International Journal of Ethnobiology & Ethnomedicine

www.advancejournals.org
Open Access Scientific Publisher

Research Article

TRADITIONAL KNOWLEDGE ON USE OF MEDICINAL PLANTS IN KITUI COUNTY, KENYA

Daniel Patrick Kisangau[1], Matheaus Kauti[2], Royford Mwobobia[3], Titus Kanui[3], Nashon Musimba[3]
[1]Department of Biology South Eastern Kenya University, P.O. Box 170-90200, Kitui, Kenya
[2]Department of Environmental Science and Technology South Eastern Kenya University, P.O. Box 170-90200, Kitui, Kenya
[3]Department of Range and Wildlife Sciences South Eastern Kenya University, P.O. Box 170-90200, Kitui, Kenya

Correspondence should be addressed to **Daniel Patrick Kisangau**

Received August 14, 2017; Accepted October 10, 2017; Published November 30, 2017;

Cite This Article: Kisangau, D., Kauti, M., Mwobobia, R., Kanui, T., Musimba, N.(2017). Traditional knowledge on use of medicinal plants in Kitui County, Kenya. International Journal of Ethnobiology & Ethnomedicine, 4(1). 1-10

ABSTRACT

Background: The use of traditional medicines in Kenya accounts for more than 70% or more of basic health-care treatments. Documentation of herbal plants is necessary because they are becoming more important, especially due to escalating costs of drugs and the focus on organic products in most developing countries. More so, with the development of resistance of pathogens to drugs, ethno-veterinary and ethno-human medicine might be the route to take since herbs tend to be broad spectrum in use. The aim of this study was to document traditional knowledge on ethnobotanical uses of medicinal plants in Kitui County.

Method: Data was collected through semi-structured open-ended questionnaires administered to 68 households in the study area. Simple random sampling was used to select households who were the final sampling units.

Results: Majority of the respondents (51.5%) had attended school up to primary level. Only about 6% of respondents were engaged as full-time herbalists whereas 90% had acquired traditional knowledge through informal trainings. A total of 62% of the informants acquired traditional herbal knowledge through apprenticeship from relatives with 29.4% of respondents taking between six months to one year to learn. A total of 42 plant species in 25 families were used in treating one or more disease conditions. *Aloe secunduflora* locally known as *Kiluma* was the most common medicinal plant, mentioned by 71% of the respondents. Other commonly used plants were *Acacia nilotica, Zanthoxylum chalybeum* and *Azadirachta indica.* Plucking of leaves (45.0%), digging of roots (31.4%) and debarking (11.6%) were the most commonly used methods of harvesting medicinal plants. The most commonly used plant parts were leaves (42%), stem bark (31%) and roots (21%). *Acacia tortilis* and *Terminalia brownii* were the most commonly used in the category of non-medicinal plant uses with 30% and 25% use frequencies respectively. The most common non-medicinal plant uses in the area were firewood, charcoal and animal feed.

Conclusion: The study provides crucial ethnopharmacological lead towards discovery of natural drugs for treatment of both human and livestock diseases in Kitui County. The study provides platform for conservation of the documented plant resources based on their vulnerability to over-exploitation.

KEY WORDS: Traditional knowledge, medicinal plants, Kitui.

BACKGROUND

About 35,000 of the Africa's plant species are endemic. These plants and the drugs derived from them are important sources of health-care remedies to people in Africa. Their use in Africa accounts for over 70% of basic health-care treatments [1]. Over time, African have through their own methods of trial and error learnt about diseases and their management. Most of these African communities live in areas affected with endemic parasites and diseases [2]. These areas are not easily accessible to modern information and services and people are less economically empowered to cope with enormous health challenges. Their survival is therefore based on local and inherent knowledge [3].

Numerous plants indigenous to Africa are of medicinal value. Some have been tested and validated for their active ingredients against target pathogens. Most of these plants are locally available free or cheaply [1].

Plants of medical value have been recorded and categorized according to their human, nutritional, medical, veterinary and domestic uses in Kenya [4]. They are becoming popular at the expense of conventional drugs since they are easily accessible, affordable and effective. Documentation of these medicinal plants is necessary, especially given the increasing costs of drugs and the focus on organic products in most developing countries. In addition, with emerging resistance by pathogens to conventional drugs, ethno- medicine might be the route to take since herbs tend to be broad spectrum in use [5].

