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The use of some Indigenous Plants for Medicinal and other Purposes by Local Communities in Namibia with Emphasis on Oshikoto Region: A Review

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ABSTRACT

Local communities in Namibia possess an in-depth knowledge of the use of medicinal plants and their environment. Medicinal plants contribute significantly to the intellectual property rights of poor local households in theses local communities. This review gives an overview of the use of indigenous knowledge held by traditional healers, the uses of indigenous plants for medicinal and other purposes, medicinal preparation methods and treated diseases in different parts of Namibia, in particular the Oshikoto region. Factors threatening the existence of the medicinal plants are discussed and the gaps in the indigenous knowledge on the uses of the medicinal plants are also presented. This review strongly recommends the importance of proper and comprehensive documentation of the traditional healing methods in Namibia, which will have a high potential for sustainable development for the medicinal plants in Namibia.

Key words: Ethnobotanical studies, indigenous knowledge system, medicinal plant, Namibia, traditional healers

INTRODUCTION

Many attempts have been made to define Indigenous Knowledge Systems (IKS). Until now, there is no universal accepted meaning of what indigenous knowledge really is and whether it differs from traditional knowledge. IKS is defined as local knowledge that is unique to a given culture or society. It is the knowledge by which food security, animal and human health and sustainability is achieved. In this sense, this knowledge is the local people's capital (UNESCO, 1999; Mapaure and Hatuikulipi, 2007; Dan *et al*., 2010).

Traditional medicinal practices are an important part of the primary health care delivery system in most of the developing world (Sheldon *et al*., 1997). The use of traditional medicine and medicinal plants in most developing countries, as a normative basis for the maintenance of good health, has been widely observed (UNESCO, 1996). Furthermore, an increasing reliance on the use of medicinal plants in the industrialized societies has been traced to the extraction and development of several drugs and chemotherapeutics from these plants as well as from traditionally used rural

herbal remedies (UNESCO, 1998). Traditional African medicine is 'the sum total of practices, measures, ingredients and procedures of all kinds whether material or not, which from time immemorial has enabled the African to guard against diseases, to alleviate his/her suffering and to cure him/herself' (Busia, 2005). The traditional medical systems are generally based on the uses of natural and local products which are commonly related to the people's perspective on the world and life (Toledo *et al*., 2009).

Plants have been used in traditional medicine for several thousand years (Abu-Rabia, 2005). Medicinal plants are used to treat the spiritual origins of disease as well as the physical symptoms. The vast knowledge of such plants is now beginning to be acknowledged by the rest of the world; so is the role played by indigenous people as custodians of the world's genetic heritage (Idu and Onyibe, 2007). It is also provides leads towards therapeutic concept thereby accelerating drug discovery; this is now being called reverse pharmacology (Chinsembu, 2009; Kaya, 2009).

The striking coincidence between indigenous medicinal plant uses and scientifically-proved phytochemical and pharmacological properties shows that the traditional remedies are an important and effective part of indigenous healthcare systems which is totally dependent on traditional healers. More detailed phytochemical and pharmacological studies of traditionally-used medicinal plants are thus an important line of research to be pursued. Medicinal plants provide huge opportunities for local communities' development and livelihood improvement. However, indigenous people are often deprived of the benefits from these resources whenever they are commercialised. Proper management of high-value and high-priority medicinal plants could serve as a sustainable income source for the communities. This would in turn help generate incentives for biodiversity conservation, thus ensuring the long-term availability of medicinal plants for indigenous and commercial uses.

IKS AND THE MEDICINAL PLANTS IN NAMIBIA

Overview: Namibian vegetation as described by White (1983) falls mainly within three phytochoria namely the Zambezian, Kalahari Highveld and Karoo-Namib centers of endemism. Namibia's vegetation categories have been proposed by Giess (1971); the main vegetation types are: desert, savanna and woodland, which were subdivided in 14 smaller vegetation units. There is a decreasing species diversity with decreasing rainfall but endemism shows the opposite trend. This has a bearing on the availability and range of plants for use by local communities (Mapaure and Hatuikulipi, 2007). A total of 3159 plant species have been reported to occur in Namibia (Cunningham, 1992; Marshall, 1998; Craven *et al*., 1997). A wide variety of these plant species is used by local communities for medicinal and other purposes. The Survey of Economic Plants for Arid and Semi-Arid Lands (SEPASAL) database (www.kew.org/sepasalweb/sepaweb) lists 615 plant species (19.5%) as being used for medicinal purposes in Namibia.

The traditional healing practices in Namibia have been studied by a number of researchers (Lumpkin, 1994; Lebeau, 1998, 2003; Marshall, 1998; Shapi *et al*., 2009; Chinsembu and Hedimbi, 2010; Dan *et al*., 2010).

