AN ETHNOBOTANICAL DOCUMENTATION OF MEDICINAL PLANTS USED BY LOCAL COMMUNITIES AROUND KIBALE NATIONAL PARK, A CASE OF KANYAWARA, KANYANSOWERA AND IBURA VILLAGES.

Waisindye. N[1]*, Anywar. G[2], Kamatenesi. M.M[1], Kazibwe. F[1]

[1]Bishop Stuart University, Faculty of Applied Sciences, Ethno-biology Laboratory-P.O Box 09 Mbarara, Uganda
[2]Makerere University, College of Natural sciences, Department of plant sciences, Microbiology and Biotechnology P.O Box 7062 Kampala, Uganda
***Corresponding Author Email Address:** nwaisindye@as.bsu.ac.ug **Tel:** +256 787704313

ABSTRACT

Currently there is rapid loss of traditional knowledge and practices due to their dependency on oral transformation, impacts of modern cultural transformation, and rapid land degradation. Ethno botanical documentation of medicinal plant use is generally an appropriate means of identifying potential sources of the new drugs. Research indicates that 74% of plant derived compounds used in pharmaceuticals, retained similar use as used by traditional healers. Motivation to study the conservation status of such medicinal plants can be realized if their local use is scientifically proven by first documenting them and testing them.

Current study was carried out to document useful medicinal plants, that are becoming prone to threats of endangerment before scientific interventions are made, in the local communities of Kanyawara, Kanyansowera and Ibura adjacent to Kibale National Park (KNP), located 124km East of Ruwenzori foothills and 20km South East (SE) of Fort Portal Town in western Uganda, in Kabarole District.

Data was collected using semi-structured interviews and guided questionnaires, house hold respondents were also chosen through random sampling. A total of 45 plant species from 28 families were recorded as useful medicinal plants harvested by people for managing diseases. Of the families encountered Asteraceae, Poaceae and Fabaceae had the highest number of species used followed by Bignoniaceae and Rutaceae.

Though many plants have been used by the people in the study area to treat diseases, they have not been domesticated but are continuously being harvested from the wild. Such plants are prone to extinction yet could be domesticated for commercial purposes.

INTRODUCTION

Ancient Man is known to have utilized plants as drugs for millennia. Further and a large number of plants are used in traditional medical practices, and have been for more than 3000 years, such as in Chinese Traditional Medicine, Ayurvedic Medicine, Unani Medicine, etc., most of which probably exert therapeutic effects and would be proven as such if they were properly evaluated by Western standards (Farnsworth and Soejarto 1991).

It seems likely that up to 80 percent of the world's population relies chiefly on so-called "traditional" medicine for primary health care; in many developing countries the majority of the population depends on traditional remedies. This is partly due to poverty, but also because traditional systems are more culturally acceptable, and are able to meet psychological needs in a way western medicine does not (Prescott-Allen, 1982; Katrina 1992). Medicinal plants therefore play an important role in health care systems of developing countries.

On a global scale, plants are still the most accessible source of natural products of therapeutic importance to three quarters of the world's population. Nations with Highly developed pharmaceutical industries are mainly interested in plants as a source of biologically active and medicinal important compounds which might be Lead to discovery of new and better drugs with pharmacological potency (Lewis, 1989; Farnsworth, 1984; Oncha et al., 2005).

However, there is rapid loss of traditional knowledge and practices due to their dependency on oral transformation, impacts of modern cultural transformation, and rapid land degradation. In addition, there is a depletion of resources due to over exploitation and lack of management system.

The value of biodiversity as a source of pharmaceutically active substances has been the subject of a number of studies, for example, Pearce and Puroshothaman (1992), McNeely (1988), Farnsworth and Soejarto (1985), and Principe (1991). This value is now being cited as one of the many arguments for conserving natural habitats in general and tropical forests in particular which contain the largest number of plant species (Katrina 1992).