The discovery of medicinal uses of plants must have occurred through various ways including trial and error method [3]. Some of these ways include watching animals rubbing themselves on medicinal plants when ill (zoopharmacognosy) and subsequent adoption of the same treatments; interacting with visiting traditional healers, inheritance of healing powers from relatives, buying the healing powers from experienced healers and deliberate trial to help select those remedies that work

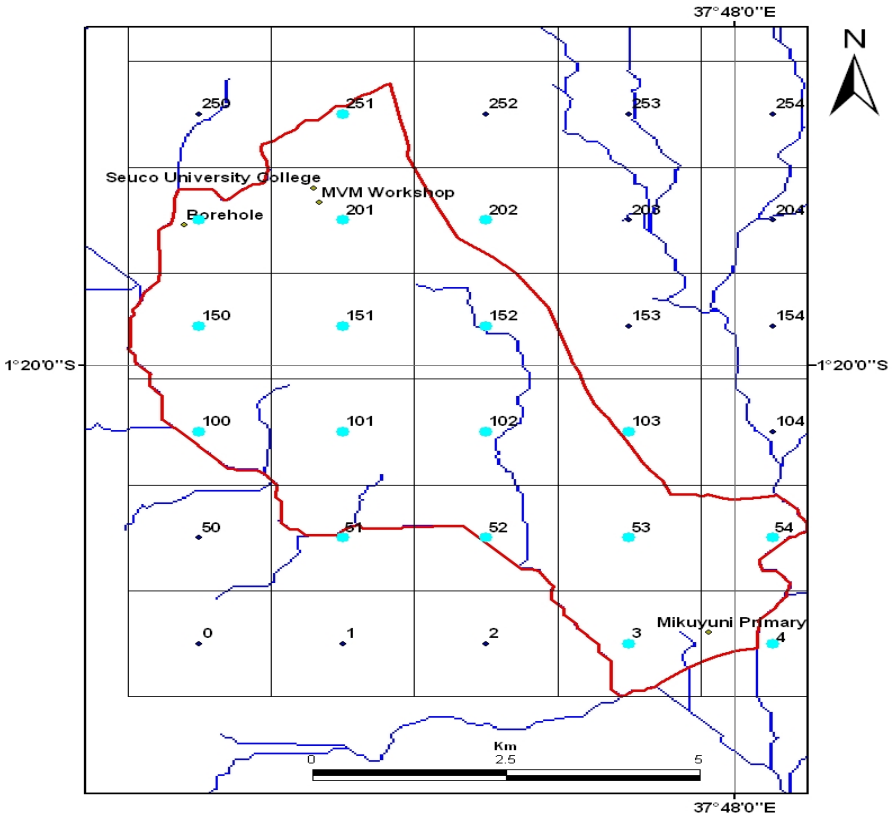
Traditional medical practitioners are a crucial component of the health-care delivery system [1]. They hold a lot of traditional medical knowledge and experience [6]. In Kenya, traditional medicines play a major role in primary healthcare and upkeep of rural communities where over 70% of the Kenyan population relies on them as their primary source of healthcare [7].

The aim of the study was to highlight ethnobotanical uses of medicinal plants in Kitui County.

MATERIALS AND METHODS

This study was carried out in Lower Yatta in Kitui County in the Lower Eastern Kenya region (Fig. 1). The County is mostly occupied by the native Kamba speaking community. Majority of the people in the community carry out subsistence farming with maize, beans, pigeon peas, cassava as their major crops. They also keep cattle, goats, sheep, poultry as well as donkeys, the latter mainly being for transport. The predominant vegetation type is that of *Acacia* wooded bushland [8].

Figure 1: Map of study area.



Data collection

Ethnobotanical surveys were carried out to obtain information on medicinal plants traditionally used to treat various ailments in the study area. With the help of local administrators Participatory Rural Appraisal (PRA) was employed to identify key respondents [9]. Ethnobotanical data was collected through individual and Focus Group Discussion (FGD) interviews using semi-structured open-ended questionnaires. Interviews were conducted in the local Kamba language. Information regarding the local names of the plant types, medicinal uses, plant parts used, methods of preparation and administration route were documented. Methods for harvesting plant materials from the wild were also recorded. Voucher specimens were collected and deposited in South Eastern Kenya University Herbarium. Ethnomedicinal data collected was analyzed using descriptive SPSS statistics and word excel sheet. Respondents interviewed were distributed in four sublocations as shown in Table 1.

Table 1: Distribution of respondents per Sub location.

