

Medicinal plants traditionally used for the management of female reproductive health dysfunction in Tana River County, Kenya

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Abstract

Reproductive dysfunction is a major health concern amongst the inhabitants of Tana River County. An ethno botanical study was conducted in Garsen, Itsowe and Ngao sub divisions of Tana River County to document the utilization of medicinal plants for the management of female reproductive ailments. The target population was practicing herbalists from Pokomo, Ormo and Giriyama communities in the study area. Structured questionnaires and focussed group discussions were used to collect data. Forty eight plant species distributed in 40 genera and 29 families were documented as being important for the management of pregnancy related complications, menstrual disorders, infertility, fibroids and as contraceptives. The species most frequently cited by the herbalists were fourteen. Fifty two percent of the plant species were probably being mentioned for the first time as being useful in reproductive health management. In conclusion, Tana River has a pool of TMPs with a wealth of indigenous knowledge that needs to be exploited. The plants used to treat dysmenorrhea for example may be important analgesic agents that need further investigation while those with anti-fertility properties may contain steroidal phyto chemical compounds. Such species therefore need further investigation to establish their efficacy and mechanism of action.

Keywords medicinal plants, female reproductive ailments, Tana River, Kenya

INTRODUCTION

Herbal medicines have been used for the treatment of human ailments for thousands of years (Yakubu et al., 2007a; Yakubu and Bukoye, 2009). Recently, there has been renewed interest, spearheaded by World Health Organization (WHO), in the use of medicinal plants by traditional healers in Africa. This interest has led to increased research on traditional medicines.

Traditional medicine as practiced among various African societies is based on the concept that the cause of illness and disease or discomfort is sometimes ascribed to forces arising from angered ancestral spirits or evil spirits and witchcraft. Traditional medicine sees the supernatural as the cause of most major illnesses and factors of one's social and economic environment are all considered in diagnosing physical and mental problems in people's lives. Smaller medical issues however are handled with herbal remedies but even this is holistically applied whereby the whole plant, its physical characteristics like its aroma, taste, color and nutrient value, along with the rituals attending to its preparation and administration are just as important as its pharmacological content (Gessler et al., 1995; Okpako, 1999).

Traditional medicinal practitioners (TMPs) by their nature do not keep records and most of the knowledge they have is passed on verbally from generation to generation (Giday et al., 2010). There is therefore need not just to capture this indigenous knowledge but also to study the plants in order to

provide credible evidence to support therapeutic efficacy claims by herbalists (Sofowora, 1993).

Reproductive issues and ailments constitute 18% of the global burden of disease for women of reproductive age and are the number one cause of maternal mortality in developing countries (WHO, 2003). Female reproductive ailments range from pregnancy and related complications, fertility issues and menstrual complications. In Tana River County, TMPs are routinely consulted because of their wide indigenous medicinal knowledge base (Swaleh, 1999), a tradition that has persisted in many rural communities due to inequitable health provision.

In Kenya, 75% of health facilities and personnel are concentrated in urban areas (National Policy of Traditional Medicine, 2005). The national doctor patient ratio is 1: 20,000; but in Tana River County with only 57 health facilities, the doctor: patient ratio is 1: 95,500 emphasizing a serious shortage of both health facilities and staff in the County (Tana River District Strategic Plan, 2005 - 2010). On the other hand, the ratio of TMP to patients is 1: 987 (Kenya Housing and Population report, 2009), suggesting that the TMPs are more readily accessible. In General, health sectors including reproductive health face a number of challenges. According to the Tana River District Strategic Plan (2005 - 2010); issues of major concern in reproductive health sector are; unsafe motherhood, high maternal/child mortality rates and inadequate family planning services.

An ethno botanical survey was carried out in Tana River County to identify and document the plants that are used by traditional herbalists for the management of female reproductive ailments and problems. The plant parts, route of administration, method of preparation, dose and whether the plant was administered as a decoction or concoction was documented.

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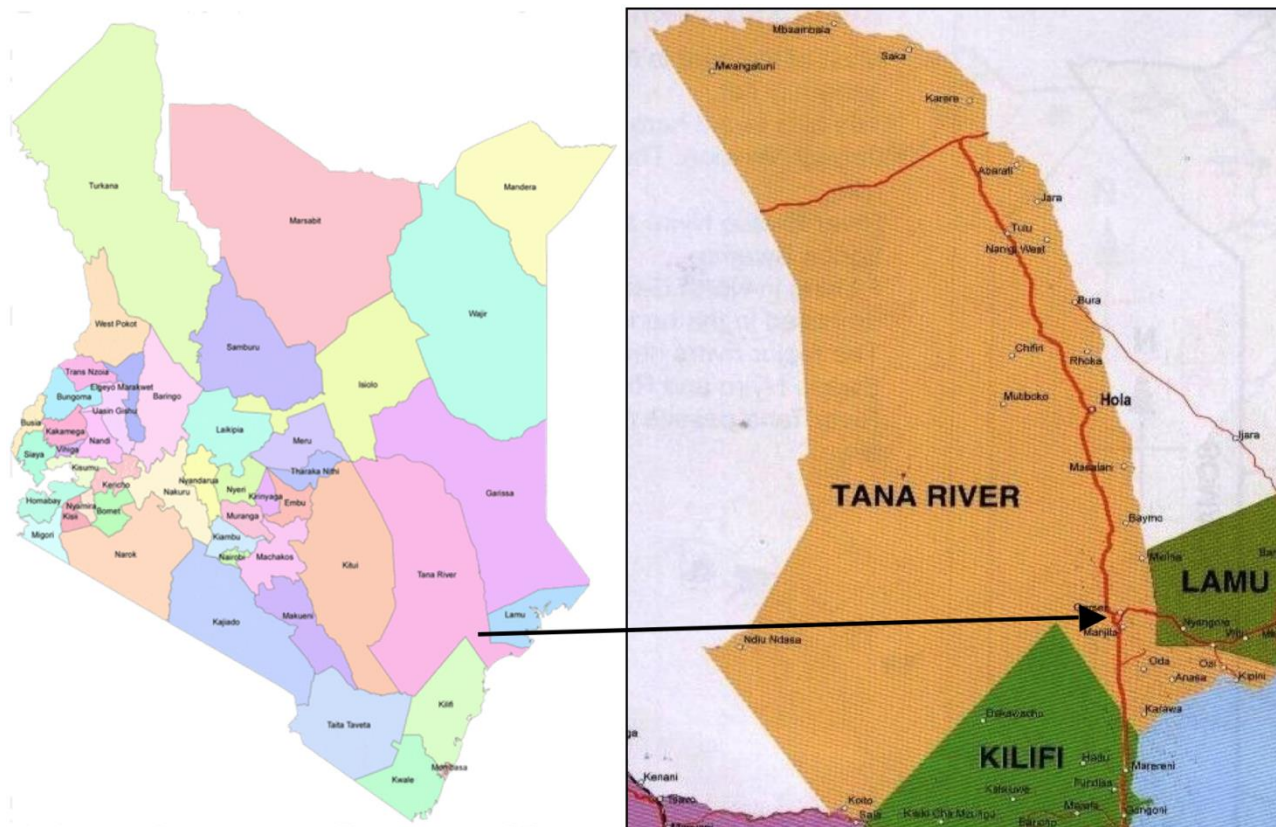


