



**ASSESSMENT OF THE USE RATE AND CONSERVATION OF MEDICINAL PLANTS BY
THE MAASAI COMMUNITY IN OLOLOSOKWAN AND SOITSAMBU VILAGES IN
NGORONGORO DISTRICT, TANZANIA**

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Abstract: Medicinal plants play great role in both health care and rural economy. In Tanzania there has been an inadequacy in addressing important conservation measures for medicinal plants by incorporating it in national policies and conservation plans. This study was conducted to assess the use rate and conservation of medicinal plants by Maasai communities in Oloolosokwan and Soitsambu Villages in Ngorongoro District, Tanzania. Face to face interviews with respondents was done during data collection. Additionally, collection and identification of medicinal plants in the villages was carried out. A total of 34 species of medicinal plants were recorded during a botanical survey in the villages. Majority of the identified species were wooded plants, with some herbaceous and shrubs. More plants were used for general healthcare including treatment of Malaria, Typhoid, Brucella, Syphilis, Trachoma and abdominal problems. An ethnobotanical study of medicinal plants in Oloolosokwan and Soitsambu Villages in Ngorongoro District was done by collecting information from the experienced medicinal practitioners of Maasai ethnic group. There is considerably high use rate of medicinal plants in the study area. The family Mimosaceae had the highest proportion of medicinal plants used with (10) plant species recorded, followed by Euphorbiaceae with nine (9) plant species recorded. Other recorded families include Lamiaceae, Anacardiaceae, Liliaceae, Rhizophoraceae, Bignoniaceae, Caesalpiniscaeae, Tiliaceae, zygophyllaceae, Amaranthaceous, combretaceae and Apocynance each having one (1) encounter. The results of the study revealed that there is rich diversity of medicinal plants used to treat various diseases in Oloolosokwan and Soitsambu Villages. Herbal practitioners and the local community in the study area should be educated on sustainable methods of using medicinal plants without compromising their availability for future use. It is also imperative to train the community on the proper propagation techniques in order to encourage the domestication of valuable and threatened medicinal plants.

Key words: *Use rate, conservation of medicinal plant and Maasai community.*

1.0 Introduction

The use of plant for treatment of various diseases is universal and has been practiced for long a time (Ekor, 2013). It is well known that people living in various parts of Africa long before the arrival of Europeans were using traditional medicine for treatment of various diseases for both humans and livestock (Shohawon and Mahomoodally, 2013). Apart from healthcare, they are



important for financial income, cultural identity and livelihood security (Gurib-Fakim and Mahomoodally, 2013).

The knowledge on medicinal plants is normally passed on orally from one generation to the next (Mahwasane *et al.*, 2013). But a lot of valuable information can be lost or distorted whenever a medicine man dies without revealing his knowledge to another (Kokwaro, 1976).

In Africa, an estimated 5400 harvested medicinal plant species are used in traditional medicine (Neuwinger, 2000). Tanzania alone is endowed with more than 10,000 plant species of which 1100 are endemic (URT, 2014). Of 10000 plant species 25% are the wild medicinal plant species (Institute of Traditional Medicine, 2012). The wild medicinal plant species are derived from five phytogeographic regions (Nahashon, 2013), which are , the Afro-montane region including the Eastern Arc mountains among others, Lake basin regions such as Lake Tanganyika and Lake Victoria, the Somali-Maasai region in the central and northern Tanzania, Zambezi region, which is covered by the Miombo woodlands in the western and southern part of the country and the Zanzibar-Inhambane region consisting of coastal, thickets, forest and woodlands. Unfortunately these phytogeographical regions are experiencing an alarming rate of deforestation, estimated to be between 130 000 to 150 000 hectares destruction annually (FAO, 2010).

Many conservation measures can be taken in for sustainable use of medicinal plants. Some of these can be taken directly at the places where the plants are found (*in-situ* conservation), while others are indirectly taken, including domestication for commercial purpose (*ex situ* conservation) (Wasnik and Naik, 2016).