Sub location	Frequency	Percentage
Kanyonyoo	4	5.9
Kitukuni	3	4.4
Mikuyuni	59	86.8
Mwita syano	1	1.5
Missing	1	1.5
Total	68	100

RESULTS

Education levels of respondents

A total of 68 respondents were interviewed during the study. About 8.8% of the respondents had not attended school, 10.3% had only attended adult education, 8.8% had attended up to secondary level and 1.5% up to college level. Of these, 19.1% of respondents did not indicate their education level. Majority (51.5%) had attended school up to primary level. Transition from primary to secondary and college level was very low. Years of formal education are predicted to be inversely related to knowledge of medicinal plants.

Type of occupation by gender

Majority of the respondents were females (53%) with men representing 47% (Table 2). Farming was the main activity at 75% for both sexes. Majority of women did not engage in more skilled occupations like teaching, masonry and carpentry. About 6% of the respondents were full-time herbalists.

Table 2: Occupation of respondents by Gender.

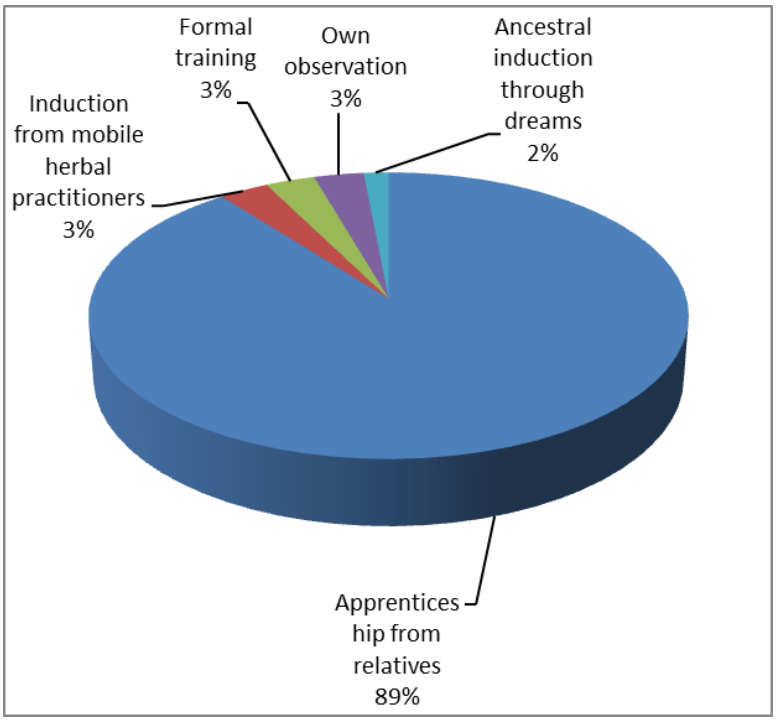
Occupation	Female	Male	Total
Business man	0	1(1.5)	1(1.5)*
Carpenter	0	1(1.5)	1(1.5)
Casual laborer/farmer	0	1(1.5)	1(1.5)
Farming	27(39.7)	24(35.3)	51(75)
Herbalist	3(4.4)	1(1.5)	4(5.9)
Housewife	4(5.9)	0	4(5.9)
KEFRI employee	1(1.5)	0	1(1.5)
Mason	0	1(1.5)	1(1.5)
Teaching	0	1(1.5)	3(4.4)
Missing+	1(1.5)	0	1(1.5)
Total	36(52.9)	32(47.1)	68(100)

**Figures in brackets are percentages*
+The respondent did not indicate her occupation

Methods of acquiring herbal knowledge

Respondents reported several social learning processes of acquiring herbal knowledge. Majority of the respondents (89%) gained herbal knowledge through apprenticeship from experienced family relatives. Other sources of acquiring herbal knowledge included induction from mobile herbal practitioners (3%), formal training (3%), own observation (3%) and ancestral induction through dreams (2%) (Figure 2).

