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Application of Medicinal Plants in Maternal Healthcare and Infertility: A South African Perspective

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Key words

- infertility
- maternal healthcare
- medicinal plants
- South Africa
- traditional medicine
- woman reproductive health

Abstract

Plants have played significant roles as medicine during pregnancy, birth, and postpartum care in many rural areas of the world. In addition to this, plants have been used for centuries to treat infertility and related reproduction problems. The aim of this paper was to review the current status of plant species used in maternal healthcare, including infertility, in South Africa, in terms of scientific evaluation for efficacy and safety. In addition to this, the role of medicinal plants as a tool in achieving the MDG5 of reducing maternal mortality by 2015 was evaluated. A search was done with the aid of Google Scholar, PubMed, Science Direct, peer-reviewed papers, and books, using keywords such as child birth, labour pain, maternal health, maternal mortality, menstrual pains, and postpartum. The plants listed in the different

research articles were classified according to their use and the target effect of a plant extract or compound on reproductive function. Eighty-four plant species were found to be used to treat infertility and related problems. Twenty plant species are used during pregnancy, while 26 plant species are used to ease childbirth. For postpartum healing and any problems after childbirth, nine plant species were recorded. Unhealthy pregnancy and birth complications are among the factors that contribute to the loss of cognitive potential in the developing world's children, condemning them to impoverished lives. The best way to keep a country poor is to rob its children of their full developmental potential. In this respect, medicinal plants play a significant role in reducing maternal mortality and ensuring the birth of healthy children.

Introduction

Maternal healthcare can be defined as the health of a woman during pregnancy, childbirth, and the postpartum period. It includes family planning, preconception, prenatal and postnatal care in order to reduce maternal morbidity and mother and child mortality [1]. Maternal death can be defined as the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes.

Maternal health and reducing maternal mortality has been a topic of concern worldwide since the late 1980s. Improving maternal health millennium development goal 5 (MDG5) is one of the eight millennium development goals, and the international community committed itself to reduc-

ing the maternal mortality ratio by three-quarters between 1990 and 2015 [2].

The health of a mother and to be born child is determined by the kind of maternal healthcare both at pre- and post-delivery [3]. In a number of developing countries, complications during pregnancy and childbirth are the leading causes of death among women of reproductive age. It is approximated that a woman dies from complications from childbirth every minute [4]. Most maternal deaths and injuries are caused by biological processes such as postpartum haemorrhaging and not from disease [5,6]. Each year, half a million women die during childbirth or from complications during pregnancy, and 99% of maternal and newborn mortality occurs in developing countries. Of these deaths, 80% are caused by direct obstetric causes such as haemorrhage, infection, hypertensive disorders of pregnancy, and complications of unsafe abortion [4]. For every woman who dies from childbirth complications,

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about 20 to 30 more suffer injuries such as obstetric fistula, a ruptured uterus, infections and disabilities that are usually untreated and ignored and can lead to life-long pain and social and economic exclusion. In 2008, about 350 000 maternal deaths occurred worldwide, with 87% of the deaths occurring in sub-Saharan Africa and South Asia [7].

Maternal mortality is still an important public health challenge in South Africa even with the Government's initiatives to monitor and reduce maternal deaths [8]. There are three health and demographic surveillance sites (HDSSs) in the country; however, reporting of deaths in rural under-resourced areas is incomplete, since some of the deaths occur at home and are not reported. Given that women with the least access to services are likely to be those whose deaths are undetected, the reasons for their deaths are likely also to go undocumented. It is claimed that about 350 000 women die during pregnancy and childbirth annually [9], and many of these women did not receive the necessary maternal healthcare due to socioeconomic factors [10]. In South Africa, the total number of maternal deaths per 100 000 live births in 2008 was about 4500 [7]. In addition to maternal deaths, more women and girls may develop short- and long-term disabilities such as obstetric fistula, a ruptured uterus, or pelvic inflammatory diseases. On a more positive note, these tragedies can be prevented with cost-effective health-care services, including the promotion of traditional medicine in the primary health-care sector.

