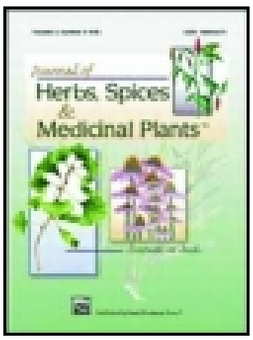

Journal of Herbs, Spices & Medicinal Plants

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/whsm20

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To cite this article: Mary Zacharia Charwi, Neema Gideon Mogha, Joseph Koni Muluwa & Koen Bostoen (2023): Indigenous Knowledge and Use of Medicinal Plants Among the Kuria Communities in the Tarime and Serengeti Districts of Mara Region, Tanzania, Journal of Herbs, Spices & Medicinal Plants, DOI: 10.1080/10496475.2022.2163734

To link to this article: https://doi.org/10.1080/10496475.2022.2163734

Published online: 05 Jan 2023.

JOURNAL OF HERBS, SPICES & MEDICINAL PLANTS
https://doi.org/10.1080/10496475.2022.2163734

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Indigenous Knowledge and Use of Medicinal Plants Among the Kuria Communities in the Tarime and Serengeti Districts of Mara Region, Tanzania

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ABSTRACT

This study documented indigenous knowledge and use of medicinal plants among the Kuria communities in Mara Region, Tanzania. Ethnobotanical data were collected in collaboration with 20 traditional healers (THs), by jungle-walk-and-identify, field guides and observation, semi-structured interviews, focus group discussions and scientific identification of plants. Kuria medicinal plant healers reported 100 medicinal plants from 34 families. Asteraceae (15%) prevailed, followed by Fabaceae (13%) and Lamiaceae (12%). Herbs constituted the largest fraction (41%), followed by shrubs (27%), trees (24%), grasses (4%), climbers (4%), and ferns (1%). Leaves were the most used plant part. Healers listed about 53 diseases treated with plants.

ARTICLE HISTORY
Received 26 August 2022

KEYWORDS
Ethnobotany; Ethnomedicine

Tanzania has the greatest diversity of plant species in all African countries, with the exception of the Democratic Republic of Congo (DRC) and South Africa.[1,2] There are 9,000 species of higher plants in Tanzania, many of which are endemic.[2] Popular medical knowledge is gaining increased attention worldwide in light of global health care demand and the significant role of local medicines in meeting the health care needs in developing countries.[3] Almost 85% of the world's population uses herbal medicines for prevention and treatment of diseases.[4] Therefore, ethnobotanical studies are encouraged on rich biological resource areas for medicinal plant identification, documentation, ranking, conservation, and sustainable usages.[2]

Wild plants provide the only affordable and readily available medical treatments to the majority of the rural population in Tanzania.[2,5] The knowledge of these medicinal plants is kept by few people in the society and transferred orally.[6] For instance, Kuria people from the Mara Region in Tanzania use numerous medicinal plants[7] most of which are not documented. Moreover,

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the indigenous knowledge of Kuria medicine is held by healers, who are mostly elderly people, hence are at risk of complete disappearance upon their death.[8] Indigenous knowledge on medicinal plants is threatened due to the endangerment of the language in which it is transmitted intergenerationally.[8] Hence, the inclusion of language data is of paramount importance for documentation of medicinal plants. In Tanzania, studies have been done on medicinal plants in Kagera,[9,10] Tabora,[11] and Iringa[5] regions. The current study assessed and documented the medicinal plants used in Kuria region for treatment of diseases, the specific plant parts turned into medicine, the methods of preparation, modes of administration, and the Kuria local name and scientific names.

Materials and Methods

The Tarime and Serengeti districts of the Mara Region is located in Northern Tanzania and borders the Simiyu and Arusha regions as well as Kenya to the North (Figure 1). It is among Tanzania's tropical regions with an annual average temperature of 28.5° receiving rainfall twice a year, both long and short rains, although global warming has changed rain patterns and seasons. The region covers a total area of 30,150 km^2, and some parts are covered by the Lake Victoria and the Mara River.[13]

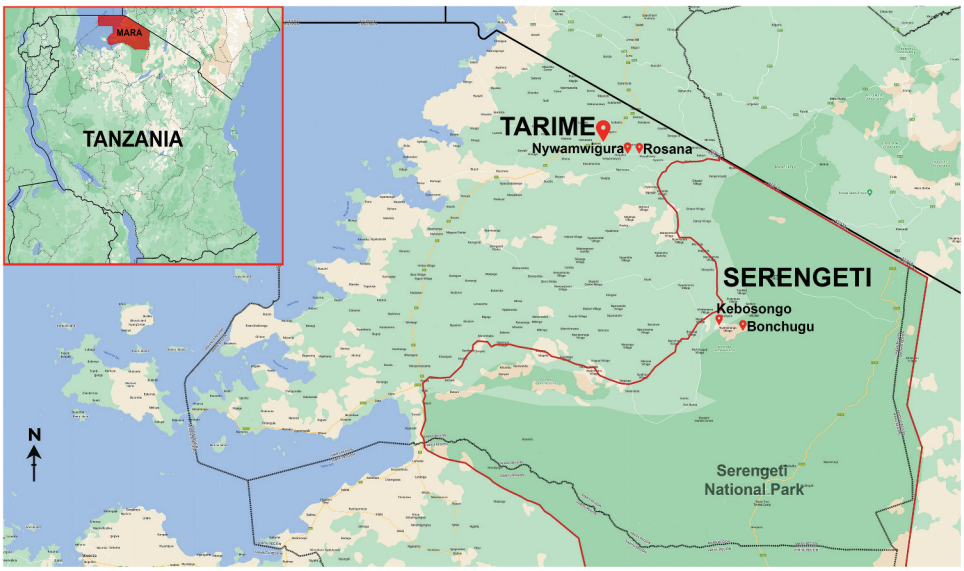

Figure 1. Ethnolinguistic communities in Mara Region Source.[12]