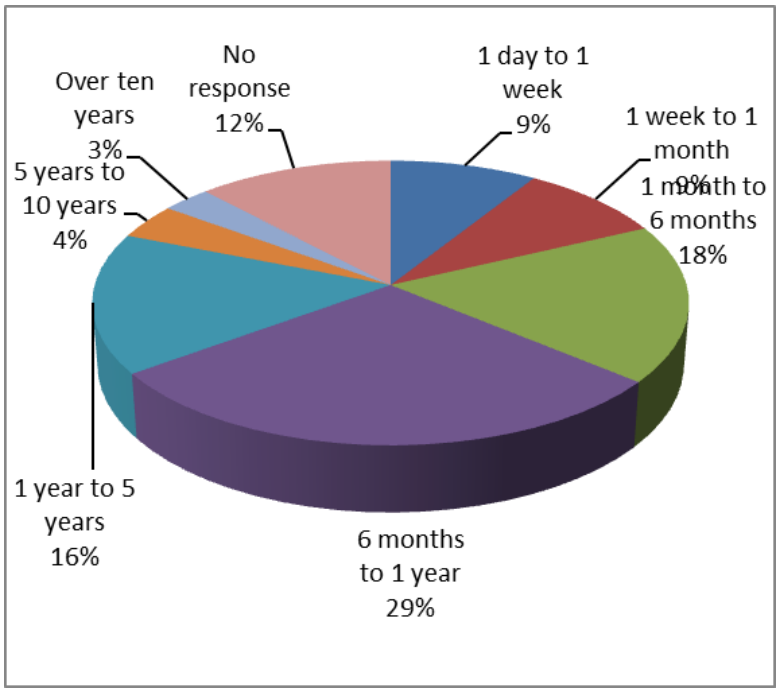
Figure 2: Methods of acquiring herbal knowledge.



Duration of formal/informal acquisition of herbal knowledge

About 9% of the respondents reported that either formal or informal training to acquire herbal knowledge took a duration of between 1 day to 1 week, between 1 week to 1 month (9%), between 1 month to 6 months (18%), 6 months to 1 year (29%), 1 year to 5 years (16%), 5 years to 10 years (4%) and over ten years (3%) (Fig. 3). About 12% of respondents did not indicate their duration of training.

Figure 3: Duration of formal/informal acquisition of herbal knowledge.



Medicinal plant types and disease conditions treated

A total of 42 plant species in 26 families were used in treating one or more disease conditions. The family Mimosaceae had the highest proportion of medicinal plants used (17%), followed by Asteraceae (9.5%) and Papilionaceae (7%) (Table 3). There were 28 disease conditions mentioned and documented during the study.

Table 3: Plant names and disease conditions treated.

	Plant Scientific name	Plant local name	Family name	Part used	Ailments	Application method	Voucher ref. No.
1.	*Acacia brevispica*	Mukuswi	Mimosaceae	Leaves	Severe headache/Fontanele	Fresh leaves crushed and applied	SKU 081
2.	*Acacia mellifera*	Muthiia	Mimosaceae	Stem bark	Cholera, cough	Boiled and decoction drunk	SKU 004
3.	*Acacia nilotica*	Musemei	Mimosaceae	Stem bark	Chest pain, cold flu, cough	Crushed and infusion drunk	SKU 042
4.	*Achyranthes aspera*	Uthekethe	Amaranthaceae	Leaves	Constipation	Crushed and infusion drunk	SKU 055
5.	*Achyrothalamus marginatus*	Kakunini	Asteriaceae	Leaves	Malaria	Boiled and decoction drunk	SKU 021
6.	*Albizia anthelmintica*	Kyoa	Mimocaceae	Stem bark	Diarrhoea, intestinal worms	Boiled and decoction drunk	SKU 008
7.	*Aloe secundiflora*	Kiluma	Aloaceae	Leaves	Cholera, swollen diaphragm, diarrhea, ulcers, filariasis, malaria	Decoction or infusion drunk	SKU 101
8.	*Amaranthus hybridus*	Kivuwa	Amaranthaceae	Leaves	Bilharzia	Crushed and infusion drunk	SKU 013
9.	*Aspilia pluriseta*	Muti	Asteraceae	Leaves	Headache, wounds	Sap squeezed and applied	SKU 019
10.	*Azadirachta indica*	Mwarobaini	Meliaceae	Stem bark	Cholera, joint pains, malaria	Boiled and decoction drunk	SKU 036
11.	*Balanites aegyptiaca*	Kilului	Balanitaceae	Stem bark	Bilharzia, constipation	Crushed and infusion drunk	SKU 007
12.	*Carica papaya*	Muvavai	Caricaceae	Stem bark	Pneumonia	Crushed and infusion drunk	SKU 104
13.	*Cissus aphyllantha*	Muvelengwa	Vitaceae	Root	Diarrhoea	Boiled and decoction drunk	SKU 016
14.	*Commiphora Africana*	Ikuu	Burseraceae	Stem bark	Oedema, ulcers	Boiled and decoction drunk	SKU 023
15.	*Curcubita maxima*	Ilenge	Curcubitaceae	Fruit stalk	Cough	Burned and powder licked	SKU 062
16.	*Cynodon dactylon*	Ikoka	Poaceae	Leaves/Stem	Kidney stones	Burned and powder licked	SKU 057
17.	*Cyphostemma cyphopetalum*	Kiungu	Vitaceae	Leaves	Eye problem	Crushed and sap applied	SKU 044
18.	*Entada leptostachys*	Mwaitha	Mimosaceae	Stem/Root	Cuts	Stem juice squeezed and applied	SKU 053
19.	*Gnidia latifolia*	Muthila	Thymelaeaceae	Leaves	Ulcers	Burnt and powder licked	SKU 046
20.	*Hymenodictyon parvifolium*	Mulinditi	Rubiaceae	Leaves	Diarrhoea, snake bite	Crushed and infusion drunk	SKU 063
21.	*Indigofera lupatana*	Muthika	Papilionaceae	Root	Cough	Crushed and infusion drunk	SKU 031
22.	*Kleinia squarrosa*	Mungendya Nthenge	Asteraceae	Stem	Malaria, oedema	Crushed and infusion drunk	SKU 078