Causes of maternal mortality

Most birth complications are caused by increased uterine contractions. However, increased uterine contractions are important when there is delayed or prolonged labour. Postpartum haemorrhage (PPH) is one of the leading causes of maternal mortality in sub-Saharan Africa [11]. Several countries have high overall maternal mortality rates and are not on track to achieving MDG5; South Africa is one of them. The Saving Mothers reports produced every 3 years in South Africa by the National Committee for Confidential Enquiry into Maternal Deaths indicate that obstetric haemorrhage is the third most common cause of maternal death in South Africa, accounting for 12.4% of all maternal deaths during 2005–2007 [12]. This cause of maternal death is not decreasing; 13.6% in 1999–2001 and 18.8% in 2005–2007. Major causes of obstetric haemorrhage in South Africa during 2005–2007 are abruptio placentae (9.8%), retained placenta (17.9%), uterine atony (13.6%), uterine rupture (16.3%), and other uterine trauma such as bleeding during and after caesarean section (28.5%). Most of these conditions can be prevented by timeous management of prolonged labour.

Postnatal depression is a type of clinical depression that can affect women, and sometimes men, after childbirth. It is characterised by a mild and transitory form of moodiness including tearfulness, irritability, hypochondriasis, sleeplessness, impairment of concentration, isolation, and headache. Postnatal depression affects a lot of women for a few weeks after childbirth, and the estimates vary widely across the world [13]. It causes distress and morbidity for the women affected and sometimes impairs their parenting capabilities, which may affect the development of the child. This, in turn, may affect the child increasing the risk of emotional, behavioural, cognitive and other health problems [14, 15]. Causes of postpartum depression may be fluctuating levels of hormones (hormonal treatment), sudden need to cope with the new situation and the reality of birth, and the exhaustion during the period of labour and the term of pregnancy. Complica-

tions during pregnancy and at birth may also result in postnatal depression. If proper care is provided during pregnancy, there is a higher chance of reducing or even avoiding postnatal depression.

Infertility and related complications

Infertility is the inability to naturally conceive a child or to carry a pregnancy to full term [16]. For the majority of South Africans, fertility is a dominant theme in their culture as it ensures preservation and propagation of the tribe [17]. Barrenness is regarded as a disgrace, and procreation is expected after marriage [18]. Although there are lots of efforts to reduce the world's population and extensive campaigns promoting contraception, for those who cannot conceive and bear children, it is a nightmare. The majority of infertile people live in the "infertility belt" which stretches across central and southern Africa. This "infertility belt" has the world's highest rate of infertility (30%). Infertility constitutes a serious burden for the socioeconomic development of many African nations since it affects the life of individuals, couples, and families and almost always leads to decreased levels of personal well-being. Thus, infertility is now considered a public health concern [19]. Fertility drugs are often used as initial treatment to induce ovulation. However, if this fails, reproductive procedures such as *in vitro* fertilisation to produce eggs, a process called super-ovulation, and high-tech treatments such as assisted reproductive technologies (ARTs) may be used [9].

The aim of this paper was to review the current status of plant species used in maternal healthcare in South Africa, including infertility, in terms of scientific evaluation for efficacy and safety. In addition to this, the role of medicinal plants as a tool in achieving the MDG5 was evaluated. This review may help in finding the most effective ways to improve reproductive healthcare practices at the community level and how best to successfully integrate traditional/indigenous medicine into global clinical practices. In addition to this, data dealing with the effects of plant extracts and compounds on maternal healthcare in South Africa is discussed.

Materials and Methods



A search was done with the aid of Google Scholar, PubMed, Science Direct, peer-reviewed papers, and books using keywords such as child birth, labour pain, maternal health, maternal mortality, menstrual pains, and postpartum. This was done by reviewing all the available literature on studies performed on medicinal plants used traditionally in maternal healthcare in South Africa to the best of our ability.

Results



The traditional use of herbal remedies in pregnancy-related conditions has been reported throughout the world. In sub-Saharan Africa, information regarding herbal remedies used during pregnancy has been documented in many countries [20–25]. In South Africa, a number of studies have been done on pregnancy-related herbal medicines [20, 26–30]. Most cited reasons for the use of herbal remedies were protection from evil spirits, as an alternative to failed modern treatment, and the belief that herbal remedies are more effective and safer than modern antenatal care (biomedical).