Fig. 1. The map of Tana River County, Kenya (Source: Department of Geography University of Nairobi). Arrow points at area of study: Garsen , Itsowe and Ngao subdivisions.

MATERIAL AND METHODS

Study area identification and description

A reconnaissance survey was undertaken in Tana River County in March 2012, to identify key informants for the study. Local administrators were key resource persons in providing information on TMPs. Discussions with these key informants led to Garsen, Itsowe and Ngao subdivisions being chosen as most suitable study areas due to widespread use of herbal medicine and in accessibility to health facilities. The County borders the Indian ocean to the south. It has a coastal strip that is approximately 35 kilometers. The County is divided into 7 administrative divisions, 43 locations and 93 sub locations. It lies between latitude 0° and 3° South and longitudes 38°30' east and 40°15' east. According to the population and housing census report 2009; the County has a population of 240,075 persons, 72% of whom live below the poverty line.

Target population, study design and data collection

The target population for the ethno botanical survey was TMPs and the County has a high number of these. The TMPs were derived from the main tribes living in the study area namely Pokomo, Ormas and Giriyama. The University of Nairobi Biosafety, Animal welfare and Ethics Committee reviewed and approved the research protocol. The study design was a cross sectional survey where a systematic random sampling method was used to identify 80 practicing herbalists as participants. Semi structured questionnaires were used to document medicinal plants used by TMPs for the management of reproductive ailments in Garsen, Itsowe and Ngao subdivisions, by a team comprising local translators, botanist and researchers. TMPs were asked to give signed informed consent before

participating in the study. The objectives of the study were clearly stated. Quantitative and qualitative data collection methods were applied. Structured questionnaires were administered to the TMPs, and focused group discussions were conducted that allowed for detailed exploration of individual's knowledge and practices about reproductive health ailments and management. The questionnaires were designed to be responsive to the objectives of the study. Interviews with informants were conducted in Pokomo, Orma and Giriyama languages assisted by local translators, and responses were recorded in English. A pilot study was conducted earlier to test and re-design the research tools appropriately. The TMPs study variables included age, marital status, education levels, number of years in practice, how they acquired their knowledge and the interventions used to manage reproductive health ailments.

Sample size determination and statistical analysis

Fisher et al. (1998) formula was used to determine sample size; $n = Z^2 pq / d^2$ whereby n = the desired sample size; z = the standard normal deviate at the required confidence level; p = the proportion in the target population estimate to have characteristics being measured; $q = 1-p$; d = the level of statistical significance set. The data was analyzed qualitatively.

Plant identification

The plants were identified by a taxonomist and voucher specimens deposited at the University of Nairobi Herbarium. The information gathered included vernacular name of plant, species and ailment treated. Plant part, route of administration, method of preparation, dose, duration and whether the remedy was administered as a concoction or decoction was also documented.

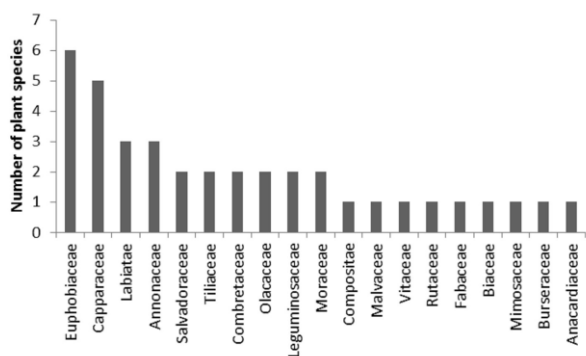


Fig. 2. Commonest plant family documented for the management of female reproductive health dysfunctions in Tana River County.

