Ethnobotanical survey and plant monographs of medicinal plants used among the Elgeyo community in Kenya

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\textbf{Abstract}
Knowledge of medicinal plants is passed orally from one generation to the next, consequently, valuable information can be forgotten, lost or distorted. The fragility of the oral-traditional knowledge and the rapid pace of climatic change, urbanization and subsequent erosion of tribal culture in Kenya calls for intervention. The aim of the study was to carry out an ethnobotanical survey of medicinal plants. This was achieved through administration of structured questionnaires. Twenty five medicinal plants were documented, majority were from the family Capparidaceae and Rutaceae. Locally endangered plants constituted 68%. Majority of the plant parts were boiled (85.19%) in water and taken orally as infusions and the roots were widely used (66.67%) also majority were utilized for gastrointestinal problems. Most of these plants were locally endangered which was attributed to overharvesting, harsh climate and extensive gulley erosion that was evident in the area.

\textbf{Citation:}

1. Introduction

1.1 Literature review
1.1.1 Introduction
Plants have been and continue to be the major source of natural products with potential lead compounds (Graham, 2001). Previous experiments on known medicinal plants through trial and error have yielded a lot of information which has been used to develop a number of conventional drugs. However, majority of the plants in situ have not been studied and therefore they still hold a wealth of undiscovered biomolecules. The current threats of medicinal plants natural habitats may lead to loss and possible extinction before they are documented (Nogrady and Weaver, 2005; Lewis and Afolayan, 2009).
1.1.2 Some plant families used as herbal remedies
It has been observed in Kenya that 75 plant species from 34 families are used to cure 59 ailments in traditional medicine of central Kenya (Graham, 2001), while in the United States, 36 of the 101 plants species implicated in drugs discovery are weeds species found mainly in disturbed habitants (Lewis and Afolayan, 2009).

In Ethiopia about 800 species of plants are used in the traditional health care system to treat nearly 300 mental and physical disorders (Tildhun and Mirutse, 2007). A total of 124 medicinal plants which belong to 107, genera and 49 families of vascular plants were recorded in Kafa Zone Ethiopia. In this region people use these plants to treat about 18 ailments of human and domestic origin (Tesfaye and Sebsebe, 2009). A total of 71 plant species from 28 families, mostly the Combretaceae (14%), Anacardiaceae (8%), Mimosaceae (8%), and Ebenaceae (7%), are used to treat conditions such as herpes zoster, diarrhea, coughing, malaria, meningitis, and tuberculosis. (Chinsembu and Hedimbi, 2010). This shows that medicinal plants are important source of remedies and should be protected for future studies and use.

1.2 Plants as source of conventional drugs
Ethno-botanical studies are often significant in revealing locally important plant species especially for the discovery of crude drugs (Mukiama, 2005). Over 50% of all modern clinical drugs are of plant origin and play an important role in drug development programs in the pharmaceutical industries. In developing countries especially among the rural people, traditional healers provide an essential service in management and treatment of diseases and other ailments. Therefore, plants with medicinal values are often presented for use in such situations (Olatunde, 2003) and their availability is dependent on the measures used to conserve their natural habitat.

The forests of the world are particularly rich in diversity of plant species which are yet to be discovered and studied (Lewis and Afolayan, 2009). Some of these plants may be the ultimate sources of anticancer and anti-AIDs drugs among many other solutions to human afflictions. Consequently, the destruction of these forests and other ecosystems is disturbing; it signifies a tragic loss of the unique plant species whose potential is yet to be established (Nogrady and Weaver, 2005).

1.3 Importance of medicinal plants
In South Africa, plants traded and marketed for medicinal value are sourced from grafting or cultivation or both. Artemisia annua L. a Chinese plant is cultivated worldwide for antimalarial agent artemisinin and also yew tree Taxus brevifolia Nutt. is cultivated for anticancer agent toxol (Graham, 2001). Aloe plant (the ‘wand of heaven’) is a cactus like plant found in deserts of Africa and Arizona and has long been used for its curative properties. Hence people have cultivated it in home gardens (Nogrady and Weaver, 2005).

Plants have been used as a source of medicine to treat different ailments in East Africa and particularly Kenya (Kokwaro, 1993). In Kenya herbal medicine relies more on wild harvested plants than any country yet the sustainability of such resources is increasingly endangered. The average annual loss is 1% as opposed to 0.6% at the global level (Iwu, 1993).

The knowledge from herbalists is either passed secretively from one generation to the next by word of mouth or their descendants inherit the medico-spiritual manuscripts (Tildhun and Mirutse, 2007). Equally threatened is the knowledge upon which the traditional system is based, as the ethno-botanical information is not documented and remains in the memory of the elderly practitioners (Tesfaye and Sebsebe, 2009). The main purpose of documentation in ethno-botany is to try and find out how people have traditionally used plants and how they relate to them even in the present times. Thus, ethno-botany preserves valuable traditional knowledge for both present and future generations and the world as well as for further studies (Tesfaye and Sebsebe, 2009).

1.4 Danger facing medicinal plants
The major concern of Dharani and Yenesew, (2010) and Dharani et al., (2010) was the rate at which these vital resources are diminishing. Among the 887 medicinal plant species in Ethiopia, about 26 species are endemic and
are becoming increasingly rare and are at verge of extinction (Tesfaye and Dimissew, 2009). The solution is to practice cultivation and conservation of endangered species. In Kenya Mukiama (2005) documented twenty medicinal plants while working with traditional medical practitioners.