Lumpkin (1994) surveyed traditional medical practitioners in Kavango, Caprivi, Oshana, Ohangwena, Omusati, Oshikoto Regions and Katutura in Windhoek. The survey was over 6 weeks through interviews of groups and individual traditional healers in these places. Few diseases and their treatment using plants are given but plant names are listed only in vernacular languages.

Marshall (1998) interviewed many traditional healers in Windhoek. He notes that reliance on traditional medicine is high; in both rural and urban areas emphasizing that people are more

knowledgeable about identities and applications of medicinal plants in rural areas. There are about 2400 traditional medical practitioners in Namibia who are registered with the National Eagle Traditional Healers Association (NETHA) but the actual number practicing could be higher (Marshall, 1998). However, the number of local plants used was found to be high, primarily originating from Kavango, Caprivi and northern Namibia. The traditional medical practitioners reported that 53 plant species were in demand for medicinal trade in Windhoek (Marshall, 1998).

Lebeau (2003) dealt with traditional healing in Katutura, Windhoek. She emphasized the practices, beliefs, witchcraft, etc. and human behavior regarding traditional healing.

The ethnobotany and indigenous knowledge of Namibian traditional healers play an important role in directing plant genetic resources conservation efforts (Cunningham, 1992) and the variety of life styles and land-use practices in Namibia, from San hunter-gatherers, pastoralists to subsistence and commercial farmers have important roles on the medicinal plant use in Namibia. The unfortunate situation is that the diversity of indigenous knowledge is rapidly being lost as life styles of people change and many plant species are becoming more difficult to obtain; such as *Albizia brevifolia*, *Commiphora mollis*, *Commiphora glaucescens*, *Commiphora pyracanthoides*, *Elephantorhiza elephantina*, *Fockea angustifolia*, *Gardenia spatulifolia*, *Momordica balsamina* and *Protea gaguedi*. In some cases, local extinction of species has been reported. A case in point is the local extermination of *Protea gaguedi* populations in North-East of Namibia which occurred naturally along the Okavango River in Namibia is practically extinct due to local trade in its roots for traditional medicine as an aphrodisiac (Cunningham, 1992) and due to frequent field fires (Kolberg, 1995). This species is, however, still available in neighboring countries. It is noted that more detailed knowledge is held by local specialists such as traditional healers and can be a useful guide not only to medicinal plants but also to over-exploited species (Marshall, 1998).

The anthroposophical medicine, homeopathy and phytotherapy are being recognized by the public health services in Namibia, hence research into and use of the natural vegetation is justified and the valuable knowledge is enshrined in herbalists and the danger is that it may soon be irretrievably lost with the passing away of the herbalists (Von Koenen, 2001). A list of 598 plant species and 2 fungi species were used as food and medicine and plants poisonous to humans and livestock. There is a vast field of applications for the medicinal plants and many pharmacies which used to stock only pharmaceutical medicines now maintain large stocks of anthroposophical, homeopathic and phytotherapeutic remedies (Von Koenen, 2001).

Topnaar communities: Topnaar communities live in the Kuiseb valley and Sesfontein situated in the south west of Namibia. A detailed ethnobotanical study was carried out by Eynden *et al.* (1992) who described 42 plant species found in Kuiseb valley and 53 plant species in Sesfontein. Some of the plant species are used for medicinal purposes while others are consumed as food, food preservation, cosmetics and fodder. Another ethnobotanical survey by Eynden and van Damme (1993) also reported on the use of medicinal and aromatic plants. A list of plant species was compiled including plant names, systematic classification and ethnobotanical properties. Many plants were analyzed for active substances. The Topnaar communities make their own traditional medicine by using mixtures of animal and plant products but no specification on medicinal plant uses are given. The most popular plant of food use is the !Nara (*Acanthosycios horridus*) (Botelle and Kowalski, 1999).

San communities: The term San or Bushman is considered the most neutral by anthropologists; they are the indigenous people of the Kalahari Desert in southern Africa. The San were and are largely still are perceived by their various neighbors to be different from all other people and are sometimes perceived negatively as constituting an inferior or more primitive ethnic community. There are just over 30,000 San living in Namibia, making up less than 2 percent of the national population (Berger and Mazive, 2002; Dan *et al*., 2010).

Medical plant uses by communities of San people in the north-eastern part of the Otjozondjupa Region has been reported by Leger (1997) who compiled a list of 110 plant species used by the !Kung for various purposes, 47 have been specifically used for medicinal purposes. The main community of the San is the !Kung, who belong to three different tribes, the Ju\'hoansi, Punguvlei and Vasekele. The !Kung hunter-gatherers have a particularly rich knowledge of tubers and roots with edible or medicinal value. The genera *Boophane*, *Urginea*, *Ornithogalum* and *Asclepidaceae* may contain certain glycosides or alkaloids, are highly toxic but are sometimes selected for medicinal purposes (Cunningham, 1992).