Infertility

Traditional medicine has been used to treat a number of conditions responsible for female infertility. In South Africa many plant species are used to overcome infertility [20]. These plants are used to treat ovulation disorders, ovulation problems caused by polycystic ovarian syndrome, premature ovarian failure, blocked fallopian tubes, adhesions (scar tissues) and pelvic inflammatory diseases, cervical mucus, and for retaining pregnancy to full-term [16]. According to Steenkamp [20], 90 plant species are used to treat infertility. A total of 72 plant species were found to be used to treat menstrual disorders and were not included in an earlier study [20]. **Table 1** shows plants that are employed to treat infertility and related complications. Eighty-four species from 52 families are used to deal with infertility issues. In addition to the plant species listed in Steenkamp [20], six new species were found to be used in treating infertility in women (**Table 1**). Modes of administration include decoction of a plant in the form of porridge and infusions taken orally or as vaginal douches.

Maternal healthcare

Plants have played a significant role as medicine during pregnancy, birth, and postpartum care in many rural areas of the world [31]. During pregnancy, these plants are used for different reasons; firstly, to prevent miscarriage, to ease morning sickness, swelling of legs, ankles, and abdominal pains. Secondly, these plants are utilised during birth to accelerate contractions during labour and to expel the retained placenta. In addition to all these, medicinal plants are also used to stop postpartum haemorrhaging, to alleviate postpartum abdominal pains, as a purgative to cleanse the womb after birth, and to encourage lactation [32].

Most of these plants are used as herbal remedies in regulating the menstrual cycle, enhancing fertility, as abortifacients or anti-abortifacients, and also during pregnancy [20]. Varga and Veale [26] reported that healers noted specific plants that are effective in inducing and aiding prolonged labour. The most popular plants were *Agapanthus africanus* (Alliaceae), *Clivia miniata* (Amaryllidaceae), *Combretum erythrophyllum* (Combretaceae), *Gunnera perpensa* (Gunneraceae), and *Pentanisia prunelloides* (Rubiaceae). Most of these plants are used as ingredients in making herbal mixtures such as “isihlambezo”, a liquid herbal mixture used mostly by Zulu women in order to promote a favourable course of pregnancy and facilitate quick uncomplicated labour. It is drunk daily as a tonic from mid-pregnancy until and including delivery [28,29,33–35]. This mixture is occasionally prescribed as a vaginal douche during pregnancy [26]. *Inembe* (a potent labour-inducing herbal mixture) is also used to facilitate delivery or to initiate delayed labour [26]. This “inembe” is often used as an abortifacient. Plants that are used during pregnancy, during delivery, and afterbirth are shown in **Tables 2, 3, and 4**. These plants are used to relieve oedema, vaginal wetness, prevention of backache, to cleanse wombs/stomach, prevention of sexually transmitted diseases, relieve constipation, and spiritual cleansing. For the fetus, the plants are mainly used to reduce placenta size, stimulate growth and movement, loosening from uterine wall, as well as prevention of miscarriages and premature labour. In labour, these plants are also used to facilitate quick and painless delivery, and after birth, they are used to promote postpartum healing. Some of these plants are employed far beyond the South African borders during and after pregnancy.

Efficacy and safety studies

Even though the number of plants used as medicine for infertility and during and after pregnancy are many, very little has been done in terms of evaluating them for efficacy and safety. Kaido et al. [36] investigated three species used as herbal remedies during pregnancy and labour. *Agapanthus africanus* and *Pentanisia prunelloides* exhibited direct smooth muscle activity on the uterus and ileum preparations, while *Gunnera perpensa* induced direct smooth muscle activity on the uterus only. Veale et al. [37] concluded that the crude extract of *Agapanthus africanus* leaves contains one or more active principle(s) with agonist activity on the uterine muscarinic receptors and that the extract promoted the synthesis of prostaglandins in the uterus. This mechanism of action justified the traditional use of this species as an oxytocic agent in the treatment of prolonged labour.

Rhoicissus tridentata subsp. *cuneifolia* (Vitaceae), used to induce labour by traditional healers, was found to stimulate concentration-dependent contractions of the uterus and ileum [38]. The contractile response of the uterus and ileum to the root extract of this species is mediated predominantly by the muscarinic receptor and the production of cyclooxygenase. The promotion of contractions comes in handy since obstructed labour is one of the five direct causes that account for the 80% of maternal deaths worldwide. *Gunnera perpensa* is broadly cited in the literature and often indicated by healers in facilitation of postpartum healing [26]. Healers prescribe this plant as a vaginal douche. This could be due to its efficiency as a uterotonic agent in preventing postpartum haemorrhage [26].