23.	*Launaca cornuta*	Uthunga	Asteraceae	Leaves	Malaria	Crushed and infusion drunk	SKU 087
24.	*Manihot esculenta*	Ianga	Euphorbiaceae	Leaves	Foot and mouth disease	Infusion given	SKU 079
25.	*Maytenus purtterlickioides*	Muthunzi	Celastraceae	Stem bark	Joint pains	Boiled and decoction drunk	SKU 092
26.	*Melia volkensii*	Mukau	Meliaceae	Stem bark	Cholera, constipation, malaria, boils	Boiled and decoction drunk	SKU 018
27.	*Moringa oleifera*	Muringo	Moringaceae	Leaves	Back pain	Boiled and decoction drunk	SKU 112
28.	*Nicotiana tabacum*	Mbaki	Solanaceae	Leaves	Constipation	Crushed and infusion drunk	SKU 080
29.	*Ocimum kilimandscharicum*	Mutaa	Lamiaceae	Stem/ Leaves	Diarrhoea, dysentery	Crushed and infusion drunk	SKU 076
30.	*Ormocarpum trichocarpum*	Muthingii	Papilionaceae	Leaves/Stem bark	Stomach ache	Crushed and infusion drunk	SKU 117
31.	*Plectranthus barbatus*	Muvou	Lamiaceae	Leaves	Dysentery, malaria, stomachache	Crushed and infusion drunk	SKU 010
32.	*Psidium guajava*	Muvela	Myrtaceae	Leaves	Diarrhoea	Crushed and infusion drunk	SKU 002
33.	*Ricinus communis*	Kivaiki	Euphorbiaceae	Leaves/Stem	Stomach ache	Crushed and infusion drunk	SKU 089
34.	*Salvadora persica*	Mukayau	Salvadoraceae	Stem/ Leaves	Joint pains	Crushed and infusion drunk	SKU 122
35.	*Solanum incanum*	Mutongu	Solanaceae	Root	Diarrhoea, stings, stomachache, worms	Crushed and infusion drunk	SKU 020
36.	*Strychnos henningsii*	Muteta	Loganiaceae	Stem bark/ Leaves/Root	Cold flu, joint pains, malaria	Boiled and decoction drunk	SKU 024
37.	*Stylosanthes fruticosa*	Kalaa	Papilinonaceae	Leave/ Whole plant	Malaria	Crushed and infusion drunk	SKU 038
38.	*Tamarindus indica*	Muthumula	Caesalpinaceae	Leaves	Joint pains	Crushed and infusion drunk	SKU 103
39.	*Teclea simplicifolia*	Mutuiu	Rutaceae	Leaves/Stem bark/ Roots	Eye problem, cold flu, joint pains, skin rashes, malaria.	Boiled and decoction drunk, Infusion applied topically for skin rashes	SKU 097
40.	*Terminalia brownii*	Muuku	Combrataceae	Stem bark	Cholera, cold flu, cough, eye problem, malaria, jaundice	Boiled and decoction drunk	SKU 009
41.	*Uvaria scheffleri*	Mukukuma	Anonaceae	Stem bark/ Root	Cold flu, joint pains, chest pains	Boiled and decoction drunk	SKU 119
42.	*Zanthoxylum chalybeum*	Mukanu/ Mukenea	Rutaceae	Stem bark/ Root	Chest pain, cold flu, joint pains, malaria, cholera	Boiled and decoction drunk	SKU 126

The most frequently mentioned disease conditions were malaria (15%), diarrhea/dysentery (12%), joint paints (10%), cold flu (10%), cholera (7%), cough (6%), constipation (5%) and stomachache (5%) (Table 4).

Table 4: Percentage frequency of mention of disease conditions.