Another field study was carried out by Leffers (2003) between 1999 and 2002 in Nyae Nyae Conservancy in the eastern Tsumkwe Constituency, which is the home to one of the oldest and most fascinating cultures on the African continent, the Ju\'hoansi. The following communities Makuri, Xamsa, N≠anemh,!Aotta, N!on!xom, Denlui, !Aotcha, Djxohoe and Baraka were studied using participatory approaches involving semi-structured interviews. The goal of this study was to document the wisdom and experience of indigenous people in order to contribute to preserving this part of the San people's heritage for future generations. Leffers (2003) described 238 plant species occurring in the area and highlights their traditional uses. A wide range of different plants and plant parts are used but plant roots play a significantly important role. The study also noted that in some cases, potentially toxic plants are used as medicines, hence dosage is very important. Some applications noted in the area were not compatible with western medical tradition, as locals have a different understanding of how certain diseases are caused. This is largely because traditional healing is a very complex issue involving rituals and spiritual aspects, far more than simply the use of plants (Leffers, 2003; Lebeau, 2003). Several plant species are used as insect repellents while others are worn as belts, pendants, or as protective charms against diseases. Inhalation of smoke or vapour from a wide range of plant species is also practiced. It is worthwhile to note that some species used by the Ju\'hoansi are protected by law in Namibia while some are on the Convention on International Trade in Endangered Species of Fauna and Flora (CITES) Appendices, e.g., *Ceropegia* genus, *Brachystelma gymnopodum* and some members of the genera *Harpagophytum*, *Euphorbia*, *Eulophia* and *Aloe* (Leffers, 2003). Dan *et al*. (2010) reported the uses of 17 medicinal plants by the San community living on Farm Six, located in the Mangetti west area north of Tsumeb. These medicinal plants are used as the sources of traditional medicine at Farm Six are either collected from the surrounding area or foraged from deeper in the bush. These remedies are easier to obtain during the rainy season, when leaves and roots are easily available. The aliments or diseases treated by these plants are tuberculosis (TB), stomach ache, malaria, coughs, colds and flu, legs pain, runny nose, back pain, chest pain and high blood pressure (Dan *et al*., 2010). One example of these medicinal plants is Ximenia; which the seed kernels of *Ximenia americana* are roasted and used as a remedy for flu in children and wounds healing. The roasted seeds are crushed and applied directly to the wound. In the same manner; the kernels of *Ximenia caffra* are used for preparing a valued ointment for healing wounds (Dan *et al*., 2010).

Owambo communities: A detailed study on the medical culture of the Owambo people of southern Angola and northern Namibia was reported by Davies (1994). All aspects of the medical culture were considered on Owambo beliefs and practices relating to health and health maintenance. The research work pays particular attention to use of plants as medicines by the Owambo communities as well as to their prophylactic and propitiatory measures. The study gives details of the plants used-species, parts used, preparation of drugs and ailments treated. The number of plants listed is slightly more than the 103 in the Powell-Cotton Museum collection in Kent, United Kingdom (collected from the region) for medicinal plants.

Lozi people (Caprivians): The Lozi people of Caprivi region especially in the capital city of this region; Katima Mulilo have very strong beliefs in the use and efficacy of ethnomedicines (Chinsembu and Hedimbi, 2010). An ethnobotanical survey in Caprivi region on the uses of indigenous plants to manage HIV/AIDS opportunistic infections in Katima Mulilo was carried out by Chinsembu and Hedimbi (2010). They interviewed 14 traditional healers (73% male, 27% female) in June and November 2009 and April 2010. A total of 71 plants belong to 28 families were identified. The most used families were Combretaceae (14%), Anacardiaceae (8%), Mimosaceae (8%) and Ebanaceae (7%). The most plant parts used were leaves (33%), bark (32%) and roots (28%). The traditional healers used these plants to treat various conditions were: diarrhoea (29%), malaria (24%), herpes simplex 15%, tuberculosis (14%), meningitis (11%), skin infections (11%), herpes zoster 10%, candidiasis (7%) and others ailments (29%). For example, *Aloe zebrina* leaves were used to treat herpes zoster which can be also treated with several plants, including: *Rhus natalensis*, *Annona senegalensis*, *Capparis tomentosa*, *Garcinia buchananii* and *Syzygium guineense* (Chinsembu and Hedimbi, 2010). The inclusion of anti-HIV ethnomedicines based drugs and other natural products in official HIV/AIDS policy is an extremely sensitive and contentious issue, because anti-HIV ethnomedicines and other natural products can easily become a scapegoat for denial and inertia to roll-out ART (Chinsembu, 2009).