Although not documented, local communities in Ololosokwan and Soitsambu villages have been practicing traditional medicine for a long time. They have been using plant species to combat various diseases in their environment. Unfortunately the knowledge about the use of these medicinal plants on treating particular diseases is transferred orally from generation to generation without documentation thus held with superstition. This limits the understanding of rate of use which can result to over harvesting. The bulk of medicinal knowledge is limited to a few people of the older generation, who seldom reveal their secrets (Mahwasane *et al.*, 2013). In Tanzania there has been an inadequacy in addressing important conservation measures for medicinal plants by incorporating it in national policies and conservation plans (Hanazaki *et al.*, 2018). This research broadens our understanding on the practice of traditional medicine thereby passing knowledge to the present and future generations. The study also seeks to enhance efforts to preserve the plant species and the traditional knowledge on the use of medicinal plants. This study was conducted to assess the use rate and conservation of medicinal plants by Maasai tribe in Ololosokwan and Soitsambu Villages in Tanzania. Specifically the study identified medicinal plants used by peoples in the study area, determined the use rate of medicinal plants in the study area and examined the kind of diseases treated using those medicinal plants.



2.0 Research methodology

2.1 Study area

Ololosokwan and Soitsambu villages are located in the northwestern corner of Loliondo division, Ngorongoro district, bordering with the Serengeti National Park to the west in Tanzania and the Kenyan border to the north adjacent to the Maasai Mara National Reserve in Kenya. The selected areas of study commonly use medicinal plants as they are occupied by the Maasai of Purko Division in the northern part of the Tanzania bordering the neighboring Kenya. Ololosokwan and Soitsambu village are the home to the pastoralists, the majority of whom are Maasai of the Ipurko dialect. The village is dominated by acacia savannah and grasslands. There are undulating topography and a number of permanent watercourses draining into Lake Victoria basin to the west.

Ololosokwan and Soitsambu villages lie within the eastern range of the annual ungulate migrations that defines the Serengeti ecosystem. Hundreds of thousands of wildebeest and other large ungulates move south through Ololosokwan and Soitsambu and neighboring village lands every year following the onset of the rains. The enduring presence of large wildlife populations in this part of the Serengeti ecosystem is based on the historic Maasai coexistence with wildlife in Ololosokwan and Soitsambu (O'Malley, 2000). Resident species such as giraffe, impala, and buffalo are common in the area (O'Malley, 2000). Vegetation in Ololosokwan and Soitsambu is typical of Acacia savannah-grassland mosaics of the greater Serengeti ecosystem (Gardner, 2016).

Rainfall is medium to high for East African savannahs, averaging around 700–1,200 mm for the Ololosokwan and Soitsambu area (Gardner, 2016). The area is semi-arid savannah woodland with little forest which is the source of some permanent spring found in the area, which act as the source of water for wildlife, livestock and human being that flow throughout the year (Gardner, 2016).

The residents of Ololosokwan and Soitsambu are predominantly Maasai agropastoralists, with a small minority of immigrant agriculturalists such as the Wambulu who come from areas in northern Tanzania. The dominant form of land use and livelihood in Ololosokwan and Soitsambu is transhumant pastoralism, which utilizes wet and dry season livestock grazing pastures (Gardner, 2016). According to traditional patterns of movement the livelihoods in Ololosokwan and Soitsambu depend primarily on livestock herding following traditional transhumant pastoralist practices. Over 90% of the people of Ololosokwan and Soitsambu are livestock keepers.

2.2 Data Collection

A stratified sampling strategy based on gender in the households in the two villages was used to select informants that, is traditional herbalist, medicinal plant collectors and household heads. A total, 70 informants (40 male and 30 female) were involved in the survey to explore local knowledge on use of medicinal plants. High proportional of male were practicing traditional



medicine and was the basis of choosing higher number of male informants. Of these, 50 were traditional herbalists, 5 plant collector and 15 household heads.

Primary data on the use of medicinal plant by local communities was acquired through questionnaires provided to the community members. These were closed and open ended questionnaires. Structured interview was conducted by asking questions to knowledgeable people on traditional medicine such as traditional herbalist, medicinal plant collectors and household heads. A total of 36 people were reached through survey questionnaires. This supplemented information gathered from questionnaire survey. This type of interview was based on people who are knowledgeable and had long time experience on the use of medicinal plants in study area. Direct observation used also used. In some cases, plant photos were taken for easy identification.