	Disease condition	Percentage frequency of mention (%)
1.	Back pain	1
2.	Bilharzia	2
3.	Boils	1
4.	Chest pain	3
5.	Cholera	7
6.	Cold flu	10
7.	Constipation	5
8.	Cough	6
9.	Cuts	1
10.	Diarrhoea/Dysentery	12
11.	Eye problems	3
12.	Filariasis	1
13.	Foot and Mouth disease	1
14.	Headache/Fontanel	2
15.	Intestinal worms	2
16.	Jaundice	1
17.	Joint pains	10
18.	Kidney stones	1
19.	Malaria	15
20.	Oedema	2
21.	Pneumonia	1
22.	Skin rashes	1
23.	Snake bite	1
24.	Stings	1
25.	Stomachache	5
26.	Swollen diaphragm	1
27.	Ulcers	3
28.	Wounds	1
	Total	100

Harvesting, use of plant parts and herbal preparation methods

Various methods of harvesting medicinal parts of plants were reported. These included plucking of leaves (45.0%), digging of roots (31.4%) harvesting of fruits (0.9%), and debarking (11.6%).

Various plant parts (leaves, fruits, bark, and root extracts) were used during preparation of medicines for administration for both human and livestock. Leaves were the highest used plant parts (42%) followed by stem bark (31%), roots (21%), fruits (4%), whole plant (1%) and others (1%) (Fig. 4). Majority of herbal remedies were prepared by crushing in water to make infusion (47%), boiling to make decoction (36%), burning or drying in sun and powdering (10%), squeezing and application of sap (4%) and chewing (3%) (Fig. 5).

Figure 4: Percentage use of plant parts.

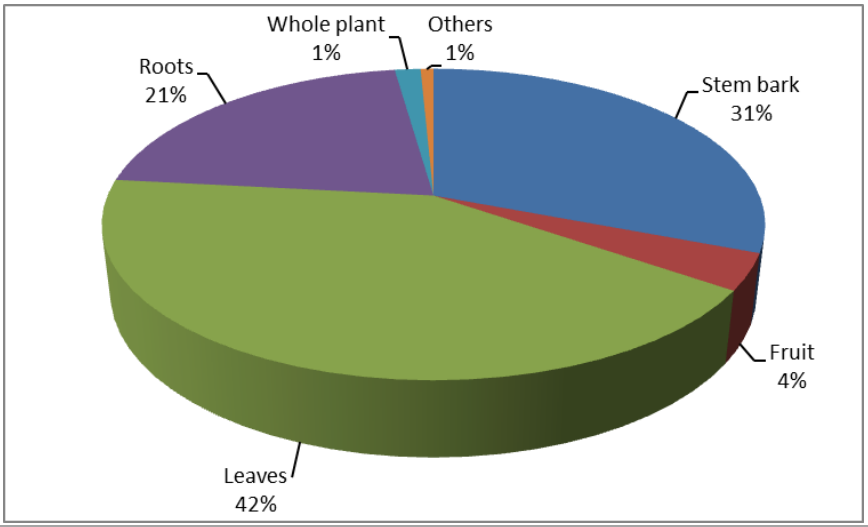
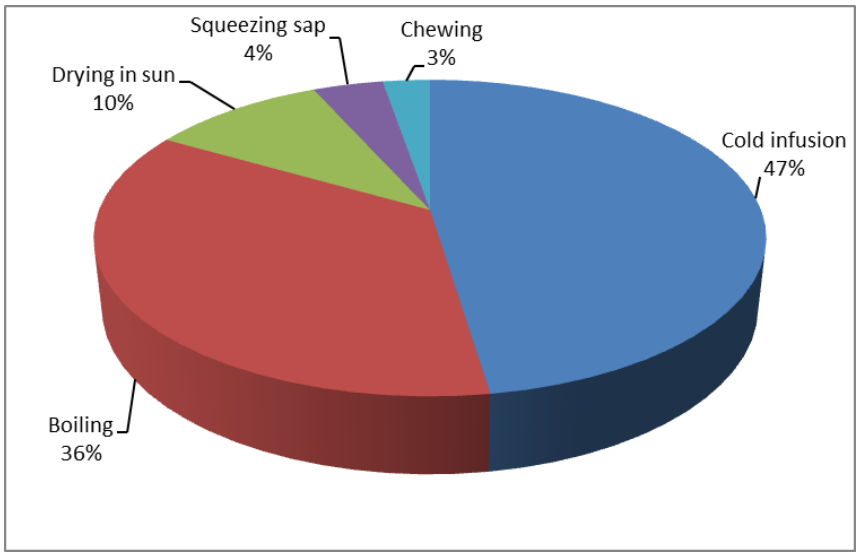


Figure 5: Percentage preparation of herbal remedies.