Other communities: Nharo people live between the Amunis reserve in Namibia and Botswana border. Steyn (1981) reported that the Nharo collect 130 different plant species for various uses including medicines, but no details are given on the indigenous medicinal uses for these plants.

Malan and Owen-Smith (1974) conducted field work in Kaokoland and recorded 272 plant species and interviewed 60 informants about plant use. They described 192 plant species of importance to the communities, documenting their distribution in the area, growth characteristics and uses.

A study in the Khowarib Schluct area in the Kunene region conducted by McGrath (1999) described the uses of 20 plant species, including those used for medicinal purposes but the text uses local Damara plant names.

Hachfeld and Schippmann (2000) concentrated on the Devil's claw trade. This plant is considered as the most popularly used medicinal plant in Namibia. Similiar studies are described by Craven and Sullivan (2002) and Stewart and Cole (2005). Devil's claw which includes two species; *Hapagophytum procumbens* and *Hapagophytum zeyheri* is used in the treatment of arthritic conditions. The former species is very popular and has been commercialised, with huge exports to other countries each year. Namibia contributes 96% of world's production of Devil's claw with a mean of 423 tons/year in the last 15 years. Devil's claw became a regulated product because of dangers of over-harvesting (Bennett, 2007).

Mu Ashekele (2004) reported on medical and pharmaceutical technologies in the Omusati region. The following indigenous technologies/products were studied for information collection: Okupanga oipute nozido; treatment of wounds and swelling; Endjadja, treatment of stomach pain; Oshinona; Treatment of epileptic fit; Okupanga ouzio; Treatment of poisoning; Okupanga oupulile, eemhepo veakwamhungu; Bad spirits Okuhena oluvalo; infertility Treatment. (Shapi, 2004), from a field study conducted in the Kavango region reported that some medical and pharmaceutical technologies are used by traditional healers in this region; which include: Ruvaro, Treatment of infertility for both men and women; Musira, Treatment of Haemorrhoid; Kukwika, Surgery Mukongo; Treatment of polio and Mukota; Treatment of Bleeding.

Other popular species are *Hoodia gordonii* and *Hoodia officinalis*. These are also now under cultivation and marketed for medicinal use as an appetite suppressant and for weight loss. On the Farm Jena located in the Hardap region; there are 10 ha of these two species at 60000 plants per ha to have a targeted annual production of 12 tons/year of dry material (Braun, 2007).

MEDICINAL INDIGENOUS PLANTS IN OSHIKOTO REGION, NAMIBIA: A PILOT STUDY

Overview: The database of plants occurring in Oshikoto provided by the National Herbarium of Namibia (WIND) (2007) contains 753 species. Cross-checking this list with the SEPASAL database (www.kew.org/sepasalweb/sepaweb) for plants recorded as specifically used for medicinal purposes in Namibia revealed that 36.4% of these plants have been used for this purpose. Shapi *et al.* (2009) conducted a field study in the Oshikoto region to collect information from traditional healers during the period September-October 2008 and reported on the use of 61 medicinal plants species that belong to 25 families for the treatment of various diseases and disorders. Trees were found to be the most used plants followed by herbs then shrubs and climbers. The average of the informant consensus factor (F_{IC}) value for all ailment categories was 0.75. High F_{IC} values were obtained for weakness and dizziness problems, snake bite, swelling and cardiovascular disorders. Table 1 summarizes the diseases, disorders and indigenous knowledge of the traditional healers on medicinal plant therapies in Oshikoto Region.

Geographic distribution of the medicinal plants: The majority of the medicinal plants in the Oshikoto region are found in the surrounding areas of the villages; however, some of the medicinal plants were from the neighboring towns such as Eenhana and Odibo in Ohangwena region and in Grootfontein and the Kavango region. Some of these plants are from Ondjiva in Angola. There is no surprise of this distribution since the major part of Oshikoto region belongs to the Cuvelai system, which is not normally preferred by some of the medicinal plants (Shapi *et al.*, 2009).

Changes in the medicinal plants quantity: The change in quantity of the natural resources in the Oshikoto region has been attributed to natural and human factors. Sixty six percent of the respondents indicated that there has been no change in the quantity of medicinal plants in the area. This is because of the sustainable harvesting techniques they are using. Additionally, it was also reported that the number of the medicinal plants in their areas were stable because the amount of rain received has not changed too much over the years (Shapi *et al.*, 2009). Thirty four percent of the respondents reported that there has been a change in the quantity of medicinal plants in their areas (Shapi *et al.*, 2009). The following are observations on changes in the quantity of the medicinal plants in the Oshikoto region:

Table 1: Medicinal plants used by traditional healers to treat different ailments in Oshikoto region, Namibia (Adopted from Shapi *et al*., 2009)