3.0 Data analysis

All computations were done in Microsoft Excel. Prior to analysis, plant species were grouped based on their families and categorized based on diseases they treat.

3.1 Results and discussion

3.2 Socio-economic importance of medicinal plants

The socio-economic importance of medicinal plants can be viewed in terms of healthcare to local communities and the household incomes. The Maasai are one of the most interesting tribes in East Africa with rich culture in the use of medicinal plants (Kiringe, 2006). In Ololosokwan and Soitsambu villages the Maasai community has remained one among the few communities that have kept their original unique culture regardless of the influence of globalization and integration with western influence on the use of modern medicine. Other communities who have kept their culture apart from Maasai in Tanzania include the Iraqw or Irakw (also known as the Wambulu by Swahili speakers) and Hazadbe in Tanzania, the Himba of northwest Namibia, the Zulu of South Africa, the Southern Ndebele of South Africa, the Bushman, San or Khoisan of South Africa and the Sambaru of north-central Kenya, (<https://www.africanbudgetsafaris.com/>, cited 29 April, 2020).

A total of 36 traditional medical practitioners were interviewed (Table 1) as key informants with their age ranging between 21 to 70 years whereby 60% of them were older than 50 years. The results show that Ololosokwan village had a low number of respondents with 15 key informants unlike Soitsambu village which has 21 key informants.

Table 1: Frequency distribution of key informants by age

Villages	Age Group		Total
	21-40	41 Above	
Ololosokwan	5	10	15
Soitsambu	12	9	21
Total	17	19	36



The findings imply that the elderly people are the main custodians of traditional knowledge and it illustrates the presence of knowledge gap between the elderly and the young generation. It also shows that traditional healers do not share the knowledge on the medicinal use of different plant species. Diagnosis is reached through spiritual means and a treatment is prescribed, usually consisting of herbal remedy that is considered to have not only healing abilities but also symbolic and spiritual significance. As a result, knowledge is restricted to a limited number of healers and with similar spiritual beliefs. In some cases, different healers gave different information on the use of a similar plant species. It was also noted that, when two or more healers were brought together, nobody volunteered to explain whatever he/she knew about medicinal plants. Knowledge was also not disclosed to members of another family. Lack of transparency between traditional healers and unwillingness to disclose their traditional knowledge resulted to the observed low number of respondents in the study area and the variation in respondents between the two study areas. It was further observed that most of the key informants were male and few were female because many households were male headed household (Table 2)

Table 2: Frequency distribution of key informants by gender

Villages	Gender		Total
	Male	Female	
Ololosokwan	12	3	15
Soitsambu	15	6	21
Total	27	9	36

The study revealed a rich diversity of medicinal plants used in the two villages and the extent (rate) of use of various plants identified. It further revealed a rich ethno botanical knowledge amongst the residents of Ololosokwan and Soitsambu villages. The families Euphobiaceae and Mimosaceae were most dominant in this study and this could be due to their wide range of bioactive ingredients especially where the area is characterized by semi-arid kind of climatic condition.

Table 2: Types of medicinal plants treating Malaria

No.	Plant species	Vernacular name	Family
1	<i>Acacia drapanolobium</i>	Eluai	Mimosaceae
2	<i>Balanite egyptica</i>	Orngoswa	Zygophyllaceae
3	<i>Euphorbia candelabrum</i>	Oropopongiorok	Euphorbiaceae
4	<i>Euphorbia</i>	Oloilaleyi	Euphorbiaceae
5	<i>Solonum incanum</i>	Endulelei	Solanaceae
6	<i>Gutrenbegia cordifolia</i>	Nanguudeyo	Asteraceae
7	<i>Euphorbia spp</i>	Orokobobiti	Euphorbiaceae
8	<i>Croton dischognuse</i>	Olokirdig'ai	Euphorbiaceae