Moreover, another factor that intensifies the threat of depletion is the explosive growth in the use of plant-based products in the last ten years. Hundreds of plant species are being converted into dozens of different product for use across a wide variety of markets (Guinand and Lemessa, 2009). The plants and derived plant products are traded locally, regionally and internationally, as nutriceuticals, dietary supplements, phytomedicines, homeopathic drugs, aromatherapy, oils, flavors, fragrance and food additives. This creates a huge demand of the plant products and a threat to their existence in their natural habitats. In addition, the vast growing multi-million trade of medicinal plants call for legislations to protect the medicinal plants by forming strict laws that govern harvesting of medicinal plant resources (Susana et al., 2007).

In 1976 Vickery and other researchers documented the most dangerous of the poisonous plants growing in Kenya and the structure of the poisons. Herbal plants of East Africa have also been documented. Dharani and Yenesew (2010) documented 136 plant species which are indigenous. They did not document all medicinal plants, limited themselves to selection of only the best known and well understood medicinal plants and their use (Tildhun and Mirutse, 2007).

1.5 Synergism of the medicinal plants
There are cases where more than one plant is used to treat many ailments, for example headache is treated with a combination of either six or nine or twelve medicinal plants. There are also cases where a particular plant is used to treat many ailments. For instance, both Clerodendrum myricoides (Hoist) RBr ex Vatke a member of the family Verbenaceae and Croton macrostachyus Del a member of the family Euphorbiaceae are used to treat seven ailments (Tesfaye and Sebsebe, 2009). Some plant products have a wide variety of different active principles which act together to produce a beneficial effect and this has been noted in vitro assays (Nogrady and Weaver, 2005). Thus, from the ongoing, ethnobotanical survey of plants found in Endo and Cherebes villages is a step towards documentation of indigenous traditional knowledge.

2. Objective of Research
The objective of the research was to carry out an ethnobotanical survey of medicinal plants used among the Elgeyo community in Cherebes and Endo villages, Elgeyo Marakwet County.

2.1 Justification of research
Knowledge of medicinal plants in traditional African societies is normally passed on orally from one generation to the next. Unfortunately, a great deal of valuable information can be forgotten, lost or distorted. For instance, the death of a medicine man before revealing the knowledge is a case in point. There is lack of detailed documentation on the significance and application of curative plants in East Africa (Dharani and Yenesew, 2010). Such documentation is an urgent priority in view of the fragility of the oral-traditional knowledge and the rapid pace of climatic change, urbanization and subsequent erosion of tribal culture in East Africa (Dharani, 2002); hence the need to document medicinal plants.

3. Materials and Methods
This part presents how data was collected. Structured questionnaires were prepared for data collection in Cherebes and Endo villages of Elgeyo Marakwet County and a sample of the form is attached. The procedure for the ethnobotanical survey is also presented.

3.1 Study area
The study was carried out in Elgeyo Marakwet County in Rift Valley in Cherebes and Endo villages Soy division of Keiyo South District. Elgeyo Marakwet County is bordered by Uasin Gishu County to the West and Baringo County to the East. It extends from Latitude 0° 10” to 0° 52” North and Longitude 35° 25” to 35° 45” East (Caspi et al., 1998). The total area of the County is 1439.30 Sq. km. It is subdivided into five (5) divisions namely: Tambach (330.8 Sq. Km.); Kamariny (210.5 Sq. Km.); Chepkorio (312.9 Sq. Km.); Soy (378.9 Sq. Km.) and Metkei (206.2 Sq. Km.) (Caspi et al., 1998).

The study was carried out in Soy division which is the largest among the five divisions in Elgeyo Marakwet County. The area is sparsely populated with about 18,658 people in the division. The area has sparse vegetation comprising mainly of Acacia drepanolobium Sjostedt., Acacia mellifera Valh., Balanites aegyptiaca (L.) Del. and Teclea nobilis Del. among other common dry land species.
Elgeyo Marakwet County is divided into three main topographical zones which run parallel to each other in a north-south direction. These are the highland plateau, the Elgeyo Escarpments, and the Kerio Valley. The highland plateau rises gradually from an altitude of 2,400m above sea level on Chebiemit Hills in the north to 2,700m above sea level on the Metkei Ridges in the south, while Kerio Valley has an altitude of about 700 meters above the sea level. The Kerio River runs along the escarpment (GK, 2006).

The climate is hot and dry with bimodal rainfall in April-July and September – October of 600mm and an average temperature of 32°C. The area is only suitable for livestock rearing due to harsh climatic conditions (GK, 2006).

Soy division is within the floor of Kerio Valley and has a high concentration of mineral deposits with the major one being fluor spar. The soil type is sandy/rocky and the surface is severely affected by erosion especially by rain water, which washes the soil down the escarpment into numerous small streams during the rainy period. The valley floor is covered with acacia trees and bushes; however, this vegetation is not sufficient to resist the enormous flow of water. Poor irrigation methods also contribute to erosion (KPLC, 2010).