RESULTS

A total of 80 herbalists from the three subdivisions were interviewed. The herbalists were mostly elderly people aged 45 years and above and mostly illiterate (53%), with only 5 having completed primary school and another 2 completed secondary school. Majority of the herbalists (68%) were males while ten of the female herbalists practiced also as Traditional Birth Attendants (TBAs). All the herbalists had been in practice for 15 years or more and practically all had acquired their knowledge from relatives. Forty eight medicinal plants were used for the management of reproductive health ailments (Table 1). The plants belonged to 29 families, the commonest based on family use value being Euphorbiaceae, Capparaceae, Labiatae, Annonaceae, Leguminosaceae, Tiliaceae, Salvadoraceae, Combretaceae, Olacaceae, Moraceae (Fig. 2). Fig. 3 gives the distribution of reproductive health ailments and the percentage of plants used for their management. A total of 27 plants (56.3%) were identified for the management of pregnancy and related problems (Table 1).

Sixteen plants (32.65%) were presented for prevention of threatened abortion, 10 plants (20.8%) were used to alleviate post-partum hemorrhage, 10 plants (20.8%) to manage retained afterbirth, 3 plants (6.25%) to alleviate protracted labor, 1 plant

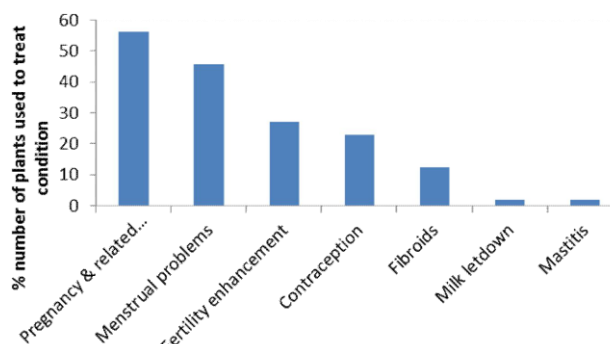


Fig. 3. Female reproductive dysfunctions /ailments managed by herbalists in Tana River County.

(2.08%) was used to augment or induce labor, 1 plant (2.08%) to arrest premature labor, 1 plant (2.08%) to manage breach birth and 1 plant (2.08%) was used to induce retraction of the uterus after birth. Twenty two (45.8%) plants were identified for the management of menstrual disorders; 8 plants (16.7%) were presented for the management of menorrhagia, 4 plants (8.3%) were used to treat dysmenorrhea, 5 (10.42%) to treat amenorrhea and 5 (10.42%) to manage irregular menses. Thirteen (27.08%) plants were used to treat infertility or to enhance fertility. Eleven plants (22.92%) were used as contraceptives to suppress fertility after delivery, 6 plants (12.50%) were presented for management of fibroids, 1 (2.08%) to induce milk letdown and 1 plant (2.08%) to treat mastitis.

The data on herbal preparations, mode of administration and part used is presented in Table 1. The most common method of preparation involved boiling or soaking the fresh or dried plant parts in water (decoctions) or ground into powder and taken orally or as infusions. The water extracts were prepared just before consumption or just before steam bath. The most frequent route of administration as reported by the herbalist was oral at 93%, followed by topical application at 7%. Most of the remedies were prepared as concoctions of more than one plant in combination with the principal plant. The most common plant part used was the root (71%), followed by the leaf (22%), the root bark (6%), the stem (4%) and the fruit (2%).

Table 1. Medicinal plants used to manage female reproductive ailments in Tana River, Kenya

Family	Plant species,	Local name	Traditional use	Method of preparation, route of administration and dose
Aloeaceae	<i>Aloe volkensii</i> Engl. CK027	Hargeis, D'ar (Orma)	Infertility	Leaves squashed in water. Decoction used to wash genital area 3 times daily until effective.
Anacardiaceae	<i>Lannea schweinfurthii</i> (Engl.) Engl. CK001	Mumongoo (Pokomo)	RAB, PPH	Roots boiled in water and decoction taken orally. Half glass daily for 2 days
Annonaceae	<i>Uvariadendron kirkii</i> Verdc. CK008	Msaidizi (Giryama)	Contraceptive	Root bark boiled in water and decoction taken orally. One glass daily for 30 days. Every 7 days fresh root bark boiled in water.
Annonaceae	<i>Uvaria acuminata oliv</i> CK023	Mundagoni, Murori (Pokomo)	PPH, menorrhagia, dysmenorrhea	Roots boiled in water and concoction taken orally. One glass daily for 5 days. Usually mixed with <i>Markhamia zanzibarica</i>
Annonaceae	<i>Uvaria leptocladon</i>	Sholole (Orma)	Threatened abortion, infertility, breach birth, RAB	Roots boiled in water and concoction taken orally. Half glass 3 times daily for 3 days. Mixed with <i>Croton dichagamus</i>
Apocynaceae	<i>Hunteria zaylanica</i> (zet.) Gard ex thr var CK041	Mutsungutsungu, (Pokomo)	Induces milk letdown after delivery	Induces milk letdown after delivery
Biaceae	<i>Pergularia daemia</i> (forsk.) chiov CK046	Mpovu (Pokomo)	RAB	Roots or leaves boiled in water and decoction taken orally. One glass daily for 3 days
Bignoniaceae	<i>Markhamia zanzibarica</i> CK014	Mubwoka (Pokomo)	Threatened abortion, infertility, menorrhagia, dysmenorrhea, amenorrhea, RAB, contraceptive, Fibroids	Roots or leaves boiled in water and concoction taken orally. Half glass twice daily for 5 days. Mixed with <i>Salvadora persica</i> and <i>Uvaria acuminata oliv</i> .