Other Non-medicinal uses of plants

Various medicinal plant parts like leaves, fruits, bark and roots were used as animal feed, preparing tea, shade and as vegetables. Others like stems and branches of certain tree species were used for burning charcoal, building and fencing posts, timber, building frames, firewood and making hives. *Acacia tortilis* and *Terminalia brownii* were the most commonly used in the category of non-medicinal plant uses with 30% and 25% use frequencies respectively (Table 5).

Table 5: Non-medicinal uses of plants.

Non-medicinal use/Plant Type	Vigna unguiculata	Kigelia africana	Balanites aegyptiaca	Acacia mellifera(Kithiia	Tamarindus indica	Azadirachta indica	Melia volkensii	Acacia nilotica	Terminalia brownii	Acacia tortilis	Grand Total
Alcohol Brewing		1									1
Animal feed			2						1	3	6
Building									1		1
Charcoal									1	4	5
Construction of animal sheds								1			1
Fencing			1	1							2
Firewood			1			1	2	1	5	5	15
Food			3		1						4
Making beehives									2		2
Preparing tea								1			1
Shade						1					1
Vegetable	1										1
Grand Total	1	1	7	1	1	2	2	3	10	12	40
Total percentage(%)	2.5	2.5	17.5	2.5	2.5	5.0	5.0	7.5	25.0	30.0	100.0

DISCUSSION

The findings of the study revealed that majority of the respondents had lower levels of education, thus agreeing with the assertion that less educated people tend to be less acculturated hence tend to acquire more knowledge on traditional medicines [10]. Also, educated and acculturated people may readily seek conventional medical treatment. Traditional healers need some level of education to empower them with particular competencies that might be important like skills on conservation and management of natural resources [10]. Thus, adult education is important to empower them with basic educational skills such as writing and reading. Greater levels of education and consequently awareness could contribute to long term sustainability of this important occupation [11].

Marsha and Robert [10] argued that commercial occupations such as businesses interfere with acquisition of traditional knowledge on medicinal plants because of regular movements and lack of concentration. The finding that females were the majority of herbalists in the study area disagrees with studies done elsewhere by Semenya and Martin [11] who found that male herbal practitioners were the majority. This could be attributed to the fact that in the study area, women formed the bulk of household care takers and therefore can easily access and use locally available medicinal plants to attend to health challenges affecting their families.

Apprenticeship on herbal medicine by relatives is usually passed orally from one generation to the next and has been touted as one of the surest ways of preserving traditional herbal knowledge [12]. If not properly documented, this knowledge could easily be lost or distorted [6, 11]. Semenya and Martin [11] indicated that herbal practitioners with experience and training of less than 10 years were considered less experienced while those with more than 10 years were considered as more established healers, and therefore more dependable and trusted in herbal medicine dispensation.

A relationship exists between resource stock, population size and sustainable rate of harvest. The method of harvesting is thus paramount in medicinal plants conservation and sustainable utilization. The slow growing species are under threat due to unsustainable harvesting methods. Some harvesting methods like total bark removal and digging to harvest roots are non-conservatory [4, 13]. It can therefore be said that in the study area, the medicinal plants are threatened. This finding therefore forms a basis to establishing conservation initiatives for these threatened species.

For some plants, the inner part of the bark produces a medicinal paste that can be applied on animals [13]. Other harvested parts include flowers, seeds and rhizomes [4]. Preparation and administration of various plant parts can be done in single or in combination [14]. A combination of use of roots and stem bark both at 52% as opposed to leaves displays high level of vulnerability of the different plant species to over-exploitation. This is because these two plant parts do not regenerate as quickly as leaves could do. Besides, Gueye [15] demonstrated that plant products involved in the treatment of diseases come from various botanical families, thus indicating that many plant species need to be protected and/or conserved to enable people to continue making good use of their products. The concerns of medicinal plants users are therefore linked to the concerns of those seeking to preserve and protect plant biodiversity. Henceforth, there is need to clearly identify the most vulnerable and threatened species with a view to ensuring their conservation, possible wider use in the future and preserving knowledge on their use.

Other uses of medicinal plants that have been reported include carvings, handles for farm tools, as ornamental trees, food, pesticides, bee forage, fibre for making ropes and stuffing mattresses and pillows, water purification, rodent poisoning, source of dye, tooth brush, human medicine, shade, cultural purposes and as wind breakers [4,13]. The findings of this study further reiterate postulation by Kauti [16] that the prevailing use of these plant species for other non-medicinal purposes enhances their chances of being over-exploited and therefore more urgent need for their conservation.