Kibale forest has significantly diverse Ecosystems. It Produces a wide range of unique and valuable medicinal plants, provided the high species abundance and diversity of Uganda`s natural forests, more especially those in western Uganda (Albertine region). Traditional medicine has

continuously been utilized as the prime option for primary health care management and an alternative for expensive allopathic medicine. (Kakudidi *et al.*, 2000)

The development of the Ethno-botanical potential of Uganda`s floral resources in the wild has been credited to extensive research including Kakudidi, et al., 2000. It is estimated that 80% of the world`s population use Traditional medicine to cure ill health (Farnsworth & Soejarto, 1991; Kakudidi *et al.*, (2000).

The World Health Organization recognizes the key role of traditional medicine in improving the health and wellbeing of the people in Africa. As in many African countries, traditional healers vastly outnumber biomedical health workers in Uganda. Estimates show that there are 15,700 traditional healers in Uganda, giving a traditional healer to patient ratio of 1:140 compared to the doctor to patient ratio of 1:20,000.These ratios imply that traditional medicine has been found to be within reach of the local communities and easy to access. However, this is not to say it is free from the unwanted side effects and yet many effective medicinal plants are being used within several local communities of Uganda and Africa as a whole. There is hence lack of systemized documentation of medicinal plants and their uses making their use unorganized and unmanaged.

STATEMENT OF THE PROBLEM

The use of medicinal plants for the control and management of diseases is a cheaper and readily available complement for the expensive synthetic drugs that are often in short supply. The knowledge of medicinal plant use in the local communities around Kibale National Park is said to have been developed gradually over a period of practical experience. Ethno botanical documentation of medicinal plant use is generally an appropriate means of identifying potential sources of the new drugs. 74% of plant derived compounds used in pharmaceuticals, retained similar use as used by traditional healers.

Much as local use of medicinal plants for treating diseases traditionally exists in the local communities around Kibale National park, their conservation status is not known. Motivation to study the conservation status of such medicinal plants can be realized if their local use is scientifically proven by first documenting them and testing them. Otherwise potentially useful medicinal plants are becoming prone to threats of

endangerment before scientific interventions are made.

MAIN OBJECTIVE

To document the different plant species used for treating ill health by people living around Kibale national park.

SPECIFIC OBJECTIVES

1. To document medicinal plants and indigenous knowledge among rural communities around Kibale national park.
2. To identify the different plant parts of medicinal plants and how they are used.
3. To identify the conservation status of domesticated medicinal plants by exploring the existing management systems.

MATERIALS AND METHODS

STUDY AREA

The study site included three villages of Kanyawara, Kanyansowera and Ibura adjacent to Kibale National Park (KNP).

KNP is located 124km East of Ruwenzori foothills and 20km South East (SE) of Fort Portal Town in western Uganda. The area is located in Kabarole district. The area of the park is approximately 766 sq km at a general altitude of 1,100-1,590 m ranging from south to extreme north respectively above sea level. The park has a tropical mean annual rainfall of 1100-1700mm.

Temperature ranges between14-27 C.

46% of the park is tropical forest while the rest is grassland and swamps. The park has marked variations in species diversity and abundance from North-central to south. It consists of medium altitude, transitional moist ever green forest with both characteristics of dry tropical or wet tropical whereas the central tends to be of mixed species distribution, while northern part consist of climatic climax species and the south is grass land.

The park also has 13 species of non-human primates (67% of Uganda`s total) and highest in Africa, and also believed to be among the highest in the world with over 250 species of butterflies and 350 species of trees (69% of Uganda`s total) have been recorded.

The park also supports 9 species of animals known to be globally endangered. Among them is healthy population of chimpanzees estimated at about 800. Whereas Priginines ground thrush *(Turdus kibalensis)* is only found in KNP and nowhere else. Kibale

ground Thrush (*Zoothera kibalensis*) is also a rare bird with other endemic species including cycads and screw palms.

FIELD SURVEY TO DOCUMENT MEDICINAL PLANTS

With the help of tour guides in the park, key informants mainly elders and traditional health practitioners (THP), knowledgeable on medicinal plants used for treating diseases were identified. Selection of informants to participate in the study was dependent on their willingness to share information and their acquaintance with medicinal plants for treating human diseases. Participatory rural appraisal (PRA) tools used to elicit information on medicinal plants used by the local communities of Ibura, Kanyansowera and Kanyawara villages have been discussed in the Methodology part of this report below.