9	<i>Euphobia spp</i>	Oropopong' oibor	Euphobiaceae
10	<i>Euphobia trucalii</i>	Emanyara	Euphobiaceae
11	<i>Acacia melifera</i>	Oiti	Mimosaceae
12	<i>Albicias chemperian</i>	Orupande	Mimosaceae
13	<i>Amarathusus hybrudus</i>	Epokai	Amaranthaceae
14	<i>Solonum spp</i>	Esikaoi	Soloneaceae
15	<i>Aloe spp</i>	Esukuroi	Tilliaceae
16	<i>Euphobia spp</i>	Oropopongi	Euphobiece

Table 3: Types of medicinal plants treating Kwashakow

No.	Plant species	Vernacular name	Family
1	<i>Acacia nalotica</i>	Engiloriti	Mimosaceae
2	<i>Rauvolfia cafra</i>	Ololesiay	Apocynaceae

Table 4: Types of medicinal plants treating Syphilis

No.	Plant species	Vernacular name	Family
1	<i>Acacia xanthophloea</i>	Oleraiioibor	Mimosaceae
2	<i>Acacia tortilis</i>	Oltepesi	Mimosaceae
3	<i>Salvadora persica</i>	Engike	Rhizophoraceae
4	<i>Acacia robusta</i>	Ol-ngwegunyi	Mimosaceae
5	<i>Acacia senegalii</i>	Eitii	Mimosaceae
6	<i>Newtonia burchananii</i>	Orupande	Mimosaceae
7	<i>Carissa edulis</i>	Alamuriaki	Caesalpiniceae
8	<i>Combretum molle</i>	Ol-maroroi	Combretaceae
9	<i>Ricinus cominus</i>	Orimatunda	Euphobiaceae
10	<i>Ocimum suvie</i>	Olomurran	Lamiaceae

Table 5: Types of medicinal plants treating Trachoma

No.	Plant species	Vernacular name	Family
1	<i>Kigelia africana</i>	Oldarpoi	Bignoniaceae

Table 6: Types of medicinal plants treating Brucella

No.	Plant species	Vernacular name	Family
1	<i>Cordia monoica</i>	Osekiorok	Euphobiaceae



Table 7: Types of medicinal plants treating Diarrhea

No.	Plant species	Vernacular name	Family
1	<i>Rhus vulgaris</i>	Orimisigiyo	Anacardiaceae
2	<i>Ficus thoningii</i>	Oreteti	Moraceae
3	<i>Ficus sycomorus</i>	Oreti oibor	Moraceae

A total of 35 medicinal plant species in 14 families were recorded to be used to in the area by several traditional practitioners (Table 3). The family Mimosaceae had the highest proportion of medicinal plants used with (10) plant species recorded, followed by Euphorbiaceae with nine (9) plant species recorded. Other recorded families include Lamiaceae, Anacardiaceae, Liliaceae, Rhizophoraceae, Bignoniaceae, Caesalpinisaceae, Tiliaceae, zygothaceae, Amaranthaceae, combretaceae and Apocynaceae each having one (1) encounter. These species are all from the wild, indicating the need for more research in natural forests given the diversity of plant species in tropical natural forests. It also shows the importance of propagating indigenous plant species using traditional and modern knowledge. Since some of indigenous plant species may be difficult to propagate, it may be useful to involve the herbal practitioners who are very traditionally familiar on the ecological requirements of those species since they use them on regular basis (Maroyi, 2013). The use of such local knowledge can enhance appropriate propagation techniques of these plant species for sustainable utilization. The increased percentage of species obtained from the wild has a direct effect on the availability of these resources and is likely to contribute to their vulnerability to being over-exploited (Maroyi, 2013). The unabated over collection of the medicinal plants from the wild is a major threat to their existence and raises serious concern for their conservation (Cheikhoussef *et al.*, 2011). However, unavailability of planting material and lack of appropriate propagation techniques were noted to be the major constraints to exploiting the potential for medicinal plant domestication.