A total of four villages were surveyed in the two districts: Rosana and Nyamwigura in Tarime, and Bhonchugu and Kebhosongo in Serengeti. This study is empirical in nature and employed mixed methods in data collection, examination, and investigation. Data were collected by jungle-walk-and-identify, local field guides and observation, semi-structured interviews, focus group discussion with traditional healers, folk taxonomy, and identification of plants. Jungle-walk-and-identify is a technique that requires the researcher to be accompanied by a native speaker and walk together across the wilderness and identify plants, discuss their names and utilities and record all the relevant information about the plants while continuing the walk.

Samples of medicinal plants were shown to Kuria speakers for identification and folk taxonomy purposes. Semi-structured interviews and focus group discussions were done with local experts in medicinal treatments. The study involved key traditional healers selected with the help of local government officials and past experiences. The information on their knowledge and use of plants for therapeutic purposes were noted and used for data analysis and discussions.

Identification of the plants was done in Dar es Salaam by a professional botanist. Most plants used as medicines by Kuria people were identified in the field to the species level. Those which were not identified in the field were pressed and transported to the University of Dar es Salaam for identification and deposition for future references. Botanist experiences, audio videos, pictures of medicinal plants, fields guide books of plants and other documents were used to identify and classify the plants.

Data were collected from 20 traditional healers (TH). The objectives of the study were explained to the TH, and their verbal consent was obtained before the actual data collection process. Most of the TH accompanied to the forest for data gathering, while others who were >80 y old were interviewed at their residences and surrounding home areas. For the medicinal plants collected from forests, the elderly also provided the Kuria names. The next step was to identify the plants, explain their functions, their names, the diseases they were used to treat, plant parts used, methods of preparation and modes of administration.

Data Analysis

Microsoft Excel ver. 2016, Statistical Package for Social Sciences (SPSS) ver. 23 and QED Statistics software were used to organize and analyze the collected data. The *t*-test was used to check for differences in plants knowledge within gender group. One-way analysis of variance (ANOVA) followed by multiple comparisons using Bonferroni post-hoc test ($P \leq 5\%$) was used to check differences in plants medicinal knowledge in the studied demographic groups (age, education level, residence, and experience).

Results

Demographic Information

A total of 20 TH from four villages were interviewed, of which 65% were female 35% were male. Out of these, Rosana (35%), and Nyamwigura (25%) were from Tarime, while Bhonchugu (20%) and Kebhosongo (20%) were from Serengeti (Table 1). TH ranged from 30 to 85 y old: four traditional healers were between 30 and 45 y of age, 8 were between 46 and 65 y, and 8 were above 65 y. The dominant age of consultants was between 46 to 65 and 65 and above, each group represented by 40%. A majority of consultants had 5–10 y (35%) of experience in medicinal plants while 30% had >15 y experience (Table 1).

Medicinal Plants Knowledge

Results showed that knowledge of medicinal plants among youth (30–45 y) THs and medium age (46–65 y) were different, while there was no difference between medium age group (46–65y) and elders (>65 y). There was slight difference on the knowledge of medicinal plants between Rosana and Nyamwigura villages and no difference between Bhonchungu and Kebhosongo. The average number of cited species within gender, age groups, educational level, and residence were similar. Most of the THs learnt their medicinal plants knowledge from their elders (63%) who were closely related members of the family. Others got their knowledge from friends (34%) and (3%) reported to have gained knowledge from neighbors.

Kuria healers from Tarime and Serengeti districts reported a total of 100 Kuria medicinal plants, belonging to 34 families. Asteraceae was the most dominant (15%), followed by Fabaceae (13%) and Lamiaceae (12%). Seven families were represented by two species (2%) each, while others were

Table 1. Demographics of the traditional healers (THs) and number of species cited.

Factor	Category	No. THs	% of THs	No. of species
Gender	Male	7	35	6 ± 2.3
	Female	13	65	6.85 ± 1.9
Villages	Rosana	7	35	7.7 ± 0.8
	Nyamwigura	5	25	6.6 ± 1.1
	Bhonchungu	4	20	5.3 ± 1.0
	Kebhosongo	4	20	6.5 ± 1.3
Age group (Y)	30 – 45	4	20	3.8 ± 1.0[a]
	46 – 65	8	40	6.1 ± 1.0[a]
	>65	8	40	6.8 ± 0.9
Education level	Illiterate	7	35	7 ± 0.8
	Primary	13	65	6.4 ± 1.0
Experiences (Y)	<5	2	10	2.5 ± 0.7
	5–10	7	35	3.6 ± 0.9[ab]
	11–15	5	25	5 ± 0.7
	>15	6	30	7.2 ± 1.6[bc]

Values for number of species cited followed by similar superscripts along the column are not different (Bonferroni *post hoc* test, $P \leq 5\%$).

represented by one species (1%) each (Table 2). The 100 species identified were used to cure 51 different human diseases and 2 animal diseases (cattle and chicken).

Among the reported medicinal plants in this study, erect herbs were the dominant group (41%), followed by shrubs (27%), trees (24%), grass and climbers (4% each), and fern (1%). Vines were not used for medicinal purposes despite being widely available in the study area.

Some diseases were associated with more medicinal plants than others, led by abdominal pain with 21 plant species (12.1%), urinary tract infections with 19 plant species (10.9%), malaria with 9 plant species (5.2%), and yellow fever and lack of vitamins with 8 plant species each (4.6%). Others include cough and convulsion with seven plant species each (4%) and dental pain with five plant species (2.8%) (Table 2), while the remaining diseases were associated with <4 plant species.