METHODOLOGY

Data was collected using semi-structured interviews and guided questionnaires in addition to direct observation of herbal extractions or crude herbs of community herbalists. However, house hold respondents were also chosen through random sampling. These included head of house hold, wife and children (Older children preferably), or another elder in the family. Guided questioners were administered in face to face interviews conducted in both English and local languages; Luganda, Rukiga and Rutoro.

Prior to contact with local community, the study and its objectives was introduced to the community members and traditional medical practitioners. The study was done with help of a local research assistant. This helped in winning respondent`s trust and creating a rapport.

Plant voucher specimens were collected and taken to the Herbarium at Makerere University for proper identification after which obtained data was analyzed using descriptive statistical methods.

RESULTS

A total of forty five plant species from 28 families were recorded as useful medicinal plants harvested by people for managing diseases by the local communities of Kanyawara, Kanyansowera and Ibura villages. Of the families encountered Asteraceae, Poaceae and Fabaceae had the highest number of species used, with 7, 3 and 3 species respectively followed by Bignoniaceae and Rutaceae (Fig 1)

Elsewhere, Asteraceae, Poaceae and Fabaceae have been reported to have the

highest genera and species occurrences in other studies. For instance, the ten families chosen by Marco et al., 2007 for the analysis of their indicative properties included Asteraceae, Poaceae and Fabaceae as the commonest families with the most species occurrences thereby being species rich.

A report on naturalized and invasive plants in china indicated that Asteraceae, Fabaceae and Poaceae had the highest genera and species richness with 140, 116, 81 species respectively for both naturalized and invasive taxa (De-Yuan & Blackmore 2015) and they constitute the leading halophyte families of Russia (Chedley et al., 2008).

Table 1: Plants used and diseases treated in the 3 selected villages

FAMILY	**Scientific name**	**Local name (Rutooro)**	**Type**	**Parts used**	**MOP**	**Diseases treated**
Acanthaceae	*Justicia flava* Kurz.	Mufooka	H	L	HT	Fever
Aloaceae	*Aloe wallostoni (L.) Burn.F*	Enkoko rutangi	H	L	AE	Wounds
					HT	Malaria
Anarcadiaceae	*Mangifera indica* L.	Muyembe	T	L	HT	Cough
Asparagaceae	*Dracaena fragrans* (L) Ker Gawl	Mugorogoro	T	S	AE	Cleaning ears
Asteraceae	*Vernonia amygdalina* Del.	Mubirizi	S	L	P	Fresh wounds
Asteraceae	*Aspilia pluriseta* Sch.	Ekarwa	S	L	CL	Dental problems
Asteraceae	*Crassocephalum vittelinum* (Benth) S.moore	Mbiriri	S	F	AE	Fresh wounds
Asteraceae	*Bothriocline longipes N.E.Br*.	Kitokotoko	T	L	HT	Cough and flue
Asteraceae	*Guizotia scabra* Chiov.	Kiterankuba	T	F	HT	Fever and malaria
Bignoniaceae	*Markhamia lutea* K.schum	Musambya	T	B & L	HT	Fever
Bignoniaceae	*Spathodea campanulata* Buch.	Munyara	T	B	HT	Vaginal dryness
Bromediaceae	*Ananas cosmosus* (L.) Merr.	Enanansi	S	F	J	Cough
Canellaceae	*Warbugia ugandensis* Sprague.	Muharrumi	T	L	HT	Stomach pain