Human settlement is mainly along the major highway and along feeder roads as well as within the shopping centers. The area has a large number of modern medical facilities which are well distributed within the district. The health facilities are managed by the government, religious organizations or private companies (Caspi et al., 1998). Most of these health facilities are underutilized, mainly due to lack of staff and equipment in these facilities. Other hidden factors like socio cultural beliefs of the community around the facilities could contribute to their underutilization. The community usually prefers herbal medicine to the modern medicine provided in hospitals, health centers and dispensaries (Census, 1999).

3.2 Ethnobotanical survey
An ethnobotanical study was carried out using structured questionnaires to gather information on the plants used medicinally. The method used to administer questionnaire was purposive mainly targeting herbalists and since this area is sparsely populated and with a challenging terrain only ten herbalists were interviewed. The information gathered provided baseline data for collection of the medicinal plants. Selection of the plants for study was based on available ethnobotanical information from traditional health practitioners consulted during the pilot study as well as available literature. The parameters that guided the study during plant collection was the number of plants available within a locality. Where species were abundant, minimum of five plants were collected, but where scarce, a minimum of two plants per species were collected. The voucher specimens of the plants collected were deposited at the department of biological science, University of Eldoret herbarium.

4. Results
The study yielded information on twenty five medicinal plant species (Table 1). Majority of these plants were from the family Capparidaceae (16%) and Rutaceae (16%), followed by Caesalpinaceae and Balanitaceae (8%) each and the rest of the families had 4% each. The names given to the medicinal plants by the local herbal practitioners were noted in Elgeyo dialect (Table 1).

Majority of the plants were categorized as locally endangered which were 17 in number constituting 68% of the collected plants while locally abundant plants were 8 in number constituting 32% of the total plants collected (Table 2). Some of the factors leading to the decimation of these plants were attributed to physical environment were erosion is rampant and detrimental for the existence of the plants. The mode of preparation varied considerably but majority of the plants were boiled (85.19%) in water and taken orally as infusions, followed by soaking and chewing of raw plant material which both constituted 7.41% (Table 1).

It was noted that various plant parts were used (Table 1) with the roots being the most widely used (66.67%) followed by bark (16.7%) and the least used being the leaves (6.67%) (Table 1). From Table 2 it is evident that majority of the plants were used in treatment of ailments related to gastrointestinal system (GI) constituting 21.15% followed by treatment of various disorders (DO) constituting 19.23% which is followed closely by treatment of reproductive system (RS) constituting 17.31% and lastly in treatment of urinary tract infection (UT) constituting 1.92%.
Table 4.1: Documentation of the uses of medicinal plants in Cherebes and Endo villages in Elgeyo Marakwet County