Plants commonly used in traditional medicine are assumed safe, however, this is not usually the case, since a number of medicinal plants have been found to be toxic, cause damage on genetic material and even to kill. In terms of safety, some of the species cited have potential toxic effects. For plants used to treat infertility, 14 species are proven scientifically to be potentially toxic either *in vivo*, *in vitro*, or both (**Table 1**). Further studies need to be done to determine a safety dosage especially for those very effective species in terms of efficacy. For plants used during pregnancy, childbirth, and after childbirth, only three species are potentially toxic (**Tables 2, 3, and 4**). *Clivia miniata* is one of these species and, despite being potentially toxic, is used for infertility, during pregnancy and childbirth, and even thereafter.

Discussion and Conclusions



A significant component of Africans, including South Africans, still use herbal remedies for antenatal care, fertility problems, and all the other problems related to reproductive healthcare. This may be because: (i) the remedies have wider applications and are effective for certain conditions and yet, their potential can only be determined by research of efficacy and safety; and (ii) the poor quality of antenatal services in some areas of Africa, whereby some urban clinics are overloaded and understaffed, and waiting for long hours to be seen by a doctor or nurse is very discouraging. Even though most women use herbal remedies to relieve pregnancy-associated symptoms, some take them as a consequence of belief, possibly superstitious, circumstantial constraints, and combinations of these [36]. For this reason, the toxicity effects of these plants need to be investigated regardless of whether they are effective or not.

As a way of recognising the values and roles of traditional medicinal knowledge in the reproductive health-care provision, exten-



Table 1 Plants used to treat infertility in southern Africa (adopted from Steenkamp 2003 [20]).

Plant names	Parts used	References
Acanthaceae		
<i>Barleria randii</i> S. Moore	R, L	[39]
Amaranthaceae		
<i>Pupalia</i> sp.	Fl	[41]
Amaryllidaceae		
* <i>Clivia miniata</i> (Lindl.) Regel.	B	[34]
Anacardiaceae		
<i>Lannea discolor</i> (Sond.) Engl.	R	[39]
<i>Sclerocarya birrea</i> A. Rich. Hochst.	B	[39]
<i>Ozoroa paniculosa</i>	R	[63]
Annonaceae		
<i>Artabotrys brachypetalus</i> Benth.	R	[40]
Apocynaceae		
* <i>Acokanthera oppositifolia</i> (Lam.) Codd	Rb	[40]
<i>Holarrhena pubescens</i> (Buch. Ham.) Wall.	R	[40]
Araceae		
* <i>Zantedeschia aethiopica</i> (L.) Spreng.	R	[40]
Asclepiadaceae		
<i>Asclepias fruticosa</i> L.	R	[42]
Asteraceae		
<i>Bidens pilosa</i> L.	L	[42]
* <i>Callilepis laeureola</i> DC.	T	[45]
<i>Dicoma anomala</i> Sond.	R	[43]
<i>Dicoma zeyheri</i> Sond.	Fl, F	[42]
<i>Vernonia amygdalina</i> Del.	R	[39]
<i>Vernonia tigna</i> Klatt	L, R	[41]
Boraginaceae		
<i>Ehretia rigida</i> (Thunb.) Druce	R	[40]
Capparaceae		
<i>Capparis tomentosa</i> Lam.	R	[39, 40]
<i>Maerua cafra</i> (DC.) Pax	R	[40]
Celastraceae		
<i>Elaeodendron transvaalense</i> (Burt Davy) R. H. Archer	B	[50]
Colchicaceae		
<i>Gloriosa virescens</i> Lindl.	R, B	[34, 41]
Combretaceae		
* <i>Combretum erythrophyllum</i> (Burch.) Sond.	B	[42]
<i>Combretum hereroense</i> Schinz	Fr	[63]
<i>Combretum imberbe</i> Wawra	R	[42]
<i>Combretum molle</i> R. Br. ex G. Don.	R	[42]
<i>Combretum paniculatum</i> Vent.	R	[40]
<i>Terminalia sericea</i> Burch. ex DC.	R	[40]
Commelinaceae		
<i>Commelina benghalensis</i> L.	Unspecified	[43]
<i>Cyanotis speciosa</i> (L. F.) Hassk.	R	[39]
Cyperaceae		
<i>Cyperus esculentus</i> L.	R	[41]
Dipsacaceae		
<i>Scabiosa columbaria</i> L.	R	[43, 46]
Ebenaceae		
<i>Diospyros lycioides</i> Desf.	R	[53]
<i>Diospyros whyteana</i> (Hiern) F. White	Unspecified	[41]
<i>Euclea natalensis</i> A. DC.	R	[40]
Equisetaceae		
* <i>Equisetum ramosissimum</i> Desf.	Rh	[49]
Euphorbiaceae		
* <i>Antidesma venosum</i> E. Mey. ex Tul.	R	[40]
<i>Croton megalobotrys</i> Mull-Arg.	Sb	[63]
Fabaceae		
<i>Bauhinia galpinii</i> N. E.Br.	R	[40]
<i>Bauhinia petersiana</i> Oliv.	R	[43]
<i>Dichrostachys cinerea</i> (L.) Wright & Arn.	R	[40]
<i>Indigofera arrecta</i> Hocht. ex A. Rich.	R	[39]
<i>Peltophorum africanum</i> Sond.	R	[47]