Capparidaceae	*Cleome gynandra* L.	Eyobyo	H	Fl	AE	Wounds
Chenopodiaceae	*Chenopodium procerum.* Hochst.	Mujumbajumba	T	L	HB	Skin care and ringworm.
Crassulaceae	*Kalanchoe crenata* (Andrews) Haw.	Enyondo	S	L	HT	Cough
Curcubitaceae	*Mormodica foetida* Schum.	Mwihura	H	Wp	HT	Cough
Euphorbiaceae	*Jatrofa curcas* L.	Ekisoga	S	S	AE	Fresh wounds
Euphorbiaceae	*Euphorbia tirucalli* L.	Kayenje	S	L	HT	Cough
Fabaceae	*Rauvolfia vomitoria* Wennberg.	Omukora	T	R	HT	Hypertension
Fabaceae	*Tephrosia vogelii* Hook.f.	Muluku	S	L	HB	Acaricide for ticks and fleas in dogs
Fabaceae	*Senna didymobotrya* (Fresen) Irwin	Mukyora	S	L	HT	Hook worms
Lamiaceae	*Ocimum grattissimum* L.	Mujaja	S	L	Br	Dental care
				T	HT	Stomach pain, Urinary tract ailments.
Lamiaceae	*Plectranthus comosus* Sims.	Kinyamusunga	H	L	HT	Stomachaches
Lauraceae	*Persea Americana* Mill	Avocado	T	S	HT	Ulcers
Malvaceae	*Sida schimperiana* Hochst.	Busoroitana	H	L	P	Fractures and sprains.
Musaceae	*Musa serpentina* Swangpol & Somana	Bitooke	T	Fr	HT*	Ulcers
Myrsinaceae	*Maesa lanceolata* G. Don	Muhangabagenzi	T	L	HB	Scabies &Rashes
Myrtaceae	*Psidium guajava* L.	Mupera	T	L	HT	Cough
Myrtaceae	*Eucalyptus globulous.* W.O.Focke	Kalitusi	T	L	HT	Dental care & Cough

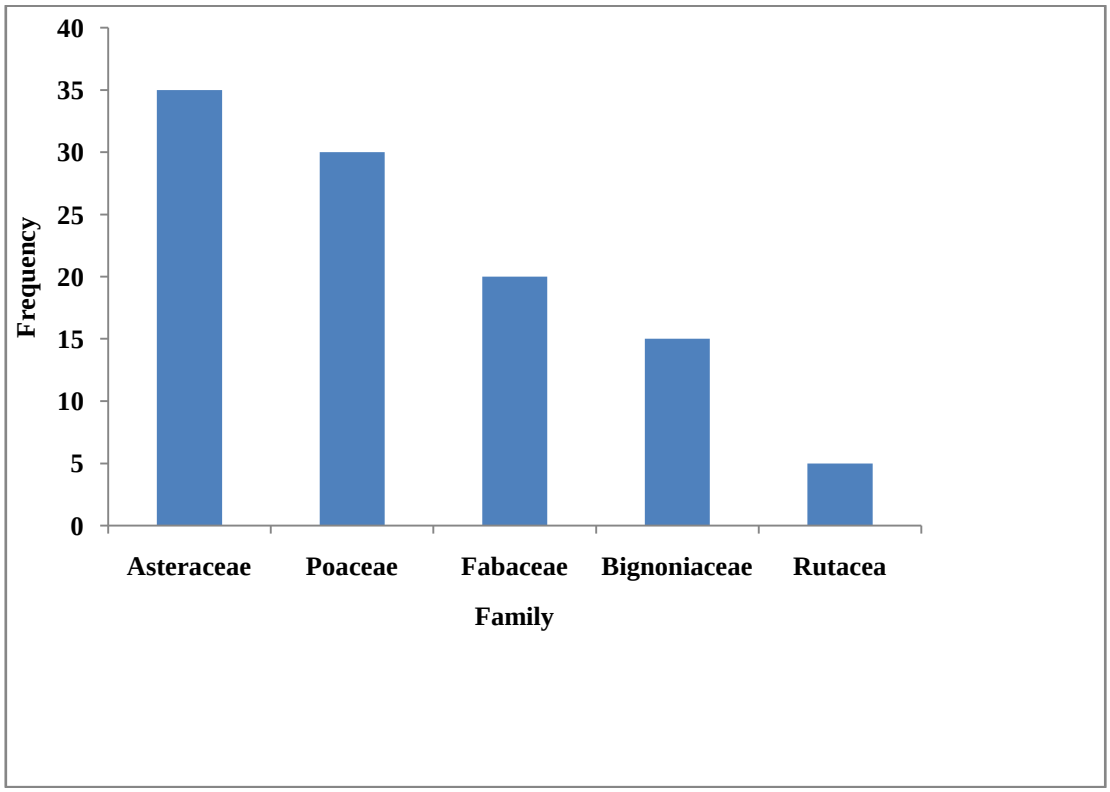
Orchidaceae	*Vanilla plantifolia* Andrews	‘‘Vanilla’’	S	Fr	HT	Hypertension & perfumery
Passifloraceae	*Passiflora edulis* Sims.	Butunda	S	L	HT	Cough
Poaceae	*Digitaria scalarum* Chiov.	Rumbugu	H	R	HT	Labor pain
					HT	Hypertension
Poaceae	*Cymbopogon nardus* (L.) Rendle.	Eteete	H	L	HT	Hypertension
Poaceae	*Cymbopogon citratus* Stapf.	Kalifuha	H	L	HT	Cough
				R	HT	Hypertension.
Rubaceae	*Pentas longiflora* Oliv.	Mulinda	S	R & B	HT	Ulcers
Rubaceae	*Coffea canephora* Pierre.	Mwani	S	L	HT	Dysentery
				F	HT	Headaches
Rutaceae	*Citrus limon* L.	Ndimo	T	Fr	J	Obesity & Hypertension
Solanaceae	*Capsicum frutescens* L.	Kamulari	S	Fr	AE	Coccidiosis
Solanaceae	*Solanum anguivii* Hook.	Njagi	S	F	HT	Ringworm
Verbanaceae	*Lantana trifolia* L.	Musekera	S	L	HT	Cough