<table>
<thead>
<tr>
<th>S. No</th>
<th>Name</th>
<th>Local name</th>
<th>Family</th>
<th>Availability</th>
<th>Locality</th>
<th>Parts used</th>
<th>Preparation</th>
<th>Uses (Diseases/ conditions)</th>
<th>Abbreviation for uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Acacia seyal</td>
<td>Leng’net</td>
<td>Mimosaceae</td>
<td>Ab</td>
<td>E</td>
<td>Bark</td>
<td>Boiled</td>
<td>Used in treatment of typhoid, kidney infection and amoebiasis especially in chronic Stages when the patient passes out blood stained stool.</td>
<td>GI, UT</td>
</tr>
<tr>
<td>2.</td>
<td>Balanites aegyptiaca</td>
<td>Ng’oswet</td>
<td>Balanitaceae</td>
<td>Ab</td>
<td>C/E</td>
<td>Root</td>
<td>Boiled</td>
<td>Used to treat blocked or narrowed reproductive tubes, typhoid and used to increasing fertility in women</td>
<td>RS, GI</td>
</tr>
<tr>
<td>3.</td>
<td>Balanites pedicellaris</td>
<td>Muiyeng’wet</td>
<td>Balanitaceae</td>
<td>En</td>
<td>E</td>
<td>Root</td>
<td>Boiled</td>
<td>Used to rectifying dysmenorrheal and to treat stomachache and diarrhoea</td>
<td>DO, GI</td>
</tr>
<tr>
<td>4.</td>
<td>Boscia angustifolia</td>
<td>Likwot</td>
<td>Capparidaceae</td>
<td>Ab</td>
<td>C</td>
<td>Root</td>
<td>Boiled</td>
<td>Used to treat wounds when used in powder form, typhoid and throat infection</td>
<td>DM, GI, BS</td>
</tr>
<tr>
<td>5.</td>
<td>Boscia solicitolia</td>
<td>Chelel</td>
<td>Capparidaceae</td>
<td>Ab</td>
<td>C</td>
<td>Root</td>
<td>Boiled</td>
<td>Used to correct inconsistency, Increases and strengthens fertility for male and female, and to treat typhoid</td>
<td>DO, RS, GI</td>
</tr>
<tr>
<td>6.</td>
<td>Boswellia neglecta</td>
<td>Uswo</td>
<td>Burseraceae</td>
<td>En</td>
<td>C</td>
<td>Root/ Bark</td>
<td>Boiled</td>
<td>Used to treat common cold, stomachache and typhoid</td>
<td>BS, GI</td>
</tr>
<tr>
<td>7.</td>
<td>Capparis tormentosa</td>
<td>Kumbolwop kimaget</td>
<td>Capparidaceae</td>
<td>En</td>
<td>E</td>
<td>Root</td>
<td>Boiled</td>
<td>Used to treat gonorrhoea, mastitis in humans, dysmenorrhoea and increasing fertility</td>
<td>RS, MI, DO</td>
</tr>
<tr>
<td>8.</td>
<td>Cissus rotundifolia</td>
<td>Cherorowet</td>
<td>Rutanaceae</td>
<td>Ab</td>
<td>E/C</td>
<td>Root</td>
<td>Boiled</td>
<td>Used to treat amoebiasis, typhoid, increasing female fertility and Rectifying inconsistency in children.</td>
<td>GI, RS, DO</td>
</tr>
<tr>
<td>9.</td>
<td>Coccinus grandis</td>
<td>Sotop cheptuge</td>
<td>Cucurbitaceae</td>
<td>En</td>
<td>C/E</td>
<td>Stem/ Leaves</td>
<td>Boiled/ Raw</td>
<td>Used to Shrink or treating fibroids, dissolving clot, treats painful sexual Intercourse and for treating internal organs, disorder and infection</td>
<td>RS, DO, IO</td>
</tr>
<tr>
<td>10.</td>
<td>Commelina africana</td>
<td>Chepseper</td>
<td>Commelinaceae</td>
<td>Ab</td>
<td>C</td>
<td>Stem</td>
<td>Raw</td>
<td>Used to treat wounds and removing objects like thorns inside the flesh.</td>
<td>DM</td>
</tr>
<tr>
<td>11.</td>
<td>Euphorbia tirucalli</td>
<td>Chepnyalil</td>
<td>Eupharbiaceae</td>
<td>En</td>
<td>C</td>
<td>Stem</td>
<td>Raw</td>
<td>Used to treat malaria and stomachache.</td>
<td>MI, GI</td>
</tr>
<tr>
<td>12.</td>
<td>Indigofera hombei</td>
<td>Parkelat</td>
<td>Papilionaceae</td>
<td>Ab</td>
<td>C</td>
<td>Root</td>
<td>Boiled</td>
<td>Used to treat allergy and toothache.</td>
<td>DO, DN</td>
</tr>
<tr>
<td>13.</td>
<td>Landolphia swynnertonnii</td>
<td>Mokokwet</td>
<td>Apocynaceae</td>
<td>En</td>
<td>C</td>
<td>Root</td>
<td>Boiled</td>
<td>Used to treat backache and increasing fertility in women</td>
<td>CN, RS</td>
</tr>
<tr>
<td>14.</td>
<td>Maerua subcordata</td>
<td>Chepyetabei</td>
<td>Capparidaceae</td>
<td>En</td>
<td>C</td>
<td>Root</td>
<td>Boiled</td>
<td>Used to treat diabetes, High blood pressure, Improving appetite, Purifies water, inducing Sleep when taken in high dose</td>
<td>DO, MI</td>
</tr>
<tr>
<td>15.</td>
<td>Salvadora persica</td>
<td>Chogowet</td>
<td>Salvadoraceae</td>
<td>En</td>
<td>C</td>
<td>Root</td>
<td>Boiled</td>
<td>Used to treat allergy, common cold and painful chest infection</td>
<td>DO, BS, RS</td>
</tr>
<tr>
<td>16.</td>
<td>Senna</td>
<td>Chema</td>
<td>Caesalpinioideae</td>
<td>Ab</td>
<td>E</td>
<td>Leaves</td>
<td>Boiled/</td>
<td>Used to treat malaria and yellow fever</td>
<td>MI</td>
</tr>
<tr>
<td>No.</td>
<td>Species/Country Name</td>
<td>Family</td>
<td>Locality</td>
<td>Availability</td>
<td>Part Used</td>
<td>Preparation</td>
<td>Uses</td>
<td></td>
<td></td>
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<tr>
<td>-----</td>
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<td></td>
</tr>
<tr>
<td>17.</td>
<td>Sansevieria occidentalis</td>
<td>Dracaenaceae</td>
<td>En</td>
<td>C</td>
<td>Root</td>
<td>Boiled</td>
<td>Used to remove placenta retained after birth in both humans and animals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18.</td>
<td>Sansevieria Conspicua</td>
<td>Dracaenaceae</td>
<td>En</td>
<td>E</td>
<td>Root/ Bark</td>
<td>Boiled</td>
<td>Used to open blocked or narrowed reproductive tubes and treat gonorrhea</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19.</td>
<td>Sansevieria suffruticosa</td>
<td>Dracaenaceae</td>
<td>En</td>
<td>C</td>
<td>Root</td>
<td>Boiled</td>
<td>Used to treat malaria</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.</td>
<td>Sansevieria siamea</td>
<td>Caesalpinaceae</td>
<td>En</td>
<td>C</td>
<td>Root</td>
<td>Boiled</td>
<td>Used to treat persistent headache and common cold</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21.</td>
<td>Teclea nobilis</td>
<td>Rutanaceae</td>
<td>En</td>
<td>C</td>
<td>Root</td>
<td>Boiled</td>
<td>Used to treat typhoid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22.</td>
<td>Terminalia brownie</td>
<td>Combretaceae</td>
<td>En</td>
<td>C</td>
<td>Root/ Bark</td>
<td>Boiled</td>
<td>Used to treat pancreas disorder, toothache, persistent headache accompanied by painful teeth and nose and eyes allergy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23.</td>
<td>Terminalia spinosa</td>
<td>Combretaceae</td>
<td>En</td>
<td>C</td>
<td>Root/ Bark</td>
<td>Boiled</td>
<td>Used to treat allergy and diarrhea.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24.</td>
<td>Trichilia emetica</td>
<td>Meliaceae</td>
<td>En</td>
<td>C</td>
<td>Root</td>
<td>Boiled</td>
<td>Used to treat malaria and yellow fever</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25.</td>
<td>Withania somnifera</td>
<td>Solanaceae</td>
<td>En</td>
<td>C</td>
<td>Root</td>
<td>Boiled</td>
<td>Used to treat all ergy and diarrhea.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26.</td>
<td>Zanthoxylum usambarense</td>
<td>Rutaceae</td>
<td>En</td>
<td>C</td>
<td>Root</td>
<td>Boiled</td>
<td>Used to treat rashes on the tongue, ulcers, cough and common cold.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

