuma	Coughs, fever, sore throat, abdominal pains, diarrhea	Roots, leaves, and fruit	Fresh roots and leaves are crushed and boiled, and a decoction (1 cup) is taken three times a day. Fruit decoction is used as enema twice daily
Sterculiaceae	*S. henningsii* Gilg	Umnonono	Dysmenorrhea, constipation, TB, rheumatism	Bark	Bark is crushed to powder and decoction is prepared and taken thrice daily
Urticaceae	*U. dioica* L.	Urhawu	Nose infections, For controlling blood pressure	Leaves	Leaves are dried and crushed into fine powders and used as a snuff three times a day. Leaves are boiled and decoction (½cup) taken daily
Verbenaceae	*L. javanica* (Burm.f.) Spreng.	Inzinziniba	Fever, coughs, colds, influenza, sore throat, bronchitis, nose infections	Leaves and stem	Leaves or stem is boiled in water and taken orally as tea (1 cup) three times a day. Dried leaves are ground into fine powders and used as snuff

A. sativum: Allium sativum; T. violacea: Tulbaghia violacea; A. ferox: Aloe ferox; C. obliquus: Cyrtanthus obliquus; S. molle: Schinus molle; A. amatymbica: Alepidea amatymbica; C. asiatica: Centella asiatica; H. arborescens: Heteromorpha arborescens; Z. aethiopica: Zantedeschia aethiopica; A. fruticos: Asclepias fruticos; X. undulatum: Xysmalobium undulatum; B. frutescens: Bulbine frutescens; A. arctotoides: Arctotis arctotoides; A. afra: Artemisia afra; B. pinnata: Bidens pinnata; E. munitus: Euryops munitus; H. odoratissimum: Helichrysum odoratissimum; T. officinale: Taraxacum officinale; C. sativa: Cannabis sativa; M. heterophylla: Maytenus heterophylla; C. orbiculata: Cotyledon orbiculata; C. pulchella: Clutia pulchella; E. cooperi: Euphorbia cooperi; E. hirta: Euphorbia hirta; R. communis: Ricinus communis; A. caffra: Acacia caffra; A. karroo: Acacia karroo; A. mearnsii: Acacia mearnsii; E. caffra: Erythrina caffra; H. colchicifolia: Hypoxis colchicifolia; L. leonurus: Leonotis leonurus; O. europaea: Olea europaea; E. australis: Emex australis; R. lanceolatus: Rumex lanceolatus; C. flanaganii: Cassipourea flanaganii; C. anisata: Clausena anisata; P. obliquum: Ptaeroxylon obliquum; Z. capense: Zanthoxylum capense; Z. davyi: Zanthoxylum davyi; S. babylonica: Salix babylonica; A. tetracantha: Azima tetracantha; L. ferocissimum: Lycium ferocissimum; S. aculeastrum: Solanum aculeastrum; S. henningsii: Strychnos henningsii; U. dioica: Urtica dioica; L. javanica: Lippia javanica; E. plana: Eragrostis plana; O. vulgaris: Opuntia vulgaris; TB: Tuberculosis

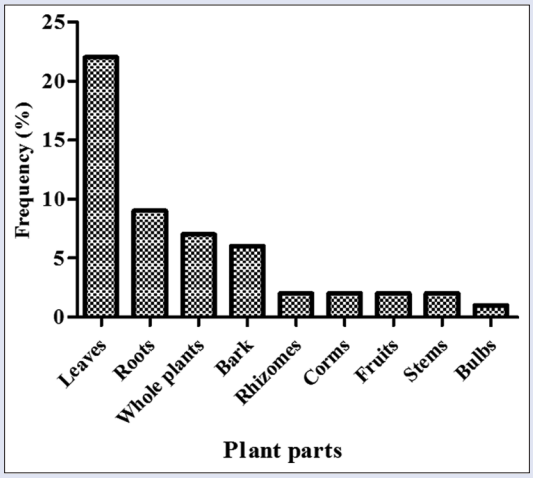

Figure 2: The different parts of plants used against ailments common among the residents of Seymour area in the Eastern Cape Province, South Africa