Ailments	Plant used (Scientific name)	Local name	Family	Part used (roots, leaves, etc.)	State of use (dry, fresh, both)	Time of recovery
Abdomen pain	Unidentified	*/hare*	-	Roots	Dry	2 days
Abscess	*Senna italic*	Okatundangu	Fabaceae	Fruits, whole plant	Both	Vary
Back pains	*Lonchocarpus nelsii*	Mupanda	Fabaceae	Roots	Both	2 days
Barren	Unidentified	*oshihangena*	-	Roots, leaves	Fresh	Vary
Bilharzia	*Aloe littorals*	Endombo	Asphodelaceae	Leaves	Dry	1 year
Bleeding	*Pterocarpus angolensis*	Uguva Oshimumu	Fabaceae	Roots, tubes,	Both	1-4 days
	Diospyros lycoides Euclea	Omudime	Ebenaceae	stem, pods, leaves,		
	divinorum Swartzia	Omukonati	Ebenaceae	bark, seed		
	madagascariensis Plumbago	Okadimeti	Fabaceae			
	zeylanica		Plumbaginaceae			
Chicken pox	*Bosica albitrunca*	Munkudi	Capparaceae	Leaves	Fresh	2 days
Colloid	*Combretum imberbe Kleinia*	Omukuku	Combretaceae	Roots	Fresh	Vary
	longiflora	Elangelamwali	Asteraceae			
Coughing	*Pterocarpus angolensis*	Uguva Mububu	Fabaceae	All barks	Dry, both	1 week
	Combretum collinum		Combretaceae			
Culture bound	*Strychnos cocculoides Ximenia*	Maguni Ompeke	Loganiaceae	Roots	Both	2-3 days
syndrome	*caffra Ximenia americanum*	Kakukuru	Olacaceae Olacaceae			
Dermatitis	*Ficus sycomorus Vangueria*	Omukwiyu	Moraceae	Leaves	Both	1 month
	infausta	Oshimbu	Rubiaceae			
Diarrhoea	Unidentified	*Xhangau*	-	Roots	Both	2 -3 days
Ear infection	Unidentified	*Munzwe*	-	Barks	Dry	1 day
Easing delivery	Unidentified	*Oshihangena*	-	Roots	Both	Few hours
child birth						up to 1 day
	Dregia macrantha	*Ondhingulula*	Apocynaceae			
	Cyperus papyrus	Onziku	Cyperaceae	Leaves, roots		
Eczema	*Asparagus nelsii*	Okawekamuthithi	Asparagaceae	Leaves, roots	Both	1-7 day
	Clerodendrum ternatum	Shanyu	Lamiaceae			
Epilepsy	*Ricinus communis*	Olumono Ekakata	Euphorbiaceae	Seeds, roots,	Fresh	1 month
	Harpagophytum procumbens	Ekakata	Pedaliaceae	Tube		
	Harpagophytum zeyheri		Pedaliaceae			
Erectile	*Diospyros mespiliformis*	Omwandi	Ebenaceae	Roots	Fresh	1-4 day
dysfunction	*Dregia macrantha*	Ondhingulula	Apocynaceae			
Fatigue	Unidentified	*okasisiti*	-	Roots	Both	4-5 days
Fertility/	*Baphia massaiensis Ximenia*	Omulyambambi	Fabaceae Olacaceae	Roots, whole	Both	1 day
impotent	*caffra Combretum imberbe*	Ompeke Omukuku	Combretaceae	plant		
Generalized	*Tragia okanyua*	Okalilifa	Euphorbiaceae	Roots	Both	4-5 months
oedema						
Gonorrhea	*Ximenia americanum Ximenia*	Kakukuru Ompeke	Olacaceae Olacaceae	Roots, barks	Both	2 -7days
	caffra Combretum imberbe	Omukuku	Combretaceae			
	Ziziphus mucronata	Mukekete	Rhamnaceae			
	Erythropheum africanum	Mupako	Erythroxylaceae			
Headache	*Acacia ataxacantha*	Mukoro	Fabaceae	Roots	Dry	3 days
Herpes	*Vigna dinteri*	Muyimbo	Fabaceae	Leaves	Fresh	1 year
High	Unidentified	*Onzinganke lo*	-	Roots, leaves	Fresh	Vary
blood pressure						
Higher fever	*Diospyros lycioides*	!oro	Ebenaceae	Roots	Dry	1 day
Inflammation	*Acanthosycios naudiniana*	Ruputwi Ohanauni	Cucurbitaceae	Roots, leaves	Fresh	Vary
	Heliotropium sp.		Boraginaceae			
Intestine cram	*Dicoma tomentosa Gloriosa*	Okalupulupu	Asteraceae	Roots, Whole plant	Both	1 -3 days,
	virescens Kohautia angolensis	Ompilu	Colchicaceae			up to 4-5
		Omutingulula	Rubiaceae			months