KEY

B –Bark	**F** -Flowers	**L** –Leaves	**T** –Twigs	**B&L**-Bark and leaves

Wp –Whole plant	**R&B** –root and bark	**R** –Roots	**S**-seeds	**H**-Herb
HT-Herbal tea	**CL-Chewing leaves**	**AE-Aqueous extract**	**P-Poultice**	**HB**-Herbal bath
Tr-Tree	**Fr**-Fruit	**Sh**-Shrub		**MOP**-Mode of preparation
J-Juice	***-**A herbal tea is prepared from dry fruit peelings of banana fruits			

Fig. 1-Graphical presentation of the five most used plant families and respective frequencies



Of the medicinal plants documented, *Vernonia amygdalina* and *Aloe spp* were the most commonly used for fevers, cough and Malaria was the most commonly treated diseases. Cough was treated with the highest number of plant species followed by stomachaches and wounds.

Most of the plant parts used as source of medicines was leaves. This may be because the local people found the practice to be

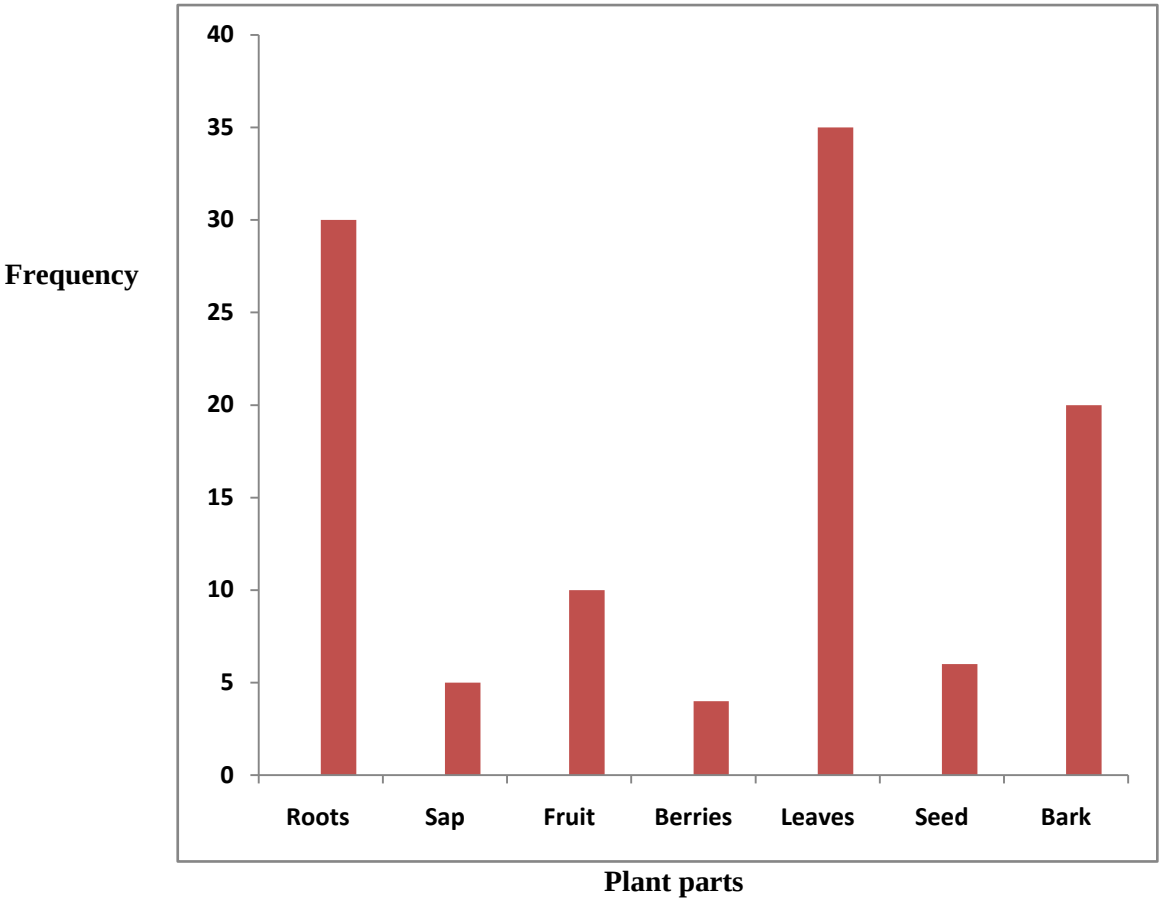
conservational benign. This was followed by roots, bark and finally with seeds and fruit being the least Consumed medicinal plant parts.