continued

Table 1 Continued

Plant names	Parts used	References
<i>Senna petersiana</i> (Bolle) Lock	R	[42]
Flacourtiaceae		
<i>Oncoba spinosa</i> Forssk.	R	[40]
Haloragaceae		
<i>Gunnera perpensa</i> L.	R	[39, 41]
Hyacinthaceae		
* <i>Bowiea volubilis</i> Harv. ex Hook. F.	B	[48, 52]
<i>Merwillia natalensis</i> Planch.	B	[60]
Hypoxidaceae		
<i>Hypoxis colchicifolia</i> Bak.	C	[41, 46]
Iridaceae		
<i>Crocasmia paniculata</i> (Klatt) Goldblatt	C	[44]
<i>Crocasmia pottsii</i> (Macnab ex Baker) N. E.Br.	C	[44]
<i>Gladiolus ludwigii</i> Pappe ex Baker	R	[41]
<i>Gladiolus sericeovillosus</i> Hook. F.	R	[44]
* <i>Moraea spathulata</i> (L. F.) Klatt	C	[45]
Lauraceae		
<i>Cassytha filiformis</i> L.	R	[40]
Maesaceae		
<i>Maesa lanceolata</i> Forssk.	R	[40]
Malphiaceae		
<i>Sphedamnocarpus galphimifolius</i> Szyszyl.	R	[40]
Malvaceae		
<i>Hibiscus vitifolius</i> L.	R	[40]
Melanthaceae		
* <i>Bersama lucens</i> (Hochst.) Szyszyl.	B	[41]
Menispermaceae		
<i>Cissampelos mucronata</i> A. Rich.	R	[39]
Moraceae		
<i>Ficus sur</i> Forssk.	R	[39]
Nymphaeaceae		
<i>Nymphaea nouchali</i> Burm. F.	R	[40]
Ochnaceae		
<i>Ochna natalitia</i> (Meisn.) Walp.	R	[47]
Olacaceae		
<i>Ximenia caffra</i> Sond.	R	[39, 41]
Orchidaceae		
<i>Disa aconitoides</i> Sond.	R	[45]
<i>Eulophia arenaria</i> Lindl.	R	[41]
<i>Eulophia clavicornis</i> Lindl.	T	[46]
<i>Eulophia cucullata</i> (Afzel. ex Swartz) Steudel	R	[45]
<i>Eulophia ovalis</i> Lindl.	T	[44]
<i>Eulophia tenella</i> Reichb. F.	T	[43]
Passifloraceae		
* <i>Adenia gummifera</i> (Harv.) Harms	R	[40]
Pedaliaceae		
<i>Harpagophytum procumbens</i> (Burch.) DC.	T	[39]
Phytolaccaceae		
* <i>Phytolacca dodecandra</i> L.'Hér	R	[44]
Piperaceae		
<i>Piper capense</i> L. F.	B	[40]
Polygonaceae		
<i>Rumex lanceolatus</i> Thunb.	Rh	[43]
Rhamnaceae		
<i>Berchemia discolor</i> (Klotzsch) Hemsl.	R	[40]
<i>Ziziphus mucronata</i> Willd.	R	[40]
Rubiaceae		
<i>Kohautia amatymbica</i> Eckl. & Zeyh.	Unspecified	[43, 44]
Rutaceae		
<i>Vepris lanceolata</i> (Lam.) G. Don.	R	[40]
Santalaceae		
<i>Osyris lanceolata</i> Hochst. & Steudel	R	[39]
Solanaceae		
* <i>Solanum hermanni</i> Dun.	Rb	[41]
<i>Solanum mauritianum</i> Scop	L	[42]