Table 1: Continued

Ailments	Plant used (Scientific name)	Local name	Family	Part used (roots, leaves, etc.)	State of use (dry, fresh, both)	Time of recovery
Leg pains	*Pterocarpus angolensis*	Uguva Murora	Fabaceae	Roots, pods,	Both	2 -7days
	Helinus intergrifolius,	Omutiwoheva	Rhamnaceae	fruits, whole		
	Helinus spartoides Terminalia	Omugolo	Rhamnaceae	plant		
	sericea Peltophorum africanum	Omupalala	Combretaceae			
	Spirostachys africana	Omuhongo	Fabaceae			
			Euphorbiaceae			
Lightening burn	*Croton gratissimus*	Ongonyo	Euphorbiaceae	Roots	Both	1 day
Meningitis	Unidentified	*Okayekaathithi*	-	Roots	Fresh	Vary
Mental illnesses	*Kleinia longiflora*	Elangelamwali	Asteraceae Fabaceae	Roots, whole plant,	Both	2-3 days,
	Erythropheum africanum	Omupako Eriko	Apocynaceae	branches		up to 16
	Pergularia daemia	Ruputwi	Cucurbitaceae			months
	Acanthosycios naudiniana	Ondhingulula	Apocynaceae			
	Dregia macrantha	Egwitha	Solanaceae			
	Datura stramonium	Runkwanana	Asparagaceae			
	Asparagus virgatus	Oshilalanamawadi	Euphorbiaceae			
	Euphorbia monteiroi					
Panaritium	*Combretum collinum*	Mububu	Combretaceae	Leaves, ash	Fresh	1 week
Pneumonia	*Acacia ataxacantha*	Mukoro	Fabaceae	Roots	Both	3-5 days
Scoliosis	*Ximenia americanum*	Kakukuru	Olacaceae	Roots/leaves	Fresh	1 week
Snake bite	*Acacia mellifera*	Okadilanghono	Fabaceae	Roots	Both	1-2 days
Stroke	*Helinus intergrifolius Helinus*	Murora	Rhamnaceae	Leaves, Roots,	Both	2 weeks,
	spartoides Securidaca	Omutiwoheva	Rhamnaceae	seeds		up to 4-6
	longepedunculata	Omudhiku	Polygalaceae			months
Swollen legs	*Colophospermum mopane*	Omusati	Fabaceae	Leaves	Fresh	1 week
Syphilis	*Boscia albitrunc Rhigozum*	Munkudi Ngandu	Capparaceae	Roots	Both	4 days
	brevispinosum		Bignoniaceae			(depends on
						the severity)
Tetanus	*Croton gratissimus*	Ongonyo	Euphorbiaceae	Tubes, leaves, roots	Both	2-3 days
Worms	Unidentified	*Guturoa*	-	Roots	Dry	2 -3 days

- Geographical factors: some of the medicinal plants are only found in outside Oshikoto region like Eenhana and Namukulo, or even in neighbouring countries like Angola
- Harvesting techniques: sustainable harvesting techniques are not applied by traditional healers themselves or by other medicinal plant harvesters
- Overgrazing/browsing: some species have decreased because goats and cattle feed on them; such factor falls within the human settlement patterns
- Increase in population growth and the high demand for the medicinal plants
- Drought and climate change: some of the medicinal plants are found only during the rainy season

Despite the increasing use of medicinal plants, their future is threatened by complacency concerning their conservation. Reserves of medicinal plants in developing countries are diminishing and in danger of extinction as a result of growing trade demands for cheaper healthcare products and new plant-based therapeutic markets in preference to more expensive target-specific drugs and biopharmaceuticals (Idu and Onyibe, 2007).

Indigenous identification, part used and preparation methods of medicinal plants: Shapi *et al.* (2009) reported that most of the respondents indicated that the ability to demonstrate, identify and distinguish various types of medicinal plants is a pre-condition for practicing, consequently most of them they identify plants as they were taught. The roots were the most used part for the treatment of diseases followed by leaves, whole plant parts, barks, tubers, seeds, fruits, pods and stems (Table 1). The preparation method of the medicinal plant(s) depends on the type of diseases. Some plants need to be boiled while others applied directly in fresh form. Fifty percent of these plants were used in fresh and dry form combination, then with 30% in fresh form and 20% for the dry form (Table 1); however, all the respondents indicated that they prepare the medicine as they were trained by their mentors (Shapi *et al.*, 2009). Leffers (2003) points out the existence of many modifications in the preparation of drugs from the plants and treatment of diseases within the community, as was the traditional plant use and naming, which showed a high degree of variation from village to village, even from individual to individual. The following parts of Ximenia plant: roots, leaves and barks of were found to be the most frequently used parts in the treatment of many diseases and ailment. The traditional healers prescribed their *Ximenia* based treatment either on single plant use like the remedies for Scoliosis, or using combination of different plants combined with Ximenia as it was prescribed for Culture Bound Syndrome (CBS), impotency and gonorrhea (Cheikhyoussef *et al.*, 2010a).