Findings showed that some plants were used in the treatment of only one type of disease, while others had multiple medical uses to treat more than one type of disease. This also applied to the parts of the plants whereby one medicinal plant can provide leaves to cure one disease and roots to cure another disease.

Leaves were the most used plant part (61.7%), followed by roots (16.5%), fruits (7.8%), barks (7.8%), seeds (3.5%), and silk corn (0.9%). Stem and whole plant were rarely used.

Boiling outweighed other methods (47%), followed by pounding (13%), pounding, and soaking in water and chewing (11% each), pounding, drying, and grinding (6%), pounding and boiling (4%) and burning and boiling in soup (3% each). Other methods included drying, mixing with water and filtering (2%), and soaking (1%).

Methods of administration included, oral (54%), nose, eye, sore, and others (Table 2). The medicines were also mixed with other medicinal and non-medicinal plants, but most medicinal plants did not require mixing (66%).

Discussion

Women in this survey were more involved in healing[14] than men. During discussions, women also provided more information on medicinal plants than men. A similar pattern was observed in the Udzungwa Mountain Forests of Tanzania,[15] while others reported otherwise elsewhere in Tanzania,[11] Ethiopia,[5,16] and Uganda.[17]

In this study, Asteraceae (15%) was the dominant family, consistent with other reports from Western Uganda,[18] Southwestern Ethiopia,[19] other parts of Tanzania,[20] Indonesia,[21] and Iraq.[22] Other studies in Tanzania[11] and Uganda[23] identified Fabaceae as the largest medicinal plant family, which was the second most dominant family amongst Kuria people of the Mara region

Table 2. Medicinal plants used by the Kuria communities in the Tarime and Serengeti Districts of Mara Region, Tanzania.

Collection No.	Scientific names[1]	Kuria plant name[2]	Family	Status in Tanzania	Habit/Life form	Diseases treated	Plant part used	Mode of preparation	Mode of administration
MC002	*Abelmoschus esculentus* (L.) Moench	ebhámía/ ichibhámía	Malvaceae	Exotic	Herb	Joints pain, gastric or peptic ulcers, blood vessel lubricant, cholesterol and acid – filter, asthma	Fruits and seeds	Chewing, boil in water decoction	Chewing/oral
MC083	*Abrus precatorius* L.	umri ghwi irighena imiri ghwi irighena	Fabaceae	Exotic	Climber	UTI	Leaves, stem and roots	Boil in water	Oral
MC023	*Acacia sp.*	ighisúrúrá/ ibhisúrúrá	Fabaceae	Native	Tree	Large/big fontanel (baby's soft spots on top of their heads)	Leaves	Chewing the leaves and later put on the fontanel of the baby	Head – put
MC088	*Adansonia digitata* L.	umuhúrú/ imihúrú	Malvaceae	Native	Tree	Coughing/chest/throat itching,	Leaves	Pound, soak in the water	Oral
MC099	*Adenophyllum* sp.	wáíróre	Asteraceae	Exotic	Herb	Sharp abdominal pain	Leaves	Mix with *elsholtzia ciliate* leaves then boil in water	Oral
MC078	*Aganonerion polymorphum L.*	orokóre lwa abhaghháká/ ichikóre cha abhaghháká	Apocynaceae	Exotic	Herb	Dental pain/tooth ache	Leaves	Pound	Teeth put
MC100	*Ageratum conyzoides* L.	waisébhó	Asteraceae	Exotic	Herb	Stomach abscess	Leaves	Boil in water	Oral
MC033	*Ajuga* reptans L.	inswámbésé/ ichinswámbésé	Lamiaceae	Exotic	Herb	Breast abscess, sharp pain, part of breast which is swell, spleen	Leaves and branches	Heat the leaves and use them to knead the swelling part	Knead skin rubbing on skin.
MC024	*Allium cepa* L.	ighitúngúrí/ ibhitúngúrí	Amaryllidaceae	Exotic	Grass	Tuberculosis, yellow fever, addition of vitamin and minerals	Fruits	Chop, brand with water to make a juice, used in cooking	Oral eating
MC067	*Alnus rhombifolia* Nutt	omokénde/ emekénde	Betulaceae	Exotic	Shrub	UTI	Leaves	Boil in water	Oral

(*Continued*)

Table 2. (Continued).