KEY Locality, E- Endo village, C- Cherebes village, Availability of the plant, Ab- locally abundant, En- locally endangered, Abbreviation for uses , GI- Gastrointestinal, RS- Reproductive System, BS- Respiratory System, DM- Dermatological, DO- Disorder-allergy, IO- Internal Organs, MI- Microbial Infection (Blood), UT- Urinary Tract, DN- Dental, CN- Central Nervous System

The photographs showing gulley erosion at the initial and late stages of erosion. This was noted as one of the contributing factor to the plants being locally endangered.

Plate 4A-4C: Showing different stages of gulley erosion

Plate 4A: Initiation of gulley erosion
Table 4.2: Frequency and percentages of plant families, availability, parts used, preparation and uses of documented medicinal plants

<table>
<thead>
<tr>
<th>Aspects</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capparidaceae</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>Rutaceae</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>Caesalpinaceae</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Combretaceae</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Dracaenaceae</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Balanitaceae</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Meliaceae</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Solanaceae</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Apocynaceae</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Papilionaceae</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Eupharbiaceae</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Commelinaceae</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Cucurbitaceae</td>
<td>1</td>
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Plate 4B: Hanging Acacia in a gulley

Plate 4C: Gulley erosion
Plate 1a: Mimosaceae, *Acacia seyal* (Oliv.) Engl

Local name: Lengnet
Locality: Endo
Part used: Bark
Preparation: Boiled
Uses: Treatment of typhoid, kidney and amoebiasis
Status: locally abundant
Active compounds: Terpenoids, tannins and anthraquinones

Plate 1b: Balanitaceae, *Balanites aegyptiaca* (L.) Del

Local name: Ng'oswet
Locality: Cherebes/Endo
Part used: Root
Preparation: Boiled
Uses: Treats blocked or narrow reproductive tubes, typhoid and increasing fertility in women
Form of administration: Bark/root infusion
Status: locally abundant
Active compounds: Terpenoids and phenols

Plate 2a: Balanitaceae, *Balanites pedicellaris* Mildbr and Schitr

Local name: Muiyeng’wet
Locality: Endo
Part used: Root
Preparation: Boiled
Uses: Treats dysmenorrhea, stomachache and diarrhea
Form of administration: root infusion
Status: locally endangered
Active compounds: Flavonoids and anthraquinolones

Plate 2b: Capparidaceae, *Boscia salicifolia* (Oliv.) Engl

Local name: Chelel
Locality: Cherebes
Part used: Root
Preparation: Boiled
Uses: Treats poor bladder control, Increases and strengthens fertility for male and female, and typhoid
Form of administration: root infusion
Status: locally abundant
Active compounds: Not tested
Plate 3a: Capparidaceae, *Boscia angustifolia* A. Rich

**Local name:** Likwot

**Locality:** Cherebes

**Part used:** Root

**Preparation:** Boiled

**Uses:** Treats Wounds when used in powder form, typhoid and throat infection

**Form of administration:** Root infusion

**Status:** locally abundant

**Active compounds:** Phenols

---

Plate 3b: Burseraceae, *Boswellia neglecta* S. Moove

**Local name:** Uswo

**Locality:** Cherebes

**Part used:** Root

**Preparation:** Boiled

**Uses:** Treats Common cold, stomachache and typhoid

**Form of administration:** Back/root infusion

**Status:** locally endangered

**Active compounds:** Not tested

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Plate 4a: Capparidaceae, *Capparis tomentosa* Lam

**Local name:** Kumbolwop kimaget

**Locality:** Endo

**Part used:** Root

**Preparation:** Boiled

**Uses:** Increase fertility, gonorrhea, mastitis and dymenorrhoea

**Form of administration:** Root infusion

**Status:** locally endangered

**Active compounds:** Terpenoids, flavonoids and phenols

---

Plate 4b: Rutaceae, *Cissus rotundifolia* (Forssk.) Vahl

**Local name:** Cherorowet

**Locality:** Cherebes/ Endo

**Part used:** Root

**Preparation:** Boiled

**Uses:** Treats amoebiasis, typhoid, increasing fertility in women and correcting inconsistency in children

**Form of administration:** Root infusion

**Status:** locally abundant

**Active compounds:** Tannin, flavonoids, alkaloids and phenols
**Local name:** Sotop Cheptuge  
**Locality:** Cherebes  
**Part used:** Stem/Leaves  
**Preparation:** Boiled/Raw  
**Uses:** For shrinking fibroids, dissolving clot, treating internal organ infection and disorder  
**Form of administration:** Stem/leaf infusion  
**Status:** locally endangered  
**Active compounds:** Phenols