Types of ailments and diseases treated: Forty seven traditional healers in Oshikoto region have used 61 medicinal plants to treat 43 types of ailments and diseases in both humans and animals (Table 1). Several common diseases such as back pains, chicken pox, ear infection, stroke, diarrhoea, wound healing and skin diseases were reported to be among the illnesses that traditional healers could treat (Shapi *et al.*, 2009). Ximenia has been observed to be the most frequently used medicinal plant among traditional healers. The traditional healers have used *Ximenia americana* and *Ximenia caffra* to treat various diseases and disorders such as Lindongo: Gonorrhea; Mukayo: CBS; Uuta: Impotency and Ondjaba: Scoliosis (Cheikhyoussef *et al.*, 2010a). The average of the Fidelity Level (FL) of the both species for all ailments was 33.33% with the highest FL for *X. caffra* to treat CBS of 66.66% (Cheikhyoussef *et al.*, 2010a). Chest ailments have been treated with decoction root of the *X. caffra* by the San people in farm six in northern Namibia (Dan *et al.*, 2010).

OTHER INDIGENOUS USES OF MEDICINAL PLANTS BY LOCAL COMMUNITIES IN NAMIBIA

The San communities use plants for food and water (Story, 1958). Saar (1995) conducted a survey of woody plants used in west San or Bushman land for fruits and crafts. A socio-ecological survey using video recording, interviews and questionnaire surveys was conducted by Botelle and Kowalski (1999) to study the changing relationships of the Topnaar communities and their physical environment, the causes of these changes and conflicts experienced in managing the resources in the lower Kuiseb valley. They noted that !Nara (*Acanthosycios horridus*) harvesting for fodder and cosmetics was a key activity among the communities. Hangula *et al.* (1998) recorded a number of plant species used in Owamboland for various purposes. These plants are used for food: Fruits; *Berchemia discolor, Sclerocarya birrea, Hyphaene petersiana, Diospyros mespiliformis*; Vegetables; *Cleome gynandra, Sesuvium sesuviodes* and for shade; *Peltophorum africanum, Entandrophragma caudatum, Adansonia digitata.* Other important multipurpose plants recorded are *Schinziophyton rautanenii, Strychnos madagascariensis, Nymphaea capensis, Lapeirousia littoralis* and *Aloe zebrina.*

Marula (*Sclerocarya birrea*) is a particularly very important multipurpose species as it provides fruits, shade, browse, timber, crafts (Cunningham, 2007). The indigenous uses of this plant were studied by Botelle (2001) in Oshikoto, Ohangwena, Omusati and Oshana regions. Du Plessis (2004) advocated for the promotion of growing indigenous fruit plants such as *Sclerocarya birrea*, *Schinziophyton rautanenii*, *Ximenia* sp., *Acanthosycios horridus*, *Adansonia digitata*, *Kigelia africana*, *Berchemia discolor*, *Hyphaene petersiana*, *Strychnos spinosa*, *Diospyros mespiliformis*. The San or Bushman communities use variety of poisons on their arrows to kill animals during hunting. Preparation of arrow poison is highly complex, with many variations regarding additives (Leffers, 2003). Some of the important plants to the Ju\'hoansi culture belong to the genera *Brachystelma*, *Ceropegia*, *Fockea* and *Vigna* which produce edible tubers (Leffers, 2003). Many species are eaten raw and those eaten prepared are done so in a variety of ways, sometimes this depends on the stage of plant's development. Winter food plants include *Citrulus lanatus*, *Schinziophyton rautanenii*, *Vigna labatifolia*. In general, food plants are highly subject to personal preferences (Leffers, 2003) just like medicinal plants. Some plants are used as construction materials, cosmetics, tools, crafts, musical instruments, tanning and dyeing for which specific species are chosen on the basis of their properties. Social traditions are also important and some plant species are used for this, e.g., they use powdered *Pterocarpus angolensis* to adorn and strengthen girls when they experience their first menstruation (Leffers, 2003). The Vigorous Indigenous Vegetables for Africa (VIVA) program (Du Plessis, 2004) aims to support increased cultivation and marketing of indigenous vegetables by Namibian small-holder farmers. The program started in Nyae Nyae conservation area. The indigenous vegetables identified are *Hibiscus sabdarifolia*, *Sesuvium sesuvioides*, *Cleome gynandra* and *Amaranthus tricolor*. Du Plessis (2004) also recommended a medium-term goal for indigenous vegetable use as a better and more accessible nutrition for people with HIV/AIDS. In the Kunene region (Knott, 2007) documented the importance of *Commiphora* resin to the local Himba communities. They use plant resin for cosmetics, medicine, washing clothes, cleaning teeth, tanning, glue and dye. The main species used are *Commiphora wildii* and *C. virgata*. Mallet (2007) discussed the importance of the Kalahari melon; *Citrulus lanatus* and how it can be cultivated for the benefit of communities. Another underutilized indigenous plant in Namibia is *Berchemia discolor* or Eembe; *which* is the most popular wild fruits in the northern parts of the country (Hailwa, 2002). The indigenous people eat it fresh or dried and stored for use in the dry season. The dried fruit have a date like flavor. Fresh and dry fruit is fermented to make beer and wine (Barrion *et al*., 2001). A qualitative phytochemical analysis of the extracts (fruits, leaves and barks) of *Berchemia discolor* was conducted (Cheikhyoussef *et al*., 2010b). The analysis revealed the presence of terpenoids, total phenols, saponins and alkaloids in the aqueous extract; flavonoid, tannins, terpenoids, total phenols and Cardiac glycoside in the methanol extracts; Cardiac glycoside, flavonoid, terpenoids and total phenols in the ethanol extracts (Cheikhyoussef *et al*., 2010b). The leaves and fruits did not show the presence of Anthraquinone and Phlobatanins in any of the extracts that were tested for its presence; they are only found in barks; this could explain the indigenous use of the barks for basket dyeing by the local communities in the northern parts in Namibia (Cheikhyoussef *et al*., 2010b). *Berchemia discolor* can be seen as a potential source of useful drugs since it seems as rich source of terpenoids, total phenols, saponins, flavonoid, tannins and Cardiac glycoside. The distribution of its phytochemicals will contribute in elucidating the importance of this plant in ethnomedicine in Namibia (Cheikhyoussef *et al*., 2010b).