CONSERVATION STATUS

Medicinal plant conservation strategies need to be understood and planned for based on understanding of indigenous knowledge and practices (Berkes et al 2006). Conservation of medicinal plants in its bio-cultural perspective not only implies conservation of biodiversity but also places an equal emphasis on conservation of cultural diversity (FAO 1997).

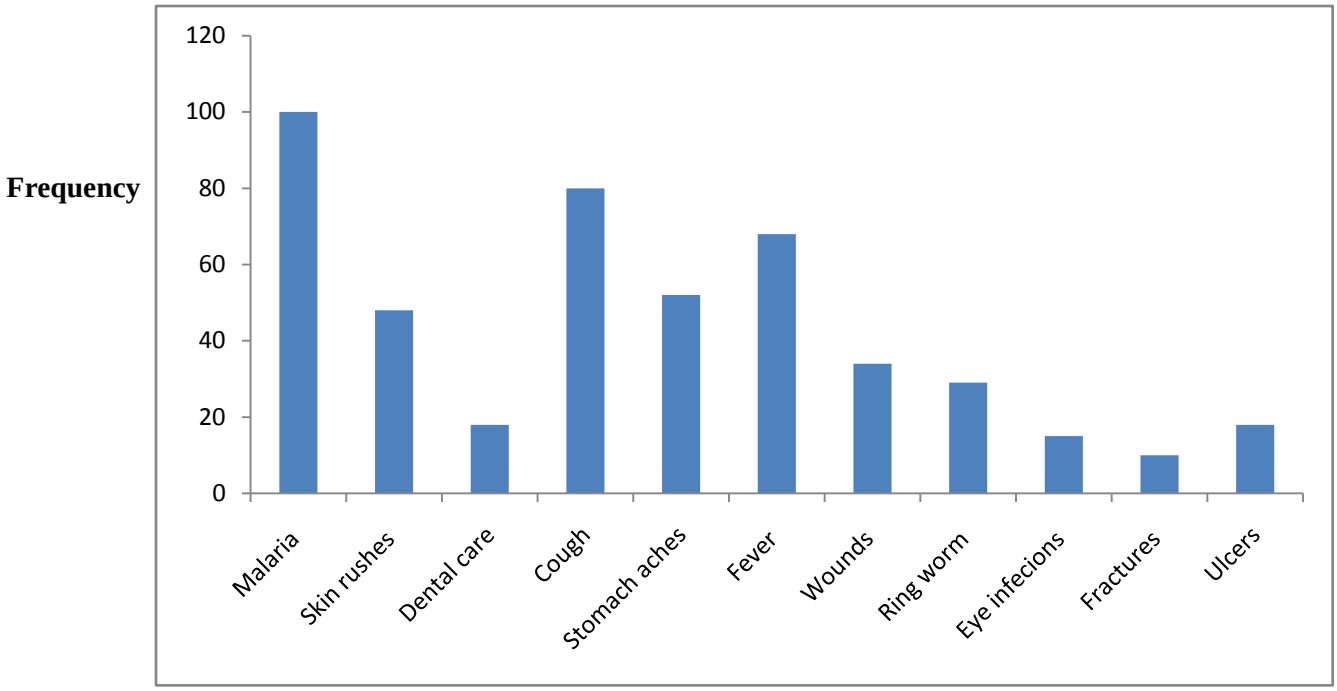
According to the observations, necessary measures have been taken by the local community members to ensure or guarantee that plants continue to produce new vegetative growth or seeds after being harvested .These include harvesting part of the plant, and leaves are seen to be the most commonly utilized plant part followed by roots, bark and other plant parts, the least utilized plant parts being the flowers, sap and berries as shown by the graph below.