Medicinal plants for female reproductive health management

Burseraceae	<i>Commiphora habessinica</i> (O. Berg) Engl. CK050	Mutsutsu (Pokomo)	RAB, PPH, post-partum retraction of uterus.	Roots boiled in water and decoction taken orally. Half glass daily for 4 days
Capparaceae	<i>Thylachium thomasii</i> Gilg CK024	Uhiya, kukube (Orma)	Threatened abortion	Roots boiled in water and decoction taken orally. Half glass daily for 3 days
Capparaceae	<i>Boscia coriacea</i> pax. CK025	Kalkacha (Orma)	Threatened abortion, menorrhagia, dysmenorrhea, amenorrhea, irregular menses, RAB, PPH	Roots boiled in water and concoction taken orally. Half glass daily for 5 days. Usually mixed with <i>Uvaria leptocladon</i> and <i>Combretum hereroense</i> Schinz
Capparaceae	<i>Cadaba ruspolii</i> Gilg CK032	Ilkavate (Orma)	Threatened abortion	Roots boiled in water and decoction taken orally. Half glass daily for 3 days
Capparaceae	<i>Cadaba glandulosa</i> forsk. CK037	Alakal (Orma)	Infertility	Roots boiled in water and decoction taken orally. Half glass daily for 5 days
Capparaceae	<i>Cadaba farinose</i> CK038	Kumis (Orma)	Infertility	Roots boiled in water and decoction taken orally. Half glass daily for 2 days
Combretaceae	<i>Combretum hereroense</i> Schinz. CK035	Konkon (orma)	Threatened abortion, menorrhagia, dysmenorrhea, amenorrhea, irregular menses, RAB, PPH	Roots boiled in water and concoction taken orally. Half glass 3 times daily for 6 days. Mixed with <i>Uvaria leptocladon</i> roots
Combretaceae	<i>Combretum Illairii</i> Engl. CK049	Mshinda alume (Pokomo)	Infertility, PPH, Contraceptive	Roots boiled in water and decoction taken orally. Half glass 2-3 times daily for 14 days
Compositae	<i>Pluchea ovalis</i> (Pers.) DC CK010	Msasa (Pokomo)	Vaginal Rash	Leaves boiled in water and decoction used to wash genitalia for 1 week
Euphobiaceae	<i>Ricinus communis</i> L. CK016	Mubonye, Mbono (Pokomo)	Contraceptive	Two dried fruits swallowed daily for 30 days. The same dose repeated after 1 year
Euphobiaceae	<i>Acalypha volkensii</i> Pax CK020	Mupunga mbuu (Pokomo)	Threatened abortion	Root bark boiled in water and decoction taken orally. Half glass daily for 3 days
Euphobiaceae	<i>Croton menyharthii</i> pax CK021	Mualikaji, Muyama (Pokomo)	Contraceptive, PPH, Threatened abortion, Infertility, menorrhagia, Irregular menses	Root and or leaves boiled in water and decoction taken orally. Half glass 2-3 times daily for 5 days
Euphobiaceae	<i>Suregada zanzibariensis</i> Boull. CK022	Mudimu tsaka (Giryama)	Contraceptive	Roots boiled in water and decoction taken orally. Half glass 3 times daily for 4 days
Euphobiaceae	<i>Croton dichagamus</i> CK031	Qashin a'adha, Muuqaadhi (Orma)	Threatened abortion, Infertility	Roots boiled in water and concoction taken orally. Half glass 3 times daily for 6 days. Sometimes mixed with <i>Uvaria leptocladon</i> roots.
Euphobiaceae	<i>Euphorbia uhligiana</i> pax CK044	Daalid (Orma)	Threatened abortion, PPH	Roots boiled in water and decoction taken orally. Half glass daily for 2 days
Fabaceae	<i>Prosopis juliflora</i> CK051	Mathenge	Threatened abortion, Infertility	Root bark boiled in water and concoction taken orally. One teaspoonful daily for 5 days. Mixed with <i>Zanthoxylum usamel</i> root bark
Labiatae	<i>Plectranthus barbatus</i> Andr. CK015	Papaha (Pokomo)	Threatened abortion, RAB, PPH Contraceptive, menorrhagia, amenorrhea, Irregular menses, Infertility	Roots boiled in water and concoction taken orally. Half glass daily for 30 days. Mixed with <i>Cissus rotundifolia</i> roots for the first 4 days
Labiatae	<i>Ocimum kilimandscharicum</i> Gurke CK018	Vumba kuu (Pokomo)	Threatened abortion	Roots boiled in water and decoction taken orally. Half glass daily for 3 days
Labiatae	<i>Hoslundia opposita</i> Vahl CK045	Mtserere	Infertility	Roots boiled in water and decoction taken orally. Half glass 2-3 times daily for 2 days
Leguminosaceae	<i>Acacia zanzibarica</i> (S. Moore) Taub. Var <i>Zanzibarica</i> CK004	Muryela (Pokomo), muhegakululu (Giryama), Wachu (Orma)	Irregular menses, Mastitis	Roots boiled in water and decoction taken orally. Half glass daily for 3 days
Leguminosaceae	<i>Cassia occidentalis</i> L. CK009	Muchoyoko (Pokomo)	RAB, PPH	Roots or leaves boiled in water and decoction taken orally. Half glass daily for 3 days
Lythraceae	<i>Lawsonia inermis</i> L. CK048	Musuruja (Pokomo)	Fibroids	Roots boiled in water and decoction taken orally. Half glass daily for 30 days. After every 7 days fresh roots boiled
Malvaceae	<i>Thespesia danis</i> Oliv. CK006	Mudanisa (Pokomo)	Fibroids	Roots or leaves boiled in water and decoction taken orally. Half glass daily for 3 days
Menispermaceae	<i>Cissampelos micronata</i> . A. Rich CK040	Chovi, Kivila kya mani (Pokomo), Kashikiropaka (Giryama)	Protracted labor, Threatened abortion	Roots boiled in water and concoction taken orally. One glass 3 times daily for 4 days. Mixed with <i>Cassia abbreviate</i> and <i>Strychnos henningsii</i> roots.