Collection No.	Scientific names[1]	Kuria plant name[2]	Family	Status in Tanzania	Habit/Life form	Diseases treated	Plant part used	Mode of preparation	Mode of administration
MC015	*Aloe barbadensis* Miller	ekhegháká/ ibhighháká	Asphodelaceae	Native	Herb	Malaria	Leaves/ branches	Slice, boil in water	Oral
MC086	*Amaranthus cruentus* L,	umuchíchá/ imichíchá	Amaranthaceae	Exotic	Herb	Vitamin c	Leaves	Boil in water or raw eaten	Soup/eating
MC014	*Amaranthus spinosus* L.	ekhebhógha/ ibhibhógha	Amaranthaceae	Exotic	Herb	Addition of vitamin a, b1, b2, b3 and vitamin c	Leaves	Eaten raw, boil in water	Oral
MC050	*Andrographis paniculata* (Burm. F) Wall ex Nees,	irirándórá/ amarándórá	Acanthaceae	Exotic	Herb	Headache	Leaves	Pound, soak in water three hours then filter by piece of clothe	Nose – drops
MC062	*Asystasia gangetica* (L.) T. Anderson,	mokéráoghetángó	Acanthaceae	Exotic	Herb	UTI, sore	Leaves	Boil in water pound	Oral – drinking squeeze on top of the burn sores
MC021	*Basella alba* L.	ɛkheréréma/ ibhiréréma	Basellaceae	Exotic	Herb	Diabetes	Leaves	Boil in water	Oral
MC060	*Bidenspilosa* L.	iritótónimaísó/ amatótónimaísó	Asteraceae	Exotic	Herb	UTI, vitamin E, acid, ascorbic, calcium, iron and protein, antioxidant and antigastro-intestinal bacterial coumarins	Leaves, fruits	Boil in water, burn/dry and grinded (powder)	Oral
MC039	*Bryophyllum pinnatum* (Lam.) Pers.	irichánchámánche/ amachánchámánche	Grassulaceae	Exotic	Herb	Convulsions	Roots	Pound, add cold water	Nose – drops
MC017	*Cajanus cajan* (L.) Huth	embáázi/ ichimbáázi	Fabaceae	Native	Shrub	Coughing/chest/throat	Leaves	Chew and gulp the liquid from leaves	Chewing
MC029	*Capsicum annum* L.	ikinyábharrre/ ibhinyábharre	Solanaceae	Exotic	Herb	Flu	Fruits	Mix with ginger, lemon and add hot water. for the chicken mix with ashes and boil in water	Oral (add honey)

(*Continued*)

Table 2. (Continued).

Collection No.	Scientific names[1]	Kuria plant name[2]	Family	Status in Tanzania	Habit/Life form	Diseases treated	Plant part used	Mode of preparation	Mode of administration
MC035	*Carica papaya* L.	iribhábháyó isáchá amabhabhayó amasáchá	Caricaceae	Exotic	Tree	Hernia	Root	Pound, add cold water or boil in water without pound	Oral
MC036	*Carica papaya* L.	iribhabhayó/ amabhabhayó	Caricaceae	Exotic	Tree	Coughing/chest/throat, abdominal pain/ stomach pain, ringworm, mycosis,	Leaves and seeds	Burn leaves and licks, pound seeds and smears	Tongue – licks skin – smears
MC069	*Carpinus betulus* L.,	omokómá/ emekómá	Betulaceae	Exotic	Tree	Kid abdominal pain	Leaves	Boil in water	Oral
MC040	*Celosia trigyna* L.	irichíríá/amachíríá	Amaranthaceae	Native	Herb	Kid abdominal pain	Leaves	Boil in water	Oral
MC098	*Cenchrus purpureus* (Schumach.) Morrone.	urusíághá urúkúríá/ ichinsíághá ichinkúríá	Poaceae	Native	Grass	Measles	Leaves	Pound and put in lukewarm water *(maji vuguvugu)*	Skin – wash a sick kid
MC046	*Chamissoa altissima* (Jacq.) Kunth.	irihókó/ amahókó	Amaranthaceae	Exotic	Herb	Swell (part of the body become larger due to some reasons), pain of any part of the body	Leaves	Heat the leaves and use them to knead the swelling part	Skin – the part of the body which is paining.
MC044	*Chromolaena odorata* (L.) R. King &H.Rob,	irihémbúhémbú/ amahémbúhémbú	Asteraceae	Exotic	Herb	Abdominal pain, UTI	Leaves	Boil in water	Oral
MC048	*Chrysanthellum indicum* DC	irinyányámá/ amanyányámá	Asteraceae	Exotic	Herb	Purge the stomach/to empty the stomach	Leaves and branches	Boil in the water	Oral juice
MC090	*Citrus limon* (L.) Burm	umulímu/ imilímu	Rutaceae	Exotic	Tree	Coughing, flu, malaria, dandruff	Leaves and fruits lemon peel	Mix with ginger, garlic and add hot water then mix with honey, boil in water boil the lemon peel in water	Oral hair shampoo
MC091	*Citrus x aurantifolia* (Christm) Swingle.	umulímu/ imilímu	Rutaceae	Exotic	Tree	Malaria	Leaves	Boil in water	Oral
MC066	Cit*rus x sinensis* (L.) Osbeck.	omochónga/ emechónga	Rutaceae	Exotic	Tree	Malaria	Leaves	Boil in water	Oral

(*Continued*)

Table 2. (Continued).

Collection No.	Scientific names[1]	Kuria plant name[2]	Family	Status in Tanzania	Habit/Life form	Diseases treated	Plant part used	Mode of preparation	Mode of administration
MC097	Cleome gynandra L.	urusáágha ichinsáágha	Cleomaceae	Native	Herb	Pneumonia, ear problem, pain during menstruation period, it adds nutrients which fight against, diabetes, heart attacks, cancer, headache	Leaves	Boil in water	Oral – soup
MC010	*Coccoloba pubescens* L.	eghetémbé/ ibhitémbé/ omotémbé/ emetémbé	Polygonaceae	Exotic	Shrub	Yellow fever	Bark of the tree	Boil in water	Oral
MC030	*Conyza bonariensis* (L.) Cronq	ikinyáitóróra/ ibhinyáitóróra; irinyáitóróra/ amanyáitóróra	Asteraceae	Exotic	Herb	Yellow fever, mycosis, urinary tract infections (UTI)	Leaves	Boil in water	Oral
MC011	Crassocephalum crepidiodes (Benth.) S. Moore,	eghetóóma/ ibhitóóma	Asteraceae	Native	Herb	Burning sores	Leaves	Pound and squeeze on top of the burn sores	Skin sore
MC005	*Crotalaria retusa* L.	eghesámu/ ibhisámu	Fabaceae	Native	Shrub	Toothache, plastic teeth to the babies	Roots	Rub roots to the plastic teeth of a baby	Teeth rubbing
MC056	*Cucurbita maxima* Duchesne	iriséb hó/ amaséb hó	Cucurbitaceae	Exotic	Climber	Diarrhea, a weakened child, vitamins, diabetes	Leaves, root, fruits	Leaves-pound, soak in water, and cooking roots-boil in water fruits – boil in water	Oral eating
MC026	*Cyanthillium cinereum* (L.) H. Rob.	ikibhuríá/ ibhibhuríá	Asteraceae	Native	Herb	Abdominal pain/stomach pain	Root	Chew and gulp the liquid from bark of the root; boil in water	Oral chewing
MC085	*Cymbopogon citratus* (DC) Stapf.,	umucháichái/ micháichái	Poaceae	Exotic	Grass	Yellow fever	Leaves	Boil in water	Oral