Fig.2. The different plant parts used and their respective frequencies.



The diseases treated in this area include but are not limited to malaria, skin rushes, cough, stomachaches, ulcers, fresh wounds dental care, fractures, eye infections, scabies ,fever, labor pain, syphilis, and poultry pests and diseases such as fleas and Coccidiosis respectively as indicated in Fig.3 below.

Fig. 3. Commonly cured diseases with their respective frequencies



CONCLUSION

Kibale National park and its surrounding villages are found to be an area with extremely very rich biodiversity with quite a good number of medicinal plant species. Many medicinal plants have been used by the people in the local communities to treat diseases, however irrespective of their illness mitigating potentials the local people have not taken time to domesticate these plants hence if they continue being harvested from the wild. Such plants are prone to extinction yet most of them can be grown for commercial purposes for example *ocimum gratisum* (Mujajja) can be used to flavor tea leaves if domesticated and grown on large scale.

RECOMENDATIONS

- Further intense long term research must be done to cover the different methods of formulation and administration.
- Also, extensive investigations on chemical components of the identified medicinal plants need to be done by laboratory analysis of plants' extracts.
- It is also recommendable that ethno-pharmacological literature should be availed to students in order to discover existing knowledge about the various plant species of medicinal potency, research on these plant species focusing on the abundance and reproductive biology.

REFERENCES

1. Berkes, Fikret; Turner, Nancy J. (2006). "Knowledge, Learning and the Evolution of Conservation Practice for Social-Ecological System Resilience". Human Ecology 34 (4): 479–494.
2. Chedley, A., Munir, O., Mohamed, A. and Grignon, C. (2008). Biosaline Agriculture and high salinity tolerance. ISSBN: 978-3-76438553-8. Birkhauser Verlag AG. Basel, Boston-Berlin
3. De-Yuan Hong and Blackmore Steven (2015). The plants of China. A companion to the flora of China, Cambridge University Press, New York.
4. Farnsworth, N. & Soejarto, D.D. (1991). Global importance of medicinal plants, Cambridge University press.
5. Farnsworth, N.R., and D.D. Soejarto, (1985). Potential Consequence of Plant Extinction in the United States on the Current and Future Availability of