3.3 Types of diseases treated using medicinal plants

The community in Ololosokwan and Soitsambu villages has a long history in the use herbal medicine for some aspect of primary health care. The disease that were mostly treated using medicinal plants are Malaria (47%), Syphilis (29%), Diarrhea (9%), Kwashakow (6%) where by Typhoid, Brucella and Trachoma has 3% (Figure 1). The use and search for drugs and dietary supplements derived from plants have accelerated in recent years such that pharmacologists, microbiologists, botanists, and natural-products chemists are combing their knowledge in the Earth for phytochemicals that could be developed for treatment of various diseases. Studies indicate that, approximately 25% of modern drugs used in the United States have been derived from plants (Ekor, 2013).

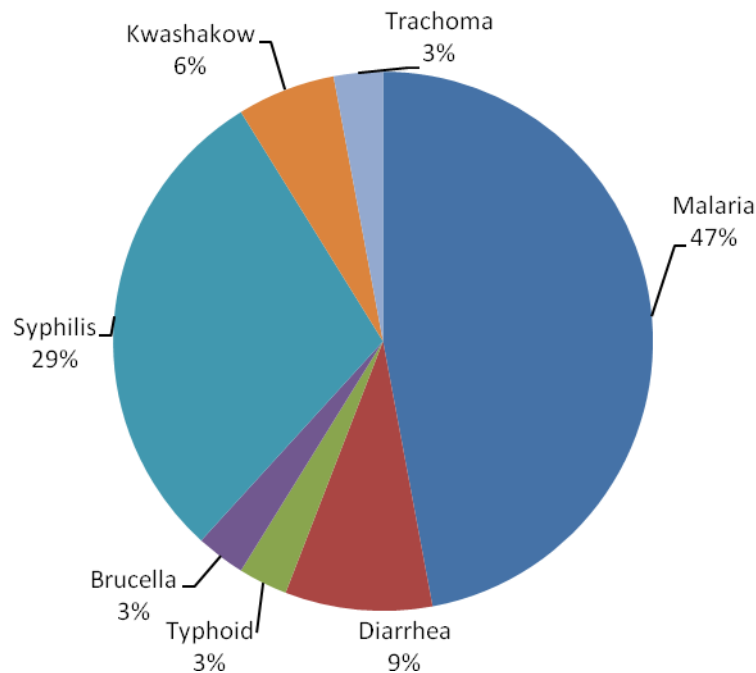


Figure 1: Types of diseases treated using medicinal plants

All plants produce chemical compounds in their bodies for their normal physiological use (War, *et al.*, 2012). These chemicals can be used for treatment of various diseases. Different plant parts are used, for example the bark of the *Acacia naitotic* tree was used in treatment for malaria in the study area. But some herbalists criticize the manner in which many scientific studies make insufficient use of historical knowledge, which has been shown to be useful in drug discovery and development in the past and present. They argue that traditional knowledge can be guided selection number of factors such as optimal dose, species, time of harvesting and target population (Hanazaki *et al.*, 2018).

Herbs have been shown to be capable of producing a wide range of undesirable or adverse reactions some of which are capable of causing serious injuries, life-threatening conditions, and even death (Ekor, 2013). Furthermore, "adulteration, inappropriate formulation, or lack of understanding of plant and drug interactions have led to adverse reactions that are sometimes life threatening or lethal". Proper double-blind clinical trials are needed to determine the safety and efficacy of each plant before they can be recommended for medical use. Although many consumers believe that herbal medicines are safe because they are "natural" (Ekor, 2013), herbal medicines and synthetic drugs may interact, causing toxicity to the patient. Herbal remedies can also be dangerously contaminated, and herbal medicines without established efficacy, may unknowingly be used to replace medicines that do have corroborated efficacy (Ekor, 2013).

4.0 Conclusion and recommendations

The results of the study revealed that there is rich diversity of medicinal plants used to treat various diseases in Ololosokwan and Soitsambu Villages. Herbal practitioners and the local



community in the study area should be educated on sustainable methods of using medicinal plants without compromising their availability for future use. It is also imperative to train the community on the proper propagation techniques in order to encourage the domestication of valuable and threatened medicinal plants. Domestication of medicinal plants will create new opportunities for the local people such as provision of an alternative income and could help reduce the pressure on the wild population. Since all the species used in traditional are from the wild, this implies the need for more research in natural forests given the diversity of plant species in tropical natural forests.



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