continued



Table 1 Continued

Plant names	Parts used	References
Sterculiaceae		
<i>Dombeya rotundifolia</i> (Hochst.) Planch.	R	[42]
Tiliaceae		
<i>Grewia flavescens</i> Juss.	R	[41]
<i>Grewia microthyrsa</i> K. Schum. Ex Burret	R	[40]
<i>Grewia occidentalis</i> L.	Unspecified	[41]
Typhaceae		
<i>Typha capensis</i> (Rohrd.) N. E.Br.	Rh	[50]
Urticaceae		
<i>Pouzolzia mixta</i> Solms	R	[39]
<i>Urtica urens</i> L.	Unspecified	[41]
Vitaceae		
<i>Rhoicissus tridentata</i> (L. F.) Wild & R. B. Drumm.	T	[39]

B = bulbs; C = corms; Fr = fruits; L = leaves; R = roots; Rb = root bark; Rh = rhizome; Sb = stem bark; T = tubers; * = potentially toxic

Table 2 Plants used during pregnancy in southern Africa.

Plant names	Plant parts	Traditional uses	References
Alliaceae			
<i>Agapanthus africanus</i> Hoffmans	R	To ensure birth of a healthy child.	[26]
Aloaceae			
<i>Aloe cooperi</i> Bak.	R	Used as an ingredient in "inembe". Only used from the 8th month of pregnancy as early use in pregnancy may cause abortions or miscarriages.	[34, 45]
Amaryllidaceae			
* <i>Clivia miniata</i> (Lindl.) Regel	Bl	Used for infection during pregnancy.	[26, 28]
<i>Scadoxus puniceus</i> (L.) Friis & Nordal	Unspecified	Ingredient in infusions such as "inemb" and "isihlambezo" taken during pregnancy.	[34, 45]
Araceae			
<i>Zantedeschia albomaculata</i> (Hook.) Baill. subsp. <i>albomaculata</i>	Unspecified	Decoctions administered to women suffering from repeated miscarriages and also given to pregnant women to prevent them from giving birth to small, weak babies.	[44, 45]
Asteraceae			
<i>Dicoma anomala</i> Sond.	R	Indigestion during pregnancy.	[26, 44]
Clusiaceae			
<i>Garcinia livingstonei</i> T. Anderson	R	Decoctions taken for abdominal pain during pregnancy.	[55, 56]
Dioscoreaceae			
<i>Dioscorea dregeana</i> Baker	Unspecified	Ingested during pregnancy.	[26, 45]
Dracaenaceae			
<i>Sansevieria hyacinthoides</i> (L.) Druce	Sap	Used to prevent miscarriages.	[44]
Euphorbiaceae			
<i>Euphorbia woodii</i> N. E.Br.	Lx	Taken internally during pregnancy.	[44]
<i>Jatropha zeyheri</i> Sond.	T	Used by pregnant women to strengthen the baby.	[45, 57]
Fabaceae			
<i>Albizia adianthifolia</i> (Schumach.) W. F. Wight	B	Enemas administered to pregnant women to clear their urine.	[44]
<i>Senna occidentalis</i> (L.) Link	L	Used as laxatives; to stop bleeding during pregnancy.	[58]
Hyacinthaceae			
<i>Eucomis autumnalis</i> (Mill.) Chitt. subsp. <i>clavata</i> (Bak.) Reyneke	B	Used to prevent premature childbirth.	[44]
<i>Ledebouria cooperi</i> (Hook. f.) Jessop	B	Used as soothing medicine for women in the fourth month of pregnancy.	[45]
Icacinaeae			
<i>Pyrenacantha scandens</i> Planch. ex Harv.	R	Infusions are taken during pregnancy to prevent miscarriages.	[43, 44]
Lamiaceae			
<i>Ballota africana</i> (L.) Benth	L, S	Uterus infection.	[51]
Menispermaceae			
<i>Cissampelos mucronata</i> A. Rich.	R	Widely used during pregnancy; no specific use cited.	[40]
Rubiaceae			
<i>Pentanisia prunelloides</i> (Klotzch ex Eckl. & Zeyh.) Walp.	R	Used to prevent/treat constipation in pregnant women.	[26, 40, 44]
Sterculiaceae			
<i>Dombeya rotundifolia</i> (Hochst.) Planch. var. <i>rotundifolia</i>	B	Used for palpitations and for nausea especially in pregnancy.	[44]

R = roots; B = bulbs; T = tubers; L = leaves; S = stems; Lx = latex; * = potentially toxic

Table 3 Plants used to ease childbirth in southern Africa.