Mimosaceae	<i>Acacia robusta</i> CK058	Munga (Pokomo)	Fibroids	Roots or leaves boiled in water and decoction taken orally. One glass 2 times daily for 5 days. Mixed with <i>Cissus rotundifolia</i> roots.
Moraceae	<i>Ficus natalensis</i> Hochst CK013	Mgandi (Pokomo)	Contraceptive	Roots boiled in water and decoction taken orally. Half glass daily for 30 days. After every 7 days fresh roots are boiled.
Moraceae	<i>Ficus sycomorus</i> L. CK052	Mukuyu (Pokomo)	Augment labor, Protracted labor	Leaves boiled in water and decoction taken orally. Half glass daily for 30 days. After every 7 days fresh leaves boiled.
Olacaceae	<i>Ximenia americana</i> L. CK033	Muntuntuda, Mtundukula (Pokomo), Huda hudo (Orma)	Contraceptive	Roots boiled in water and decoction taken orally. Half glass daily for 5 days. Mixed with <i>Ochna holstii</i> roots.
Olacaceae	<i>Capparis sepiaria</i> Var. <i>caffra</i> CK039	Hamwalika (Pokomo), Mugwada paka (Giryama)	Fibroids	Roots boiled in water and decoction taken orally. Half glass daily for 3 days. Sometimes mixed with <i>Grewia plagiophylla</i> roots
Passifloraceae	<i>Adenia gummifera</i> (Harv.) Harms CK019	Mujoka (Pokomo)	Menorrhagia, Infertility, Fibroids	Roots and or stems boiled in water and decoction taken orally. Half glass daily for 3 days
Pedaliaceae	<i>Pedaliium murex</i> L. CK005	Mbigili (Pokomo)	Protracted labor	Roots boiled in water and decoction taken orally. Half glass daily for 3 days
Rutaceae	<i>Citrus sinensis</i> (L) Osbeck CK012	Mudimu (Giryama)	Contraceptive, Infertility	Roots and or stem bark boiled in water and decoction taken orally. One glass 3 times daily for 3 days. Mixed with <i>Acacia robusta</i> and <i>Cissus rotundifolia</i> roots.
Salvadoraceae	<i>Salvadora persica</i> L. CK017	Muswaki, Mujungu moto (Pokomo) A'adhey (Orma)	Excessive bleeding	Roots boiled in water and decoction taken orally. Half glass daily for 5 days.
Salvadoraceae	<i>Dobera glabra</i> (forsk.) poir CK034	Garas (Orma)	RAB	Roots boiled in water and decoction taken orally. One glass 2 times daily for 2 days.
Sapindaceae	<i>Allophylus pervilleria</i> (A.Rich) Engl. CK047	Mnyanga kitswa (Pokomo)	Infertility	Roots boiled in water and decoction taken orally. One glass daily for 3 days.
Simorobaceae	<i>Harrisonia abyssinica</i> Oliv A. CK042	Musabini, Muyengwa, Chewa, (Pokomo)	Contraceptive	Roots boiled in water and decoction taken orally. One glass 2-3 times daily for 3 days. Mixed with <i>Cassia abbreviate</i> and <i>Cissampelos micronata</i> roots.
Tiliaceae	<i>Grewia villosa</i> Willd CKK026	Ogomdi (Orma)	Threatened abortion, Contraceptive	Roots boiled in water and decoction taken orally. Half glass daily for 30 days.
Tiliaceae	<i>Grewia tenax</i> (forssk.) Fiori. CK028	Deeka (Orma), Mubavubavu, Mukawa wa guba (Pokomo)	Infertility, PPH	Roots boiled in water and decoction taken orally. Half glass 3 times daily for 6 days. Mixed with <i>Combretum illairii</i> roots.
Usambareseae	<i>Zanthoxylum usamel</i> CK011	Safaraji (Pokomo)	Threatened abortion	Root bark boiled in water and decoction taken orally. One teaspoonful daily for 5 days. Mixed with <i>Prosopis juliflora</i> root bark.
Vitaceae	<i>Cissus rotundifolia</i> (forsk.) CK030	Mkwembe, Maneke, Neke (Pokomo), Arma (Orma)	Threatened abortion /premature labor, Contraceptive	Leaves boiled in water and decoction taken orally. Half glass 3 times daily for 4 days. Mixed with <i>Plectranthus barbatus</i> leaves.

RAB- Retained after-birth; PPH- Post- partum hemorrhage.

DISCUSSION

Dried fruits of *Ricinus communis* were traditionally used in Tana River as contraceptives. Njoroge and Bussmann (2009) reported a similar use in Central province of Kenya. In India, Ramandeep Singh et al. (2011) reported that it had aphrodisiac properties. *Euphorbia uhligiana* pax was traditionally used for the management of post-partum hemorrhage and prevention of first trimester abortion in Tana River. This corroborates Njoroge and Bussman (2009) who reported a similar use of the plant in Central province of Kenya. *Euphorbia candelabrum* is used in Loitoktok (Kenya) to treat infertility (Muthee et al., 2011). *Plectranthus barbatus* is used in Tana River to prevent first trimester abortion. This use contrasts Almeida & Lemonica (2000) who reported that it was used as an emmenagogue and abortifacient. In Tana River, the species was also used as a contraceptive, menstrual cycle regulator and for management of infertility, post-partum hemorrhage and retained after birth. *Ocimum kilimandscharicum* Gurke was used to prevent first trimester abortion thereby promoting fertility. This contrasts the study by Gill et al. (2012) who reported on anti-fertility effect of *Ocimum sanctum* in India. *Uvaria acuminata* Oliv was used TANG / www.e-tang.org