**Local name:** Cherebes  
**Locality:** Cherebes  
**Part used:** Stem  
**Preparation:** Raw  
**Uses:** Treats allergy and toothache  
**Form of administration:** Root infusion  
**Status:** locally abundant  
**Active compounds:** Not tested

**Local name:** Cherebes  
**Locality:** Cherebes  
**Part used:** Boiled  
**Locality:** Treats allergy and toothache  
**Form of administration:** stem infusion  
**Status:** locally endangered  
**Active compounds:** Not tested

**Local name:** Chepseper  
**Locality:** Cherebes  
**Part used:** Stem  
**Preparation:** Raw  
**Uses:** Treats wounds and removing objects  
**Form of administration:** stem infusion  
**Status:** locally abundant  
**Active compounds:** Not tested

**Local name:** Parkelat  
**Locality:** Cherebes  
**Part used:** Root  
**Preparation:** Boiled  
**Uses:** Treats allergy and toothache  
**Form of administration:** root infusion  
**Status:** locally abundant  
**Active compounds:** Not tested

**Local name:** Cherebes  
**Locality:** Cherebes  
**Part used:** Stem/Leaves  
**Status:** locally abundant  
**Active compounds:** Not tested

**Local name:** Euphorbia tirucali  
**Part used:** Stem  
**Locality:** Not tested  
**Form of administration:** internal organ infection and disorder  
**Status:** locally endangered  
**Active compounds:** Not tested

**Local name:** Euphorbiaceae, *Euphorbia tirucali* L

**Local name:** Sotop Cheptuge

**Locality:** Cherebes
**Part used:** Stem/Leaves
**Preparation:** Boiled/Raw
**Uses:** For shrinking fibroids, dissolving clot, treating internal organ infection and disorder
**Form of administration:** Stem/leaf infusion
**Status:** locally endangered
**Active compounds:** Phenols

**Local name:** Chepseper

**Locality:** Cherebes
**Part used:** Stem
**Preparation:** Raw
**Uses:** Treats wounds and removing objects
**Form of administration:** stem infusion
**Status:** locally abundant
**Active compounds:** Not tested

**Local name:** Parkelat

**Locality:** Cherebes
**Part used:** Root
**Preparation:** Boiled
**Uses:** Treats allergy and toothache
**Form of administration:** root infusion
**Status:** locally abundant
**Active compounds:** Not tested

**Local name:** Euphorbiaceae, *Euphorbia tirucali* L
Plate 7a: Apocynaceae, *Landolphia swynnertonii* (Hall. F) Stapf

**Local name:** Mokokwet  
**Locality:** Cherebes  
**Part used:** Root  
**Preparation:** Boiled  
**Uses:** Treats backache and increase fertility in women  
**Form of administration:** Infusion  
**Status:** locally endangered  
**Active compounds:** Terpenoids

Plate 7b: Capparidaceae, *Maerua subcordata* (Gilg.) Dewolf

**Local name:** Chepyetabei  
**Locality:** Cherebes  
**Part used:** Root  
**Preparation:** Boiled  
**Uses:** Treats diabetes, high blood pressure, purifies water, increases appetite and induces sleep  
**Form of administration:** root infusion  
**Status:** locally endangered  
**Active compounds:** Saponins and phenols

Plate 8a: Draenaceae, *Sanseveria conspicua* N.E.Br

**Local name:** Sagratiet  
**Locality:** Endo  
**Part used:** Root  
**Preparation:** Boiled  
**Uses:** Removes retained placenta after birth  
**Form of administration:** root infusion  
**Status:** locally endangered  
**Active compounds:** Terpenoids, alkaloids and phenols

Plate 8b: Draceanaceae, *Sanseveria suffruticosa* N.E.Br

**Local name:** Mokolatiet  
**Locality:** Cherebes  
**Part used:** Root/bark  
**Preparation:** Boiled  
**Uses:** Opens reproductive tubes and treats gonorrhoea  
**Form of administration:** root/bark infusion  
**Status:** locally endangered  
**Active compounds:** Phenols
Plate 9a: Salvadoraceae, *Salvadora persica* L. (N.E.Br)

**Local name:** Chogowet  
**Locality:** Endo  
**Part used:** Root  
**Preparation:** Boiled  
**Uses:** Treats allergy, common cold and painful chest infection  
**Form of administration:** root infusion  
**Status:** locally endangered  
**Active compounds:** Flavonoids

Plate 9b: Caesalpiniaceae, *Senna occidentalis* (L.) Link

**Local name:** Chemarakwa  
**Locality:** Cherebes  
**Part used:** Leaves  
**Preparation:** Boiled/soaked  
**Uses:** Treats malaria  
**Form of administration:** leaf infusion  
**Status:** locally abundant  
**Active compounds:** Not tested