Plant names	Parts used	Traditional uses	References
Alliaceae			
<i>Agapanthus africanus</i> Hoffmans	R	Used to ensure easy childbirth and a healthy child.	[26]
Amaryllidaceae			
* <i>Clivia miniata</i> (Lindl.) Regel	Bl	Used for delivery.	[26, 28]
<i>Cyrtanthus sanguineus</i> (Lindl.) Walp.	Bl	Infusions taken regularly from the 4th month of pregnancy to ensure easy labour.	[45]
Combretaceae			
* <i>Combretum erythrophyllum</i> (Burch.) Sond.	B	Used as ingredients in “isihlambezo” taken during pregnancy to facilitate labour.	[28, 43]
Dioscoreaceae			
<i>Dioscorea dregeana</i> Baker	Unspecified	Also used as an ingredient in “inembe” to ease childbirth.	[45]
Ebenaceae			
<i>Euclea undulata</i> Thunb.	Unspecified	Used as an ingredient in “inembe”.	[45]
Fabaceae			
<i>Erythrina lysistemon</i> Hutch.	B	Infusions taken to ease childbirth.	[48]
<i>Ormocarpum trichocarpum</i> (Willd.) A. Chev.	L, R	Used for prolonged labour in childbirth.	[21]
Flacourtiaceae			
<i>Gerrardina foliosa</i> Oliv.	Whole plant	Sometimes used as an ingredient in “inembe”.	[34, 45]
Gunneraceae			
<i>Gunnera perpensa</i> L.	R	Used with <i>Crinum</i> species to facilitate the delivery or initiate delayed labour.	[26, 40, 42, 44]
Hyacinthaceae			
* <i>Bowiea volubilis</i> Harv. ex Hook. f	B	Infusions taken during pregnancy to facilitate delivery; care should be taken when administering since it is also used to procure abortion.	[34, 45]
<i>Merwillia natalensis</i> Planch.	B	Used as an ingredient in infusions taken during pregnancy to facilitate delivery.	[34, 45]
Icacinales			
<i>Pyrenacantha scandens</i> Planch. ex Harv.	R	Sometimes used as an ingredient in “inembe” to ease birth.	[42, 44]
Iridaceae			
<i>Dietes iridiodes</i> (L.) Sweet ex Klatt	Rh, R	Infusions used during childbirth.	[34, 44]
Meliaceae			
<i>Ekerbergia capensis</i> Sparm	Unspecified	Used to facilitate childbirth.	[51]
Moraceae			
<i>Ficus natalensis</i> Hochst. subsp. <i>natalensis</i>	B	An ingredient in “inembe”, used to ease childbirth.	[45]
Polygalaceae			
<i>Polygala fruticosa</i> Berg.	R	An ingredient in “inembe”, used to ease delivery.	[44]
Sterculiaceae			
<i>Dombeya rotundifolia</i> (Hochst.) Planch. var. <i>rotundifolia</i>	B	Decoctions used to hasten delayed onset of labour and for procuring abortion.	[44]
Tiliaceae			
<i>Grewia occidentalis</i> L.	R	Infusions taken to facilitate or procure delivery.	[42]
<i>Triumfetta rhomboidea</i> Jacq.	R	Infusions taken to facilitate delivery.	[42, 59]
Thymelaceae			
<i>Gnidia kraussiana</i> Meisn. var. <i>kraussiana</i>	Unspecified	Sometimes used as an ingredient in “inembe”.	[34, 45]
Typhaceae			
<i>Typha capensis</i> (Rohrb.) N. E.Br.	Rh	Ease childbirth; strengthen uterine contractions.	[45, 60]
Vitaceae			
<i>Cyphostemma natalitium</i> (Szyzyl.) j. v. d. Merwe	R	Ingredient in “inembe”.	[34]
<i>Rhoicissus digitata</i> (L. f.) Gilg & Brandt	R	Used during pregnancy to facilitate delivery.	[45]
<i>Rhoicissus tomentosa</i> (Lam.) Wild. & Drum	R	Used during pregnancy to facilitate delivery.	[45]
<i>Rhoicissus tridentata</i> (L. F.) Wild. & R. B. Drumm.	T	Used in an herbal mixture to induce labour.	[26, 28, 40–42, 44, 49, 52]