CONCLUSION

The study revealed a rich diversity of medicinal plants used in the county for treatment of various human and veterinary disease conditions. The study adds to the increasingly critical importance of documenting traditional knowledge on our local plant species for safe custody. There is need to sensitize the local community on harvesting more of leaves than roots or stem bark for sustainable conservation of the plant species. There is also need for phytochemical studies of the documented medicinal plant species to determine biometabolite concentration levels on the various plant parts in order to provide scientific justification for the harvesting of leaves other than stem bark or roots, the latter of which render the plant resources vulnerable to over-exploitation.

CONFLICT OF INTEREST

The authors declare that none of them has conflict of interest relating to the authorship and editorial process of the article and neither are there competing interests amongst them. They also share the aspirations of the local people in Kitui County to utilize medicinal plant resources in a sustainable manner for the benefit of the present and future generations.

ACKNOWLEDGEMENT

We are also grateful to the local community and particularly the respondents of Kitui County who freely offered crucial information needed for this study.

REFERENCES

[1] . Adedeji OS, Ogunsina T K, Akinwumi AO, Ameen, S A, Ojebiyi OO and Akinlade, JA. Ethnoveterinary medicine in African organic poultry production. Int Food Res J 2013; 20(2): 527-532.

[2] . Abubakar S. Ethnoveterinary Medicine in Ormaland – Kenya, Master of Science Degree in Tropical Animal Production and Health, Centre for Tropical Veterinary Medicine (CTVM), University of Edinburgh, UK, 1999

[3] . Wanzala W, Zessin KH, Kyule NM, Baumann MPO, Mathias E and Hassanali A. Ethnoveterinary medicine: a

critical review of its evolution, perception, understanding and the way forward. LRRD 2005; 17(11):119 .
[4] . FAO. Non wood forest products-medicinal plants for forest conservation and healthcare, 1997. Rome, Italy.
[5] . Marizvikuru M, Evison B, Michael C, Tinyiko EH. Use of Herbal Plants in Poultry Health Management in the Mushagashe Small-Scale Commercial Farming Area in Zimbabwe. Intern J Appl Res Vet Med 2005; 3(2):163-170.
[6] . Romha G, Dejene TA, Telila LB, Bekele DF. Ethnoveterinary medicinal plants: Preparation and application methods by traditional healers in selected districts of southern Ethiopia. Vet World 2015; 8(5):674-684.
[7] . Kisangau DP, Herrmann TM. Utilization and conservation of medicinal plants used for primary health care in Makueni district, Kenya. Int J Biodivers Sci Manage 2007; 3(3): 184-192.
[8] . County Government of Kitui, Kenya. 2014 County Integrated Development Plan (2013-2017).
[9] . Amri E, Kisangau DP. Ethnomedicinal study of plants used in villages around Kimboza forest reserve in Morogoro, Tanzania. J Ethnobiol Ethnomed 2012; 8: 1.
[10] . Marsha BQ, Robert JQ. Modernization and medicinal plant knowledge in a Caribbean horticultural village. Med Anthropol Q 2007; 21(2): 169-192.
[11] . Semenya SS, Martin JP. Bapedi traditional healers in the Limpopo Province, South Africa: Their socio-cultural profile and traditional healing practice. J Ethnobiol Ethnomed 2014; 10:4.
[12] . Jedidah N. 2014. The salient traditional medicinal plants and conservation strategies of the Loita Maasai of Kenya. All theses. Paper 1995.
[13] . Owuor BO, Kamoga D, Kaungu J, Njoroge GN. Some medicinal trees and shrubs of eastern Africa for sustainable utilization and commercialization, 2006, The African Network for Agricuture, Agroforestry and Natural Resources Education (ANAFE), World Agro-forestly Centre (ICRAF), Nairobi, Kenya.
[14] . Mwobobia RM. Challenges Facing Chicken Production in Katulani District, Kitui County, 2016. MSC Thesis, South Eastern Kenya University, Kitui, Kenya.
[15] . Gueye. Ethnoveterinary medicine against poultry diseases in African villages. Worlds Poult Sci J 1999; 55:187-198.
[16] . Kauti MK. A geographical and longitudinal approach to rural livelihood security and crisis responses in Central Kenya: The case of crop variety and livestock breed selection. J Geogr Reg Plann 2012, Vol. 5(6), pp. 173-188.