Plate 10a: Rutaceae, *Teclea nobilis* Del

**Local name:** Kuryot  
**Locality:** Cherebes  
**Part used:** Root  
**Preparation:** Boiled  
**Uses:** Treats persistent headache and common cold  
**Form of administration:** root infusion  
**Status:** locally endangered  
**Active compounds:** Terpenoids, flavonoids and phenols

Plate 10b: Combretaceae, *Terminalia brownie* Fresen

**Local name:** Koloswet  
**Locality:** Cherebes  
**Part used:** Root  
**Preparation:** Boiled  
**Uses:** Treats typhoid  
**Form of administration:** root/bark infusion  
**Status:** locally endangered  
**Active compounds:** Tannins and anthraquinones
Plate 11a: Combretaceae, *Terminalia spinosa* Eng

Local name: Tikit
Locality: Cherebes
Part used: Root/bark
Preparation: Boiled
Uses: Treats pancreas disorder, toothache, persistent headache accompanied by painful teeth and nose and eyes allergy
Form of administration: root/bark infusion
Status: locally endangered
Active compounds: Not tested

Plate 11b: Meliaceae, *Trichilia emetica* Vahl

Local name: Kuryonde
Locality: Cherebes
Part used: Root
Preparation: Boiled
Uses: Treats allergy and diarrhea
Form of administration: root infusion
Status: locally endangered
Active compounds: Not tested

Plate 12a: Solanaceae, *Withania somnifera* L. Dunal

Local name: Kumyap Chepkuk
Part used: Root
Preparation: Boiled
Uses: Treats yellow fever and malaria
Form of administration: root infusion
Status: locally endangered
Active compounds: Phenols

Plate 12b: Rutaceae, *Zanthoxylum usambarense* Engl

Local name: kokchat
Part used: Root
Preparation: Boiled
Uses: Treats rashes on the tongue, ulcers, cough and common cold.
Form of administration: root infusion
Status: locally endangered
Active compounds: Not tested
Locality: Cherebes
Local name: Chemarakwa
Part used: Root
Preparation: Boiled
Uses: Treats malaria
Form of administration: root/stem/leaf infusion
Status: locally endangered
Active compounds: Phenols

5. Discussion and Conclusion

5.1 Documented plants
A total of twenty five plants were collected in this study. Information on the medicinal value of these plants is highly guarded by herbalists and is mostly lost when the herbalists pass on without documentation of the indigenous knowledge (Graham, 2001). Whereas such information has been lacking for a long time in Cherebes and Endo villages, the same has been done in other areas such as Nandi County (Jeruto et al, 2008), Embu and Mbeere people of Kenya (Karera et al., 2007) and Samburu district of Kenya (Nanyingi et al., 2008).

In particular, the importance and urgency of documentation of traditional knowledge on medicinal plants cannot be overemphasized. In fact the lead herbalist passed on suddenly shortly after having provided crucial information on the uses of medicinal plants in this study. If he had not provided this information, he would have died with knowledge that no one would ever access. Therefore, death naturally forms the basis to support the urgent need to do ethnobotanical survey and documentation of traditional knowledge of medicinal plants in the study area.

The villagers confirmed that the transmission of the indigenous knowledge from herbalist to their next of kin in a very secretly guarded activity and this posed danger leading to fast disappearance of the knowledge on traditional medicine, which concurs with the findings by Nakashima et al., (2000).

5.2 Plant families used
Majority of the plants used for medicinal purposes were from the family Capparidaceae and Rutaceae each with 16% followed by both Caesalpinaceae and Balanitaceae each with 8% while, the rest of the families each had 4%. These results agree with the findings by Dharani and Yenesew (2010), who observed that majority of medicinal plants come from the family Capparidaceae and Rutaceae. The activity of Capparidaceae is attributed to their high amounts of toxic chemical compounds such as the milky latex synthesized by the family while, the activity of Rutaceae is attributed to high aromatic compounds that are among the features that characterize the family. The chemical compounds synthesized by plants qualify them to be used for curative purposes.

5.3 Availability of the medicinal plants
Most of the plants (68%) were noted as locally endangered while locally abundant plants constituted 32% of the total plants collected. Some of the plants that were to be gathered were completely unavailable within the region as confessed by the herbalists and were located in specific forested areas within the neighboring Kapnorok Game Reserve. The problem of unavailability of some medicinal plants was due to the belief by the herbalists that the medicinal value of the plants lay in the roots. Roots are found in soil which has enormous amount of microorganisms many of them being pathogenic thus plants shield themselves from pathogenic microorganisms by depositing these chemical compounds in the roots. Roots are also storage organ to some medicinal plants, thus their use by herbalists.

5.4 Plant parts used
Subsequently, roots were the most widely used constituting 66.67% followed by barks (16.7%) and the leaves (6.67%). Thus, many plants were destroyed in the process of harvesting roots especially in this arid region (Schippmann, 2000). The herbalists also believed that the fresh herbs had more activity
than dried herbs, thus leading to overharvesting of the plants (Cheserek, 2005). On the plant parts, the findings were in agreement with the findings from southern Ethiopia where the most frequently utilized plant parts are the underground parts namely; roots, rhizomes and bulbs constituting 42% (Tildhun and Mirutse, 2007). This represents instances where different parts of the same plant are used for different purposes (Tesfaye and Sebsebe, 2009). Herbs accounted for the highest proportion of plants type used as traditional medicine followed by shrubs and trees. Leaves contributed about 50% of parts used, followed by seeds at 15% and lastly roots at 10% (Tesfaye and Sebsebe, 2009), on the contrary Chinsembu and Hedimbi (2010) established that the most plant parts used were leaves (33%), back (32%), and roots (28%) while the least used plant parts were fruits/seeds (4%).