(*Continued*)

Table 2. (Continued).

Collection No.	Scientific names[1]	Kuria plant name[2]	Family	Status in Tanzania	Habit/Life form	Diseases treated	Plant part used	Mode of preparation	Mode of administration
MC071	*Dalbergia latifolia* Roxb,	omóóbhó/ emióbhó	Fabaceae	Exotic	Tree	Sore	Piece of stick/ branch	Ties near to the sore	Skin – ting
MC031	*Dovyalis caffra* (Hook. f. & Harv.) Warb.	ikinyámáhwá/ ibhinyámáhwá	Flacourtiaceae	Native	Shrub	Sharp abdominal pain	Leaves	Chewing – and gulp the liquid from the leaves	Chewing
MC042	*Dracaena trifasciata* (Hort ex Prain) Mabb,	irighongwi íkúría/ amaghongwi íkúría	Asparagaceae	Native	Herb	Sore	Piece of stick of snake plant	Tie a stick of peppermint near to the sore by using dracaena	Skin – sore
MC081	Elsholtzia ciliata (Thunb.) Hyl.	ubhunsúránchá/ ihinsúránchá	Lamiaceae	Exotic	Herb	Abdominal pain	Leaves and branches	Boil in water	Oral
MC074	*Eucalyptus globulus* Labill.	omote ghóbhóraya/ emete ghebhóraya	Myrtaceae	Exotic	Tree	Yellow fever, flu, malaria	Leaves roots	Boil in water rub leaves on the hands put to the nose	Oral sniffing
MC019	*Euphorbia heterophylla* L.	esárárá – echisárárá	Euphorbiaceae	Exotic	Herb	Baby cleaning	Leaves	Skin cleaning	Skin-cleaning
MC016	*Ficus lyrata* (Warb.)	ekheghánáná/ ibhighánáná	Moraceae	Native	Tree	Convulsions	Bark of the tree	Pound, dry, grind, water and then filter with a piece of clothe	Nose – drops, oral
MC080	*Flemingia macrophylla* (Willd.) Merr.	oroténgéti ichiténgéti	Fabaceae	Exotic	Shrub	Dizziness	Leaves	Boil in water	Oral
MC001	*Galium murale* (L.) All.	–	Rubiaceae	Exotic	Climber	Abdominal pain – kids	Leaves and stem	Boil in water	Oral
MC072	*Grewia optiva J. R. Drumm. ex Burret*	omootíá ighuhá/ emeotíá ighuhá/	Malvaceae	Exotic	Tree	Stomach/abdominal abscess	Roots	Mix with the root of – *magnolia stellata and pterocarpus santalinus* (ikimusi and umnyole) then boil in water	Oral
MC004	*Gymnema inodorum* (Lour.) Decne.	eghekómóóri/ ibhikómóóri	Apocynaceae	Exotic	Shrub	Dysmenorrhea (menstrual cramps)	Leaves	Boil in water	Oral

(*Continued*)

Table 2. (Continued).

Collection No.	Scientific names[1]	Kuria plant name[2]	Family	Status in Tanzania	Habit/Life form	Diseases treated	Plant part used	Mode of preparation	Mode of administration
MC008	*Helianthus giganteus* L.	eghetabhárári/ ibhitabhárári	Asteraceae	Exotic	Herb	Yellow fever	Leaves	Boil in water	Oral
MC063	*Hibiscus acetosella* Welw ex Hiern.	mualovera/ mialovera	Malvaceae	Exotic	Shrub	Dizziness	Leaves	Boil in water	Juice
MC006	*Indigofera suffruticosa* Mill.	eghesángúchi/ ibhisángúchi	Fabaceae	Exotic	Shrub	Abdominal pain, UTI, malaria yellow fever	Roots	Chewing and gulp the liquid from the roots pound and soak in water for 3 hours	Chewing oral
MC096	*Jatropha curcas* L.	umwíta nkóbha/ imíita nkóbha	Euphorbiaceae,	Exotic	Shrub	Sore/injury circumcised youth, tongue ulcers (ubhonana – rushes or wound on tongue	Liquid from the branch of the tree	Cut a piece of the branch	Skin – sore put a liquid on the sore
MC094	*Juglans regia* L.	umurííbha/ imirííbha	Juglandaceae	Exotic	Tree	UTI, child weakened	Bark of the tree, branches and leaves seeds	Boil in water pound seeds, mix with water	Oral
MC003	*Kalanchoe pinnata* (Lam.) Pers. Green	eghekénékéné/ ibhikénékéné	Grassulaceae	Exotic	Herb	Convulsions, UTI	Roots	Pound, add cold water	Nose – drops
MC076	*Lantana camara* L.	orohémba lobharísía/ ichihémba chabharísía	Verbenaceae	Exotic	Shrub	Convulsions	Roots	Pound, add cold water	Nose – drops (with some conditions) two times in a month.
MC061	*Leonotis nepetifolia* (L.) R. Br.	iritúmbághéra/ amatúmbághéra	Lamiaceae	Native	Herb	Ringworm	Leaves	Pound then rub the leaves	Skin – rubbing
MC047	*Leonurus cardiaca* Mint	irinyabhoghághá/ amanyabhoghághá	Lamiaceae	Exotic	Herb	Abscess	Leaves	Pound and soak in water	Oral
MC034	*Leucas urticifolia* (Vahl) Sm.	inyímíría/ ichinyímíría	Lamiaceae	Exotic	Herb	UTI	Leaves	Boil in the water	Oral

(*Continued*)

Table 2. (Continued).