GAPS IN IKS USE FOR MEDICINAL PLANTS IN NAMIBIA

Cunningham (1997) commented that the remarkable issue is the continuity in use of few key plant species over large areas of their range in Africa for food and medicine. Such plants include: food-*Sclerocarya birrea, Schinziophyton rautanenii,* !nara (*Acanthosycios horridus*), *Aspalanthus linearis, Agathosma betulina* - all highly significant for hunter-gatherer communities; medicine-*Prunus africana, Warburgia salutaris, Abrus precatorius, Afzelia qaunzensis, Synaptolepis kirkii, Myrothamnus flabellifolius.*

Some of the gaps that have been identified are: Existing literature indicates (part of this literature is presented in this review) that we know substantially a lot on the use of indigenous plants for medicinal purposes for only a handful of cultures in Namibia, the majority of cultures still need to be studied.

Some work has been done in Owamboland, Damaraland, Kavango and Caprivi but such information has a focused bias on food and other uses of plants, with medicinal plant use aspects superficially dealt with. This gap must be addressed in further research work.

It has been demonstrated that the distribution of research efforts in Namibia on medicinal plant use has been skewed towards selected communities, especially the San communities, the Topnaar, parts of Owamboland and in Windhoek with other communities not being considered but may hold potential(s).

Some literature is focused on the practices of traditional healing that are dependent on rituals, magic and spiritual beliefs. Focus needs to be shifted to the more straight-forward, non-complex but still little-understood uses that are more relevant to improvement of primary health care.

In general, detailed ethnobotanical studies are lacking, not just in Namibia, but in many countries. Hence, future studies must collect more detail on the use of indigenous knowledge in the utilization of plant resources.

CONCLUSIONS

This review gives a good overview of the application of indigenous knowledge by local communities in the utilization of plant species for various purposes in Namibia, with emphasis on medicinal plants. There is no doubt that indigenous knowledge is very important in the development process, which is why today, more efforts are devoted towards documenting it before it disappears. Communities are utilizing a wide range of plant species for medicine, food, fodder, construction, shade, hunting and in social events. However, much still remains to be done to document the information in areas that have not been studied, or that have been little-studied. The traditional healing knowledge of the use of the medicinal plants to treat diseases has been with the traditional healers for generations but has not been recorded and this knowledge remains mostly with the traditional healers who are mostly old people. Since the use of plants has been demonstrated to sometimes be culture-specific, ethnic group-specific or location-specific, efforts to document such information in detail in specific locations in the various Namibian regions should be worthwhile because the loss of the indigenous knowledge and practices on the traditional healing could negatively affect the healthcare system of the people in Namibia. The local communities should be educated on the sustainable methods of harvesting and managing the medicinal plants. The youth should also be encouraged to learn the traditional healing knowledge to preserve it from being lost with the older generation.

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