Prescription Drugs. Economic Botany 39.3: 231-240

6. Farnsworth, R.N. (1984).Synthesis and vitro and in vivo evaluation of dopaminergic ergoline derivatives In: Natural Products and Drug Development (Krosgaard-Larsen, P. Christensen, S. Rand Kofod, H. (Eds) pp 17. Munksgaard. Copenhagen.
7. Food and Agriculture Organization of the United Nations (1997). Medicinal plants for forest conservation and health care. Food & Agriculture Org. pp. 87–99. ISBN 978-92-5-104063-8.
8. Ibrahim, M., Nwude N Ogunsusi R, A and Aliu Y, O (1984). Screening West African plants for anti helmintic activity. International Livestock Centre in Africa Bulletin 17: 19-23
9. Kakudidi, E. K, Bukenya, Z. R. and Kasenene J.M (1995). Rwenzori mountain forest non-timber products and people.
10. Kakudidi, E.K, Bukenya, Z. and Kasenene, J.M (2000).The medicinal plants in and around Kibale National park in Western Uganda.
11. Katrina Brown (1992).Medicinal plants, indigenous medicine and conservation of biodiversity in Ghana CSERGE Working Paper GEC 92-36
12. Kokwaro, J.O (1976) Medicinal plants of East Africa. The East African Literature Bureau, General printers, Nairobi.
13. Lewis, D. A. (1989). Anti-inflammatory drugs from plant and marine sources pp 231. Birkhanser Verlag Switzerland.
14. Marco, S., Holger, K., Adjima, T. & Georg, Z. (2007) indicator value of different vascular plant families for overall plant diversity in the savanna belt of western Africa (abridged title: grasses as indicators of plant diversity)
15. McNeely, J.A., (1988). Economics and Biodiversity: Developing and Using Economic Incentives to Conserve Biological Resources. Gland, Switzerland: IUCN
16. Onocha, P.A., Ajaiyeoba, E.O., Dosumu, and Ekundayo, O (2005). Phytochemical Screening and Biological Activities of Gomphrena celosioides (C. Mart) Extracts. Nigerian society for experimental Biology, Nigeria.
17. Pearce, D.W., and S. Puroshothaman, (1992). Protecting Biological Diversity: The Economic Value of Pharmaceutical Plants. CSERGE Global Environmental Change Working Paper 92-27, Centre

for Social and Economic Research on the Global Environment, University College London and University of East Anglia

18. Principe, P.P., (1991). Valuing the Biodiversity of Medicinal Plants. In Akerele, O., V. Heywood, and H. Synge (eds) The Conservation of medicinal Plants, Proceedings of an International Consultation, 21-27 March 1988, Chiang Mai, Thailand. Cambridge: Cambridge University Press, pp 79-124
19. Tropical Biology association (TBA), (2004) field report, use of medicinal and wild food plants by local communities in and around Kibale National park in western Uganda.

Author Profile

Waisindye Noah attained a Bachelor of Ethnobotany from Makerere University and is a Masters of Public Health student at Bishop Stuart University, Mbarara Uganda where he is currently working as a Laboratory assistant in the Ethnobiology Laboratory, Faculty of Applied sciences, Bishop Stuart University. His interests include research on medicinal plants

Prof. Maud Kamatenesi Mugisha attained a PhD in Medical Ethnobotany and Ethno-pharmacology from Makerere University. She is a senior researcher on medicinal plants and current vice Chancellor of Bishop Stuart University, Mbarara, Uganda. Her interests include Herbal medicinal products research, development and commercialization.

Godwin Anywar attained a Master of Science degree in Botany from Makerere University.
He is an assistant lecturer of Ethnobotany at the Department of plant sciences, Microbiology and Biotechnology, Makerere University.

Dr. Francis Kazibwe (PhD) is an Associate Professor of Public Health at Bishop Stuart University, Uganda. He has been engaged in operational research on Vector Borne Diseases. He has accumulated knowledge on the ecological dynamics of disease vectors and has held many consultancies for the business community and international research institutions.

Appendix 1: QUESTIONAIRE USED DURING DATA COLLETION.

Informant`s consent for the participation in the study.

I…….. (Name of informant) here by give my full consent and conscious to participate in this study and declare that to the best of my knowledge the information that I have provided are true, accurate and complete.

Date……. Signature of informant……..……..

Informant`s details:

Name…….

Gender……Age……..

Occupation…….

Education Level……...……
Location/Residence……

Data about medicinal plant and its use:

Plant (local Name)……...

Habit (Tree/Herb/Shrub/Climber/…….)

Plant part used…….

Cultivated/wild……

If cultivated, cultivated for……

Conservation needs……

Method of collection and storage……

Name of disease(s) treated……

Mode of application……

Dosage…….

Other uses…….

Remarks:

Plant identified as……. (Botanical name & plant family).

Signature of researcher…….....