Collection No.	Scientific names[1]	Kuria plant name[2]	Family	Status in Tanzania	Habit/Life form	Diseases treated	Plant part used	Mode of preparation	Mode of administration
MC028	*Magnolia stellata* (Siebold & Zucc.) Maxim.,	ikimúsi/ ibhimúsi	Magnoliaceae	Exotic	Tree	Abdominal abscess	Roots	Mix with the root of othermedicinal plants then boil in water	Oral
MC095	*Mangifera indica* L.	umuyémbe/ imiyémbe	Anacardiaceae	Exotic	Tree	Malaria, abdominal pain	Leaves and bark of the tree	Boil in water	Oral
MC053	*Manihot esculenta* Crantz,	irirébhwá/ amarébhwá eghesámbó	Euphorbiaceae	Native	Shrub	Anemic cases, vitamin and protein, reduces of cholesterol, snake's poison	Leaves, Poots/fruits	Boil in water Cound-put (part of the body which is bitten Ty snake)	Oral eating skin – knead/ press
MC032	*Marsilea minuta* L.	ikinyonyo/ ibhinyonyo	Marsileaceae	Native	Fern	Coughing/chest/throat	Leaves	Chew and gulp the liquid from the leaves	Chewing
MC092	*Mentha x piperita* L.	umunyénté/ iminyénté	Lamiaceae	Exotic	Herb	Sore	Piece of stick of *mentha piperita*	Tie near to the sore	Rubbing
MC073	*Montanoa hibiscifolia* (Benth), Standl.	omosighóngóghe/ imisighengoghe	Asteraceae	Exotic	Shrub	Yellow fever	Leaves	Boil in water	Oral
MC070	*Moringa oleifera* Lam.	omolongélóngé/ emelongélóngé	Moringaceae	Exotic	Tree	Gastric or peptic ulcers to stimulate milk for breastfeeding	Leaves seeds	Boil in water chewing seeds, pound, dry and grind – to be taken in the tea/milk	Oral tea, milk, porridge chewing
MC068	*Morus alba* L.	omokénéné/ emekénéné	Moraceae	Exotic	Tree	Addition of vitamins k, a and c	Fruits	Eaten/or juice making	Oral (juice)

(*Continued*)

Table 2. (Continued).

Collection No.	Scientific names[1]	Kuria plant name[2]	Family	Status in Tanzania	Habit/Life form	Diseases treated	Plant part used	Mode of preparation	Mode of administration
MC059	*Musa X paradisiaca* (L.) Pro. sp.	iritóke/ amatóke	Musaceae	Exotic	Tree	Headache, pimples, reduce cholesterols swelling part of the body, the part of the body – beaten/pain part	Banana peels bark	Rub the banana peels to the pimples, at forehead and at the back to the neck make a juice by using banana peels pound, dry, grind	Rubbing on skin skin – rubbing incision of the swelling part then you rub the powder on it
MC027	*Ocimum gratissimum* L.	ikiíri/ ibhiíri	Lamiaceae	Native	Shrub	Abdominal pain/stomach pain, UTI, kid abdominal pain	Leaves	Chew and gulp the liquid from the leaves – boil in water for kids	Chewing oral
MC007	*Oxygonum sinuatum* (Hochst. & Steud. ex Meisn) Dammer	eghesókóró/ ibhisókóró	Polygonaceae	Native	Herb	Abscess	Leaves	Heating the leaves and put to abscess	Skin – abscess
MC064	*Persea americana* Mill.	omobharachichi/ emebharachichi	Lauraceae	Exotic	Tree	Kidney stones, sharp abdominal pain, convulsions, gastric or peptic ulcers, backbone pain, male libido	Leaves, fruits, avocado peels,	Boil in water eating fruit dry, grind mix with honey in milk	Oral
MC043	*Phaseolus vulgaris* L.	irihárákwa/ amahárákwá	Fabaceae	Exotic	Herb	Anemic cases, vitamin and protein, reduces of cholesterol, snake's poison	Leaves, seeds	Boil in water	Oral eating
MC054	*Plectranthus amboinicus* (Lour) Spreng.	iririlebhána/ amaríghabhána	Lamiaceae	Native	Shrub	UTI,	Leaves	Boil in water	Oral
MC055	Plectranthus parviflorus Willd.	iririlebhána irikuria/ amaríghabhána amakuria	Lamiaceae	Native	Shrub	UTI,	Leaves	Boil in water	Oral

(*Continued*)

Table 2. (Continued).