B = bulbs; R = roots; L = leaves; Rh = rhizomes; Sb = stem bark; * = potentially toxic

sive research into the efficacy and safety of herbal uses in the management of reproductive-related disorders needs to be done. The study of the use and health consequences of pregnancy-related traditional medicine is significant for diverse reasons. It is also relevant from a medical anthropology perspective. The persistence of traditional medicinal systems alongside modern medicine is an indication of adaptive mechanisms in the face of social changes. Some people view traditional medicine being more

open, flexible, and more accommodative of social mobility and change than modern medicine. Unfortunately, modern science has not maintained pace in the study of the mechanisms and relative benefit or potential harm of these plants. Women from many cultural backgrounds continue to use plants despite the presence of modern medications, and since most of the women who die during pregnancy and childbirth come from the less fortunate sectors of society in terms of availability of proper socio-



Table 4 Plants used after childbirth in southern Africa.

Plant species	Plant parts	Traditional uses	References
Amaryllidaceae			
* <i>Clivia miniata</i> (Lindl.) Regel	Bl	Used for infection during pregnancy postpartum healing.	[26, 28]
Asteraceae			
<i>Cnicus benedictus</i> L.	L, S	After birth conditions.	[40]
<i>Vigna unguiculata</i> (L.) Walp.	Sb, R	Used after childbirth to expel the afterbirth.	[54]
Euphorbiaceae			
<i>Ricinus communis</i> L.	L, R	Leaves used to prevent afterbirth bleeding while the roots are used to facilitate expulsion of the placenta and to hasten parturition.	[45, 64]
Fabaceae			
<i>Ormocarpum trichocarpum</i> (Willd.) A. Chev.	L	Used to treat depressed fontanelles in infants.	[21]
Gunneraceae			
<i>Gunnera perpensa</i> L.	R	Expulsion of the afterbirth and proper clearing of the womb; also used for postpartum healing.	[26, 40, 42, 44]
Iridaceae			
<i>Gladiolus sericea-villosus</i> Hook. F.	R	Facilitate expulsion of the afterbirth.	[42, 45]
Rubiaceae			
<i>Pentania prunelloides</i> (Klotzch ex Eckl. & Zeyh.) Walp.	R	Used to aid in the expulsion of retained placenta in both humans and animals.	[26, 40, 44]
Typhaceae			
<i>Typha capensis</i> (Rohrb.) N. E.Br.	Rh	Expulsion of the afterbirth in human and animals.	[59]

B = bulbs; R = roots; L = leaves; Rh = rhizomes; Sb = stem bark; * = potentially toxic

economic infrastructure, traditional medicine is their only hope. Death from postpartum haemorrhage caused by prolonged labour can be prevented by timeous management of labour using medicinal plants. More detailed studies in this area could yield new information about mammalian reproductive endocrinology and physiology, plant pharmacognosy and constituent physiology, and identify the larger potential of some of the recorded plants. In addition to this, these plants may play a role in achieving MDG5, especially when they are incorporated in the primary health-care systems of rural communities.

On the other hand, efforts on the research of efficacy and safety of these medicinal plants need to be given urgent attention. As indicated in the efficacy and safety studies section, among the few plants whose biological activities have been evaluated scientifically, some have been reported to be poisonous or toxic and yet are still being used by pregnant women. Toxicological evaluation of medicinal plants is often neglected since prolonged use with no effects is considered proof of their safety. However, historical traditional usage is not always a reliable guarantee of safety since it is difficult for traditional healers to detect or monitor delayed consequences such as mutagenicity and long-term adverse effects [61]. Toxicological evaluation, such as carcinogenesis of medicinal plants, is very important, especially if the plant contains compounds with known mutagenic activities [62]. The plants listed in the tables need to be evaluated *in vitro* and *in vivo* for biological activities and further for efficacy and safety, including clinical studies where possible.

Conflict of Interest

▼
The authors declare no conflict of interest.

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