to manage painful menses in Tana River. Ichimaru et al. (2004) reported a similar use in Ethiopia. This probably supports the traditional use of the plant in Tana River. On the other hand; *Salvadora persica* was used to stop excessive bleeding in Tana River. Darmani et al. (2003) reported its use as a male and female fertility regulator. *Grewia hexamita* (Ribeiro et al., 2010) was used to regulate the menstrual cycle and promote female fertility. This corroborates the traditional use of *Grewia tenax* in Tana River for the treatment of infertility. Muthee et al. (2011) reported the use of *Ximenia americana* for uterine bleeding; Ribeiro et al. (2010) reported its use as a fertility regulator and abortifacient. In Tana River it is used as a contraceptive. Probably its mechanism of action is as an abortifacient. *Croton menyharthii* pax was the species with the highest use value in Tana River. It was used to treat infertility, prolonged menses, irregular menses, manage post-partum hemorrhage, threatened abortion and as a contraceptive. It was probably being reported for the first time for female reproductive health management as no other study has reported its function in reproduction.

The present study has revealed that traditional medicine practice is not only common in Tana River County of Kenya

but is socio-culturally acceptable. Traditional healers are known and respected members of the same community in which they practice (Swaleh, 1999). Reproductive health issues that drive women in Tana River County, to visit TMPs are many but similar to those found in other rural parts of Kenya (Kaingu et al., 2011). Several studies have reported that long distances to hospital, unreliable public transport system and lack of financial support are the main constraints that drive people in the rural areas to consult TMPs (Barton and Wamai, 1994; Chuang et al., 2009; Cigand and Laborde, 2003; Kaingu et al., 2011). TMPs are cheap and will rarely deny treatment to patients due to lack of payment. This makes them the most likely to be consulted by the majority rural poor (Kaingu et al., 2011; Kazerooni et al., 2006; Rapkin, 2003).

The present study established that in Tana River County, the custodians of traditional knowledge, including reproductive health knowledge, were all elderly men and women aged over fifty years with long years of practice. Considering that their knowledge was acquired through inheritance from practicing relatives, coupled with the migration of youth to major towns (according to practicing parents and grandparents), there is danger of this knowledge not being passed on to the younger generations for posterity (Kamatenesi-Mugisha and Oryem-Origa, 2005). The lack of documentation is coupled with the lack of systematic conservation to preserve the plants. In this study, the plant part mostly used was the root thereby

issues of plant conservation becomes a priority.

Female reproductive ailments managed by traditional healers in Tana River County are shown in Table 1. The commonest ailments were pregnancy and related complications, menstrual problems, infertility and contraception (Fig. 3). The study revealed that pregnant women with signs of threatened abortion readily consulted herbalists and used herbal remedies. Threatened abortion was the most commonly mentioned pregnancy related problem in the community (Table 1). A similar finding was reported by (Kaingu et al., 2011; Chuang et al., 2005 and 2007). Post-partum hemorrhage (PPH) and retained afterbirth (RAB) are the leading cause of maternal mortality and morbidity in developing countries and a concern in developed countries (WHO, 2003, WHO, 2006). Excessive bleeding requires emergency services that would involve administration of uterotonic agents to facilitate the delivery of the placenta (afterbirth). In rural parts of the developing world, such emergency services are non-existent (WHO, 2006). The role played by TMPs in handling PPH and RAB is therefore crucial.

A few plants were reported for the management of delayed and protracted labor and in these cases; TMPs used herbal remedies to induce labor with hardly any hospital referrals. This contrasts similar studies (Kaingu et al., 2011), where some TMPs referred such patients to hospital.

Table 2. Medicinal plants used by herbalists for the management of female reproductive dysfunctions in Tana River County

Family	Species, Voucher number.	Traditional use in females	Documented uses	UV _s
Aloeaceae	<i>Aloe volkensii</i> Engl. CKK027	Infertility	Cleaning of uterus, Njoroge & Bussmann, 2009	0.14
Anacardiaceae	<i>Lannea schweinfurthii</i> (Engl.) Engl. CKK001	RAB, PPH	Post-partum pain Njoroge & Bussmann, 2009	0.04
Annonaceae	<i>Uvariadendron kirkii</i> Verdc. CKK008	Contraceptive	Probably being reported for first time for reproductive use. Documented reproductive use could not be found.	0.10
Annonaceae	<i>Uvaria acuminata oliv</i> CKK023	PPH, Excessive bleeding, Painful menses	Menstrual pain. Ichimaru et al., 2004.	0.22
Annonaceae	<i>Uvaria leptocladon</i> CKK029	Threatened abortion, Infertility, Breach birth, RAB, Lack of menses	Probably being reported for first time for reproductive use. Documented reproductive use could not be found	0.18
Apocynaceae	<i>Hunteria zaylanica</i> (Zetz.) Gard ex thr var CKK041	Induces milk letdown after delivery	<i>Acacia edulis</i> Milk letdown and Post-partum pain Njoroge & Bussmann, 2009	0.04
Biaceae	<i>Pergularia daemia</i> (forsk.) chiov CKK046	RAB	Probably being reported for first time for reproductive use. Documented reproductive use could not be found	0.04
Bignoniaceae	<i>Markhamia zanzibarica</i> CKK014	Threatened abortion, Infertility, Excessive bleeding, Painful menses, Lack of menses, RAB, contraceptive, Fibroids	<i>Markhamia Platycalyx</i> , Induces labor, Eases birth, Kamatenesi et al., 2007.	0.45
Burseraceae	<i>Commiphora habessinica</i> (O. Berg) Engl. CKK050	RAB, PPH, Retraction of uterus	<i>Commiphora africana</i> , Painful menses, Njoroge & Bussmann, 2009	0.04
Capparaceae	<i>Thylachium thomasii</i> Gilg CKK024	Threatened abortion	Probably being reported for first time for reproductive use. Documented reproductive use could not be found	0.04
Capparaceae	<i>Boscia coriacea</i> pax. CKK025	Threatened abortion, Excessive bleeding, Painful menses, Lack of menses, Irregular menses, RAB, PPH	Probably being reported for first time for reproductive use. Documented reproductive use could not be found	0.04
Capparaceae	<i>Cadaba ruspolii</i> Gilg CKK032	Threatened abortion	Probably being reported for first time for reproductive use. Documented reproductive use could not be found	0.06
Capparaceae	<i>Cadaba glandulosa</i> forsk. CKK037	Infertility	Probably being reported for first time for reproductive use. Documented reproductive use could not be found	0.04
Capparaceae	<i>Cadaba farinose</i> CKK038	Infertility	Probably being reported for first time for reproductive use. Documented reproductive use could not be found	0.07
Combretaceae	<i>Combretum hereroense</i> Schinz. CKK035	Threatened abortion, Excessive bleeding, Painful menses, Lack of menses, Irregular menses, RAB, PPH	Probably being reported for first time for reproductive use. Documented reproductive use could not be found	0.08