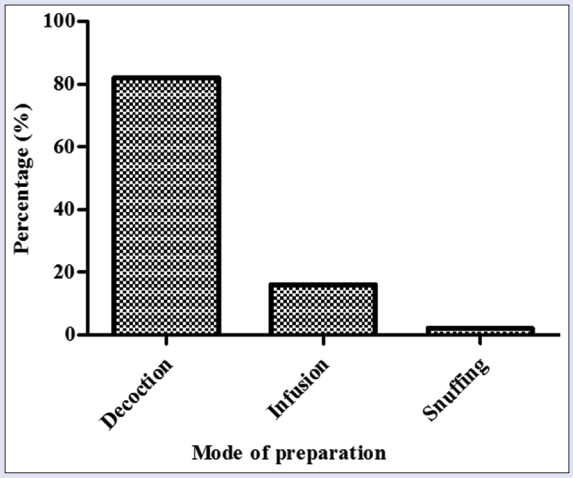

Figure 3: Mode of preparation of remedies used in the treatment of ailments common among the residents of Seymour area in the Eastern Cape Province, South Africa

Table 3: Ailment categories and informant consensus factor values

Ailment category	Nur	Nt	ICF
Respiratory system diseases	32	12	0.65
Reproductive system diseases	11	5	0.60
Musculoskeletal disorder	15	7	0.57
Gastrointestinal diseases	29	15	0.50
Ulcer, wound, and sores	11	6	0.50
Ear, nose, and throat problems	19	12	0.39
Fever	12	8	0.36
Infectious diseases	10	7	0.33
Circulatory system diseases	4	3	0.33

Respiratory diseases: Asthma, cough, and colds; shortness of breath; respiratory ailments; and bronchitis; Reproductive system diseases: Menorrhagia, urinary tract infection, low sex drive, infertility, dysmenorrhea, and women infertility; Musculoskeletal diseases: Headaches, toothache, chest pain, and body pain; Gastrointestinal diseases: Stomach disorders, constipation, vomiting, and diarrhea; Ulcer, wound, and sores: Ulcers, wound, sore, and warts; Ear, nose, and throat problems: Sore throat, ear aches, sinusitis, and blocked nose; Fever: Fever; Infectious diseases: Influenza and TB; Circulatory diseases: Hemorrhage, high and low blood pressure. Nur: Number of reports; Nt: Number of taxa; ICF: Informant consensus factor; TB: Tuberculosis

were also mentioned during the interview process. Preparing decoction and infusion from the plant material was the most commonly used method of preparation [Figure 3]. Grinding the plant material into fine powder was the preparatory method often used in the treatment of headaches, blocked nose, and other nose infections as well as respiratory ailments, while boiling the leaf making a warm brew was mainly used in the treatment of ear aches. Grinding plant material into fine powder and making a paste was often used in the treatment of wounds and skin infections. Heating the leaf and cut open fresh stem, burning the plant material into ashes, and making a paste were other reported preparatory methods used for the treatment of wounds. Using the fresh material as it is, with no preparations, was another method used in the treatment of coughs, colds, and blocked nose.

The application methods of herbal remedies also varied [Figure 4]. They included taking the decoctions, infusions, or fresh plant material orally for most reported ailments; application of plant extracts and paste directly on wounds and infected areas of skin; snuffing the powdered plant material for headaches and nose infections; smoking the powdered plant material for respiratory ailments; squeezing the warm plant extracts or sapping directly into the ear for ear infections; administering enema through the rectum for digestive problems; and inserting fresh leaves into the nostrils for blocked nose.