5.4 Factors attributed to unavailability of the medicinal plants

Climatic change also played a major role in the plants unavailability in the study area (Ande, 2012). In the past the area used to receive heavy rains but presently the drought spell can prolong for many years thereby in the process many non-xerobiotic plants dries up. It was also noted that the herbalists did not cultivate the medicinal plants and they depended entirely on the plants from the wild. These medicinal plants are not only utilized by herbalists but also charcoal burners and wild and domestic animals (Schippmann, 2000) thus posing danger to the already diminishing number of the medicinal plants.

The environmental challenge of gulley erosion contributed largely to unavailability of plants in the study area. Erosion had wiped off the rich top soil that enhanced vegetation growth as well as a number of important medicinal plants hence threatening their existence. This posed a serious problem which if not addressed would lead to extinction of important and undocumented medicinal plants, Nyanchaga et al., (2012) observed that the erosion is caused by floods and wind which carries away the loose soil. The susceptibility of the soil in the study area to erosion is attributed to overgrazing, clearance of natural vegetation cover and increased human agricultural activity.

5.5 Mode of preparation of the medicinal plants

In terms of preparation of the medicinal plants, it was observed that most herbalists used more than one plant in their herbal preparations to achieve the desired effect in treatment of various diseases. This is attributed to synergism of the medicinal plants (Dharani and Yenesew, 2010; Jeruto et al., 2008; Njenga et al., 2005; Nascimento et al., 2000). The mode of preparation varied considerably but majority of the plants were boiled in water and taken orally as infusions. This is common among other communities in Kenya (Dharani and Yenesew, 2010). Most of the diseases being treated with these infusions are found in blood and the reproductive system (Barrett and Watt, 1979). It was noted that very few plants were used in their raw form or when soaked (7.4%) compared to the boiled (85.2%) plants and this could probably be attributed to their use in treatment of allergies and other minor ailments.

5.6 Documented ailments treated by the medicinal plants

The study showed that majority of the plants were used in treatment of ailments related to gastrointestinal system (GI) constituting 21.2% of the plants used and mainly used in treatment of diarrhea, typhoid and general stomachache. This was attributed to lack of clean water in the semi-arid study area (Cheserek, 2005) hence calling for residents to search for a remedy to public health diseases resulting from lack of clean water. Plants used in treatment of various disorders which included diabetes, high blood pressure, allergies among others constituted 19.2% which showed that these conditions were common among the people in the study area as noted in Kahuthu et al., (2005).

Plants used in treatment of the diseases and disorders of the reproductive system (RS) such as blocked reproductive system, family planning, dysmenorrhea, poor bladder control, gonorrhea, fibroids, painful sexual intercourse and retained placenta constituted 17.3% of the plants used. Despite the sparse population of the people in this area, the sexually active most probably were ignorant of the general understanding of the functioning of reproductive system, coupled with their cultural belief that children are a source of labour. Girls are a source of bride wealth (dowry) and boys a source of security and investment (Peil, 1977). The remaining plant were used in treatment of microbial infection (blood), respiratory system, dermatological, central nervous system, dental, internal organs and urinary tract which were between 11.5-1.9% of the plant used and this indicated lower prevalence of the ailments in the study area.
In conclusion, total of 25 medicinal plants were documented as found in Cherebes and Endo Villages in Elgeyo Marakwet County. It was further established that most of these plants were locally unavailable and endangered due to overharvesting, climate change and extensive gulley erosion.

Acknowledgement

The authors are very grateful to the University of Eldoret and Kenya Medical Research Institute (KEMRI) Nairobi for offering a place to conduct research. The Elkeiyo people are hereby acknowledged for sharing their knowledge on medicinal plants.

Author’s Contribution and Competing Interests

All authors contributed equally both scientifically and in resource contribution, all of them have equal interests. The work is research with no conflicting interests since it was designed only on the academic interests.

Limitation:

Due to scarcity of resources the researchers limited themselves to a small area of only 2 villages.

Recommendations

(a) This study was carried out in a small portion of Elgeyo Marakwet County, therefore there is need to conduct an extensive ethnobotanical study on the entire County to document all the medicinal plants.

(b) Most of the plants encountered in the study were locally endangered. This calls for conservation both in situ and ex situ in order to preserve the germplasm of the medicinally important plants used by the herbalists. Conservation can be at community or institutional level. For instance, University of Eldoret has a botanical garden for the endangered medicinal plants conservation. The County government can also set up a medicinal plant nursery to grow them ex situ and make them available for cultivation to the herbalists and hence reduce pressure on the medicinal plants in situ.

(c) It is also important to create awareness among people on the importance of cultivating the medicinal plants instead of relying on the wild ones, and this in turn will minimize the harvesting of the wild plants.