Combretaceae	<i>Combretum Illairii</i> Engl. CKK049	Infertility, PPH, Contraceptive	Probably being reported for first time for reproductive use. Documented reproductive use could not be found.	0.04
Compositae	<i>Pluchea ovalis</i> (Pers.) DC CKK010	Vaginal Rash	Probably being reported for first time for reproductive use. Documented reproductive use could not be found.	0.04
Euphobiaceae	<i>Ricinus communis</i> L. CKK016	Contraceptive	Antifertility, retained after birth, Njoroge & Bussmann., 2009 Aphrodisiac, Pallavi et al., 2011	0.08
Euphobiaceae	<i>Acalypha volkensii</i> Pax CKK020	Threatened abortion	Probably being reported for first time for reproductive use. Documented reproductive use could not be found	0.04
Euphobiaceae	<i>Croton menyharthii</i> pax CKK021	Contraceptive, PPH, Threatened abortion, Infertility, Prolonged menses, Irregular menses	Probably being reported for first time for reproductive use. Documented reproductive use could not be found	0.48
Euphobiaceae	<i>Suregada zanzibariensis</i> Boull. CKK022	Contraceptive	Probably being reported for first time for reproductive use. Documented reproductive use could not be found.	0.21
Euphobiaceae	<i>Croton dichagamus</i> CKK031	Threatened abortion, Infertility	Probably being reported for first time for reproductive use. Documented reproductive use could not be found.	0.18
Euphobiaceae	<i>Euphorbia uhligiana</i> pax CKK044	Threatened abortion, PPH	PPH, Njoroge & Bussmann., 2009	0.04
Fabaceae	<i>Prosopis juliflora</i> CKK051	Threatened abortion, Infertility	Probably being reported for first time for reproductive use. Documented reproductive use could not be found.	0.04
Labiatae	<i>Plectranthus barbatus</i> Andr. CKK015	Threatened abortion, RAB, PPH Contraceptive, Excessive bleeding, Lack of menses, Irregular menses, Infertility	Emmenagogue, abortifacient Almeida & Lemonica., 2000; Verissimo LF et al. 2011	0.19
Labiatae	<i>Ocimum kilimandscharicum</i> Gurke CKK018	Threatened abortion	<i>Ocimum sanctum</i> Antifertility, Gill et al., 2012.	0.04
Labiatae	<i>Hoslundia opposita</i> Vahl CKK045	Infertility	Probably being reported for first time for reproductive use. Documented reproductive use could not be found.	0.04
Leguminosaceae	<i>Acacia zanzibarica</i> (S. Moore) Taub. Var Zanzibarica CKK004	Irregular menses, Mastitis	Probably being reported for first time for reproductive use. Documented reproductive use could not be found.	0.08
Leguminosaceae	<i>Cassia occidentalis</i> L. CKK009	RAB, PPH	Infertility, Noumi., 2010	0.04
Lythraceae	<i>Lawsonia inermis</i> L. CKK048	Fibroids	Probably being reported for first time for reproductive use. Documented reproductive use could not be found.	0.04
Malvaceae	<i>Thespesia danis</i> Oliv. CKK006	Fibroids	Probably being reported for first time for reproductive use. Documented reproductive use could not be found	0.04
Menispermaceae	<i>Cissampelos micronata</i> . A. Rich CKK040	Protracted labor, Threatened abortion	Probably being reported for first time for reproductive use. Documented reproductive use could not be found	0.18
Mimosaceae	<i>Acacia robusta</i> CKK058	Fibroids	<i>Acacia catechu</i> , <i>Acacia nilotica</i> Aphrodisiac, facilitates child birth. Pallavi et al., 2011	0.19
Moraceae	<i>Ficus natalensis</i> Hochst CKK013	Contraceptive	<i>F. racemosa</i> aphrodisiac, Pallavi et al., 2011	0.12
Moraceae	<i>Ficus sycomorus</i> L. CKK052	Augment labor, Protracted labor	Female fertility, menstrual cycle, Amri & Kisangau , 2012. Uterine bleeding, J.K Muthee et al., 2011	0.1
Olacaceae	<i>Ximenia Americana</i> L. CKK033	Contraceptive	Uterine bleeding, J.K. Muthee et al., 2011 Antiabortive, menstrual cycle, women fertility, Ribeiro et al., 2010	0.18
Olacaceae	<i>Capparis sepiaria</i> Var. <i>caffra</i> CKK039	Fibroids	Aphrodisiac, Ribeiro et al., 2010	0.12
Passifloraceae	<i>Adenia gummifera</i> (Harv.) Harms CKK019	Excessive bleeding, Infertility, Fibroids	<i>Adenia kirkii</i> , Prolonged menses	0.04
Pedaliaceae	<i>Pedaliium murex</i> L. CKK005	Protracted labor	Aphrodisiac, Pallavi et al., 2011	0.04
Rutaceae	<i>Citrus sinensis</i> (L) Osbeck CKK012	Contraceptive, Infertility	Dysmenorrhea, Emmenagogue. Suryawanshi, 2011	0.04
Salvadoraceae	<i>Salvadora persica</i> L. CKK017	Excessive bleeding	Male and female fertility Darmani et al., 2003	0.18
Salvadoraceae	<i>Dobera glabra</i> (forsk.) poir CKK034	RAB	Probably being reported for first time for reproductive use. Documented reproductive use could not be found.	0.04
Sapidaeeae	<i>Allophylus pervilleria</i> (A.Rich) Engl. CKK047	Infertility	Probably being reported for first time for reproductive use. Documented reproductive use could not be found.	0.08
Simorobaceae	<i>Harrisonia abyssinica</i> Oliv A. CKK042	Contraceptive	Aphrodisiac, Pallavi et al., 2011	0.19
Tiliaceae	<i>Grewia villosa</i> Willd CKK026	Threatened abortion, Contraceptive	Probably being reported for first time for reproductive use. Documented reproductive use could not be found	0.08
Tiliaceae	<i>Grewia tenax</i> (forssk.) Fiori. CKK028	Infertility, PPH	<i>Grewia hexamita</i> menstrual cycle, women fertility, post-delivery cleaning of uterus Ribeiro et al., 2010	0.22