Some plants such as *Aloe ferox, Alepidia amatymbica, Artemisia afra, Zantedeschia aethiopica, Arctotis arctotoides, H. odoratissimum, C. sativa, R. communis, A. tetracantha, Olea europaea, L. leonurus, M. heterophylla,* and *Xysmalobium undulatum* were frequently mentioned by the traditional healers, herbalists, and villagers during the survey. In addition, it was interesting to note that *Cyrtanthus obliquus*, *A. arctotoides*, *A. afra*, *H. odoratissimum*, *Emex australis*, *Cassipourea flanaganii*, *Solanum aculeastrum*, *Tulbaghia violacea*, *Asclepias fruticose*, *Bulbine frutescens*, *Opuntia vulgaris*, *L. leonurus*, *O. europaea,* and *S. henningsii* were the most commonly used species in all the four villages (Phakamisa, old location, Izinyoka, and Joza). These plants have previously been cited in literature for the management and treatment of many ailments in South Africa, some of which were not mentioned by traditional healers, herbalists, and villagers in the study area. For example, *A. afra* is reported to be effective in treating bronchitis, TB, mumps, pneumonia, pimples, skin rashes, loss of appetite, colic, headache, ear ache, and intestinal worms,[52-54] whereas *L. leonorus* is used against diabetes mellitus, eczema, epilepsy, delayed menstruation, intestinal worms, constipation, scorpion stings, snake bites, skin rashes, and boils.[25,55-57] *A. ferox* is a very popular medicinal plant used to treat sores, wounds, acne, burns, blisters, cold sores, cracked lips, insect bites, mouth ulcers, sunburn, rashes, and secondary infections of HIV.[53] This is not surprising considering that a single plant species may contain several chemical compounds that may be active against a wide array of diseases.[58] During the survey, some plants were reported to be more effective when used together with other plants for the treatment of a number of ailments, for example, *C. asiatica* was reported to be more effective when mixed with *R. lanceolatus* for the treatment of infertility and other related diseases.

CONCLUSIONS

This study has revealed important information on medicinal plants used by people, traditional healers, and herbalists of Seymour region in the Eastern Cape Province of South Africa to treat various ailments. It also demonstrates the vital role that medicinal plants play in the primary health care of these people. Fifty plant species, belonging to 29 families, are used to treat a wide range of ailments including respiratory and reproductive system diseases, musculoskeletal disorders, skin infections,

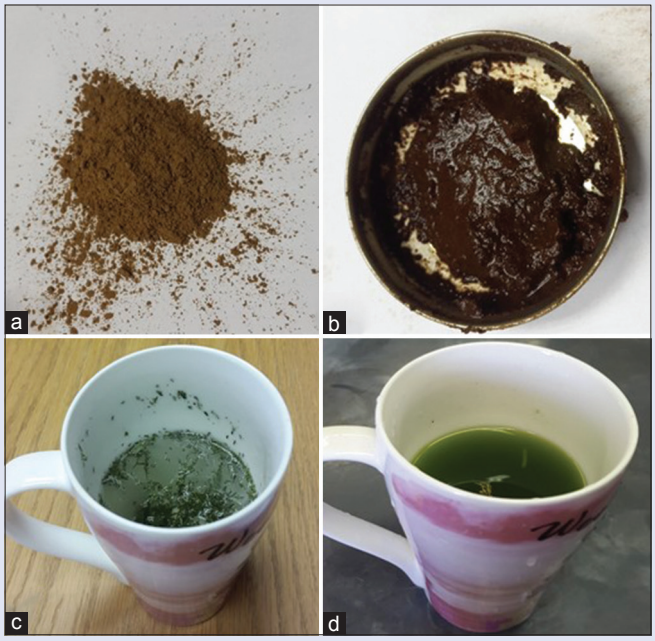

Figure 4: Methods of preparation of traditional medicine. (a) Powdered traditional medicine which is used as a snuff; (b) Poultice which is applied on wounds or sores; (c and d) Leaf infusion and decoction

ENT infections, ulcers, headache, gastrointestinal diseases, etc. It was interesting to note that some plant species were used to treat more than one ailments, for example, *S. henningsii* is used to treat TB, dysmenorrhea, constipation, and rheumatism. Some plants were effective when used in combination with others, for example, *C. asiatica* was effective when combined with *R. lanceolatus* for infertility. Leaves were reported to be the most commonly used plant parts, with decoction and infusion reported as the commonly used methods of preparation.

To know the proper medicinal value of some of these plants, studies have been undertaken and have confirmed their therapeutic effects. However, more researches on pharmacological, phytochemical, and toxicological studies of extracts prepared from some of these plants need to be conducted. This will help in the development of new plant-based drugs. This is part of a Master degree student work which will lead to writing a thesis which will be available in the university website for all users after submission.

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Conflicts of interest

There are no conflicts of interest.

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