Collection No.	Scientific names[1]	Kuria plant name[2]	Family	Status in Tanzania	Habit/Life form	Diseases treated	Plant part used	Mode of preparation	Mode of administration
MC065	*Psidium guajava* L.	omobhera/ emebhera	Myrtaceae	Exotic	Tree	Malaria	Leaves	Boil in water	Oral
MC093	*Pterocarpus Santalinus* – L.f.	umunyóré/ iminyóré umokárákárá/ emekárárá	Fabaceae	Native	Tree	Stomach abscess, purge a stomach sharp abdominal pain/ stomach pain	Roots	Boil in water	Oral
MC087	*Pterocarpus santalinus* L.f	umughútú/ imighútú	Fabaceae	Native	Tree	High blood pressure	Bark of the tree	Boil in water	Oral
MC051	*Ricinus communis L.*	iriransanyi amaransanyi	Euphorbiaceae	Exotic	Shrub	UTI	Root	Boil in water	Oral
MC079	*Rosmarinus officinalis* L.,	orosabhai emesabhai	Lamiaceae	Exotic	Shrub	High blood pressure	Leaves	Boil in tea/can be cooked in the food	Oral eaten
MC025	*Scutellaria lateriflora* L.	ikibhungábhare/ ibhibhungábhare	Lamiaceae	Exotic	Herb	Eye, nose bleeding	Leaves	Pound, add cold water	Eye – drops nose – drops
MC058	*Senecio mannii* (Hook.f.) C. Jeffrey	iritághárá/ amatághárá	Asteraceae	Exotic	Shrub	Remove poison, UTI, malaria, treatment for cow	Leaves	Boil in water chop leaves-cow	Oral chewing
MC018	*Senecio* sp.	ensóndasónda/ ichinsóndasónda	*Asteraceae*	Exotic	Herb	Skin tag	Fruit, flower and seeds	Rub	Skin – rubbing
MC037	*Senna alata* Linn.	iribhénó/ amabhénó	Fabaceae	Native	Shrub	Coughing/chest/throat itching,	Leaves	Burn leaves, grind and licks,	Tongue – licks
MC084	*Senna occidentalis* (L.) Link	umubhíbhí/ imibhíbhí	Fabaceae	Exotic	Shrub	Abdominal pain, UTI	Roots	Boil in water	Oral
MC009	*Solanum incanum* L,	eghetárátórá/ ibhitárátórá iritárátórá/ amatárátórá	Solanaceae	Native	Shrub	Abdominal pain, UTI, malaria, yellow fever dental pain	Bark and roots fruits	Chewing – and gulp the liquid from the bark and roots cut the fruits mix with lemon boil in water	Chewing rinse mouth
MC038	*Solanum myriacanthum* Dun.	iribhótó/ amabhótó	Solanaceae	Exotic	Shrub	Kid pancreas infection	Fruits	Pound, dry and grind	Incision of skin then then you rub the powder on it

(*Continued*)

Table 2. (Continued).

Collection No.	Scientific names[1]	Kuria plant name[2]	Family	Status in Tanzania	Habit/Life form	Diseases treated	Plant part used	Mode of preparation	Mode of administration
MC022	*Spilanthes mauritiana* (Rich. ex Pers.) DC,	ighichánygárárimáte/ ibhichángárárimáte eghesárághánimáte/ ibhiseregánimáte	Asteraceae	Exoti	Herb	Chest pain/coughing/ throat itching, dental pain/toothache	Leaves	Pound and mix with milk/tea; chew and gulp the liquid from leaves	Oral chewing
MC013	*Stenochlaena palustris* (Burm. f.) Bedd.	ekhebhámbáríhi/ ibhibhámbáríhi	Bleachnaceae	Exotic	Herb	Convulsions	Bark of the tree	Pond, add cold water	Nose – drops, oral
MC082	*Sterculia quadrifida*, R. Br.	umorámá/ emerámá	Malvaceae	Exotic	Tree	Sharp abdominal pain	Leaves	Chewing – and gulp the liquid from the leaves	Chewing
MC075	*Syzygium cumini* (L.) Skeels	omozámbáráu/ emezámbáráu	Myrtaceae	Exotic	Tree	Diabetes	Bark of the tree	Boil in water	Oral
MC049	*Tetradenia riparia* (Hochst.) Codd.	ririrákwá/ amarákwá	Lamiaceae	Native	Shrub	UTI, dental pain	Leaves	Boil in water	Oral
MC012	*Thunbergia alata* Bojer ex Sims	ekerang'énta kebhágháká/ ebhirang'énta bhyabhágháká	Acanthaceae	Native	Herb	Abscess	Leaves	Pound and put to abscess	Skin – abscess
MC041	*Tithonia diversifolia* (Hemsl.) A. Gray,	irichonkíná/ amachónkíná inchókíná)/ ichinchókíná)/	Asteraceae	Exotic	Herb	UTI, eye problems	Leaves	Boil in water	Oral
MC057	*Trichanthera gigantea* (Bonpl.) Nees	irising'óró/ amasing'óró	Acanthaceae	Exotic	Shrub	Abdominal pain/stomach pain	Leaves	Boil in water	Oral
MC052	*Vernonia gigantea* (Walter) Trel.	ririrárárwé/ amarárárwé	Asteraceae	Exotic	Shrub	Dental pain, UTI, sharp abdomen pain	Leaves, roots	Pond, grind – teeth root – boil in water	Teeth – put oral
MC089	*Withania somnifera* (L) Dunal.	umukúbhya nyongo/ ichinkúbhya nyongo	Solanaceae	Exotic	Herb	Convulsions	Leaves and roots	Pound, soak in the water	Nose -drops
MC045	*Zea mays* L,	irihíndi/ amahíndi	Poaceae	Exotic	Grass/ Graminoid	Kidney disease, cleaning the bladder, urinary system problems	Fruit (corn silk)	Boil in water few minutes 10 to 15 soak in water for 2 hours	Oral
MC020	*Zehneria maysorensis* Arm,	ewáwá/ ichiwáwá	Cucurbitaceae	Exotic	Climber	Dislocation of a body part	Leaves	Boil in water	Knead, press
MC077	*Zornia latifolia* Sm	orohóórró/ ichihóórró	Fabaceae	Exotic	Shrub	Constipation in children.	Leaves	Mix with senna alata leaves then boil in water	Oral