Usambareseceae	<i>Zanthoxylum usamel</i> CKK011	Threatened abortion	Post-partum weakness, Njoroge & Bussmann., 2009	0.12
Vitaceae	<i>Cissus rotundifolia</i> (forsk.) CKK030	Threatened abortion /Premature labor, Contraceptive	Probably being reported for first time for reproductive use. Documented reproductive use could not be found.	0.3

RAB- Retained after-birth; PPH- Post- partum hemorrhage.

Menstrual disorders were the second most mentioned ailments in this study. Literature indicates that numerous effects including physical, hormonal and emotional disorders can disrupt the normal menstrual cycle resulting in complications such as absence or abnormal cessation of menstruation (amenorrhea), heavy menstrual bleeding, (menorrhagia), and dysmenorrhea (severe painful menses) (McEvoy et al., 2004; Meduri and Touraine, 2003; Rapkin, 2003). Herbal remedies have proven effective in relieving the pain and discomfort of menstrual disorders. In the present study, menstrual problems were managed by 22 plants (45.8%) suggesting a high prevalence of such ailments. Similar high prevalence of menstrual disorders has also been reported in other studies (Yassin, 2012). The most common menstrual complaints in this study were menorrhagia, irregular menses, amenorrhea, and dysmenorrhea respectively. This agrees in part with previous studies conducted in Israel (Goldestein et al., 2006), Turkey (Talat and Egbunu, 2007), England (Houston et al., 2006) and Egypt (Yassin, 2012) where dysmenorrhea and premenstrual syndrome (PMS) were the most prevalent menstrual complaints.

Infertility was the third commonest problem in this study. WHO estimates that approximately 8 - 10% (50 - 80 million people worldwide) of couples experiences some form of infertility problems whose prevalence varies from region to region (Nagendra and Jayachandra, 2010). Many women consulted herbalists in order to enhance their fertility. The treatment for infertility by use of herbs is worldwide (Deka and Kalita, 2011). However, no individual herb is considered especially useful for promoting fertility. In Africa, India and China for instance, a lot of plants have been used in various combinations to treat infertility (Deka and Kalita, 2011; Ugwah-Oguejiofor et al., 2011; Nagendra and Jayachandra, 2010).

In the present study, although 13 plants were presented for the treatment of infertility or to enhance fertility, 6 plants were also presented for treatment of fibroids, a condition that is linked not only to painful menses and excessive bleeding but also to infertility. The herbalists seemed to clearly recognize the presence of fibroids and claimed to not only control their growth but also shrink the large growths.

Herbal practitioners in this study presented eleven plants which they claimed were used to suppress fertility by preventing conception rather than as abortifacients. The importance of plants as a source of antifertility (contraceptive) drugs has been investigated by many researchers for years (Farnsworth et al., 1975; Yakubu et al., 2007a, Yakubu et al., 2007b) and availability of such plants with anti-fertility properties would be of great benefit in developing countries because such drugs would be easily available and affordable (Goonasekera et al., 1995). The minimal uptake of modern contraceptive methods among rural communities in sub-Saharan Africa is generally due to lack of access to orthodox medicine and contraceptive options in particular (Adebisi and Bello, 2011). In Tana River County the presence of a district hospital at Ngao that offers family planning services did not prevent women from consulting herbalists and instead emphasized the dependence of rural communities on traditional remedies perhaps due to safety considerations.

CONCLUSION

Reproductive dysfunction is a major obstacle to social-economic development amongst the inhabitants of Tana River County. The area has a pool of TMPs with a wealth of indigenous knowledge that needs to be exploited. The plants used to treat dysmenorrhea for example may be important analgesic agents that need further investigation while others reported for instance as anti-fertility herbs may contain steroidal phyto chemical compounds. Such species therefore need further investigation to establish their active phyto chemical compounds and bio-activity.

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CONFLICT OF INTEREST

The authors declare that there was no conflict of interest.

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