(13%). Most of the Fabaceae members are trees available throughout the year and the locals were quite informed of that. The Lamiaceae was the third most dominant (12%) in this study. The family's usefulness as a source of medicinal plants has been reported in many parts of the world.[24] The members of the Lamiaceae contain phytochemicals, which are used for the production of insecticides, repellents, antifungals, antibacterials, antioxidants, antimalarials, and medicines for treating gastrointestinal disorders, cancers, and snakebites.[17,25–27]

The predominance of herbs (41%), shrubs (27%), and trees (24%) in the treatment of diseases among the Kuria can be attributed to the abundance of rainfall in the area, since Mara receives both long and short rain periods. This way herbs, shrubs, and trees are available throughout the year.[11] The higher abundance of herbs in the area makes them easily accessible, and their effectiveness could be the reason for their predominance, among medicinal plants. These findings were in line with those of other studies in Tanzania,[20] Ethiopia,[6,28,29] and Nepal [30] which found herbs the highest category of plants mostly used as medicinal plants followed by shrubs. Other determining factors in the usage of herbs and trees could be attributed to local residents' knowledge and familiarity with these types of plants compared to others.

Leaves were the most used part as also reported elsewhere in Tanzania,[20] Ethiopia,[6,28,31,32] and Indonesia.[21] The main reason for many healers to use plant leaves rather than other plant parts for remedial purposes is their easy accessibility, easy processing, and abundance of organic elements, which have medicinal effects as well as antioxidants. Leaves also preserve plants from extinction more than roots since the removal of the former does not affect the plants' life.[32] Boiling (47%) was highly preferred over other types of preparation by Kuria medicinal plants healers. This may be because boiling dissolves the active molecules easily and helps to detoxify poisonous compounds and sterilize used materials.[15,33]

The study showed that some of the[34] disease could be treated with a variety of medicinal plants and some medicinal plants had multiple functions and they were used to treat or manage more than one disease. The ability of plants to have multiple functions depends on their phytochemical and pharmacological characteristics. *Syzygium cumini* has the ability to treat diarrhea, dysentery, piles indigestion, and diabetes and its seed extract exhibited bactericidal, anti-cholera activity against multi-drug resistance strains of Cholerae.[9] *Allium cepa* has antidiabetic, antioxidant, anticancer, and antimicrobial effect and facilitates better functioning of cardiovascular system.[9] *Solanum incanum* has[35] antibacterial, antioxidant, and cytoprotective properties[36] and *Cleome gynandra* possesses immunomodulatory,[37] antidiabetic, anticancer, and free radical scavenging qualities.[38] *Abrus precatorius* is used for treatment of UTI while in the study by others[39] this was used for worms, asthma, inflammation, bronchitis, antitumor, and antimicrobial. *Euphorbia*

heterophylla was used in cleaning baby after[40] birth and skin cleaning for adults although in Bunda district, it is used for antidote for irritation and treatment of typhoid fever.[41]

Ethics Approval and Consent to Participate

Verbal consents were collected from the traditional healers in the Mara Region in Tanzania that they agreed to give information about the Kuria Medicinal Plants for publication.

Availability of Data and Materials

All data collected and analyzed for this study were included in this article. All have been shown in Table 2. They are arranged in alphabetical order of their scientific names started with Voucher number. The collected data specimen are deposited in Dar es Salaam University College of Education in the Department of Biology.

Notes

1. The Latin and English names were confirmed using the databases available on www.itis.gov,[42] and www.ipni.org,[11] Flora of Tropical East Africa[18] and Small Wetlands of East Africa: A Field Guide to the Representative Flora.[22]
2. Kuria is a tonal language, which means that the tone pattern of a word can be the only phonological feature distinguishing it from other words. Kuria has two basic tones, i.e. high and low. Only high tones are noted with an acute accent mark on the vowel, e.g. á. Unmarked vowels are low-toned. Kuria plant names are inventoried in both their singular and plural forms, which are separated by a slash. Plant names with only one form are non-count nouns. Some of medicinal plants have two names, others have more than one noun class. All these possibilities have been shown in the column of Kuria plant names.

Acknowledgements

This study was made successful through the aid of a significant number of colleagues from Dar es Salaam University College of Education. We would like to thank almighty God for guidance and strength for all the way of doing this study. Special thanks go to Global Minds Fund of Ghent University for their financing a short research stay at Ghent University (May–July 2022) which allowed us to write this manuscript. We would like to thank all 20 traditional healers, namely, Aghata Ikorongo, Maria Vincent, Justina Ngarare, Selina Mwita, Julitha Ntaiga, Robhi Chacha, Mariamu Kyangwi, and Otaigo Mwita elderly female aged above 65 years; Wegesa Nyanda, Asunta Marwa, Ghati Anthony, Bhoke Marwa, and Bernadetha Mwita females aged 30–65 years; Albinus Mwita, Machera Canisusi, Lucas Chacha, Maluga Werema, Lukas Sabayo, Marwa Mwita, and Ryioba Marwa Males aged 30–65 years for their valuable time to give information on the Kuria medicinal plants and provisional of local Kuria names. We are also very grateful to Miss Mary Steven Matiko and Mr Julius Simangwi Chacha for their assistance

during the fieldwork. Lastly, our sincere thanks go to the family group of the first author who accommodated the researchers and were always ready to assist us in getting the local healers, coordinated the local visits, and provided information about the study area.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

The Global Minds Fund of Ghent University funded a short research stay at Ghent University (May–July 2022) which allowed us to write this manuscript.

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