



INDIGENOUS KNOWLEDGE AND SUSTAINABLE DEVELOPMENT



Editors:
Tom Kwanya, Peter Matu

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The Technical University of Kenya • Nairobi, Kenya

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1. Application of traditional medicine to mitigate diseases and ailments in Elgeyo Marakwet County, Kenya

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Abstract

There is an upsurge in the demand for herbal and traditional remedies for various ailments amongst communities in Kenya and internationally. The upsurge has been necessitated by the high cost of conventional modern medicine, inadequacies in public health service delivery and the ineffectiveness of conventional medicines. This study aimed to investigate the application of traditional medicine to manage diseases and ailments among the natives of Elgeyo Marakwet County in Kenya. The study's specific objectives were to identify and document traditional herbs which grow in the Kerio Valley, explore indigenous knowledge used by the natives to administer the traditional herbs in palliative care and treatment of diseases and ailments and propose a framework for the preservation of indigenous knowledge for future generations. The study employed correlation analysis through a literature review to collect data on traditional medicine. The application of indigenous knowledge in administering the traditional medicine in Kerio Valley and other parts of the country. The study has documented traditional herbs of medicinal value in Kerio, Elgeyo Marakwet County, and consolidated the application of indigenous knowledge about their existence, use and awareness of their availability. The originality of this paper is reflected in the context, methodology and the subject under study for practical application by medical and herbal professionals and locals.

Keywords: *Indigenous knowledge, herbal medicine, traditional medicine, Kerio Valley, Elgeyo, Kenya*

1 Introduction

Traditional medicine is defined as “the sum total of the knowledge, skill and practices based on the theories, beliefs and experiences indigenous to different cultures, explainable or not, in health maintenance, diagnosis, prevention or treatment of physical and mental illness” (World Health Assembly, 2003, p. 15). There is a continuing demand for traditional medicine worldwide for millions living in rural areas. The ratio of traditional healers to the population in Africa is 1:500, whereas the ratio of medical doctors is 1: 40,000 (World Health Assembly, 2003). The government of Kenya has several laws and policies in recognition of traditional medicine, including the Traditional Medicine and Medicinal Plants Bill of 2010; thus, it created the Traditional Medicine Management Council (TMMC), which oversees traditional medicine practices. Traditional medicine is still prevalent in rural areas while modern medicine is being developed. In the face of the changing times coupled with the high cost of living, traditional medicine has regained recognition as a mainstream treatment, similar to regulated modern medicine. Medicinal plants are mainly used for palliative care and treatment of illnesses and

diseases that affect communities, such as respiratory illnesses and diseases that thrive in highland areas, as well as reproductive health and abdominal pains, which affect all regions (Kurui, 2016).

In the 21st century, traditional medicine is acknowledged as a significant source of primary healthcare for most communities in rural areas due to the common belief that traditional medicine presents less harm to the human body than conventional medicine. Rural communities believe that conventional treatments and methods give rise to several side effects, leading to patients experiencing unwanted symptoms, allergies or reactions to the new medication and procedures. Cases of ongoing allergies and resistance have given rise to people preferring traditional to conventional medicines. A study done in Burkina Faso by Olaf (2004) established that the effectiveness of traditional medicine proved to be better than the conventional alternative. The population comprised 87% of persons treated with Chloroquine (traditional medicine) and 13% treated using conventional medicine. The community effectiveness of Chloroquine was 67%, while that of conventional medicine was 54%.

Many challenges have led to traditional medicine being labelled as “primitive” by younger generations due to hereditary seclusion of the craft and the infiltration of quack practitioners in many places, including urban areas (Kigen, 2017). Traditional knowledge owners and practitioners kept the knowledge despite the current domination of elderly persons in the craft, increasing the ongoing knowledge loss (Chebii et al., 2020). Apart from the increased affordability and accessibility, a gentler approach towards enhancing understanding and applying traditional medicine is necessary for applying expertise in our daily lives (Mwangi, 2005). Elgeyo Marakwet County has a rich and diverse culture and inherent knowledge of medicinal plants and their applications, which deserves to enrich its inhabitants over their lifetime.

2 Area of the study

Elgeyo Marakwet County is found in the North Rift region of Kenya (see figure 1). The county region is situated between 0° 51' to 1° 19' N and 35° 29' to 35° 43' E, and the area covers a total of 1588 Km² (EMC., 2023).

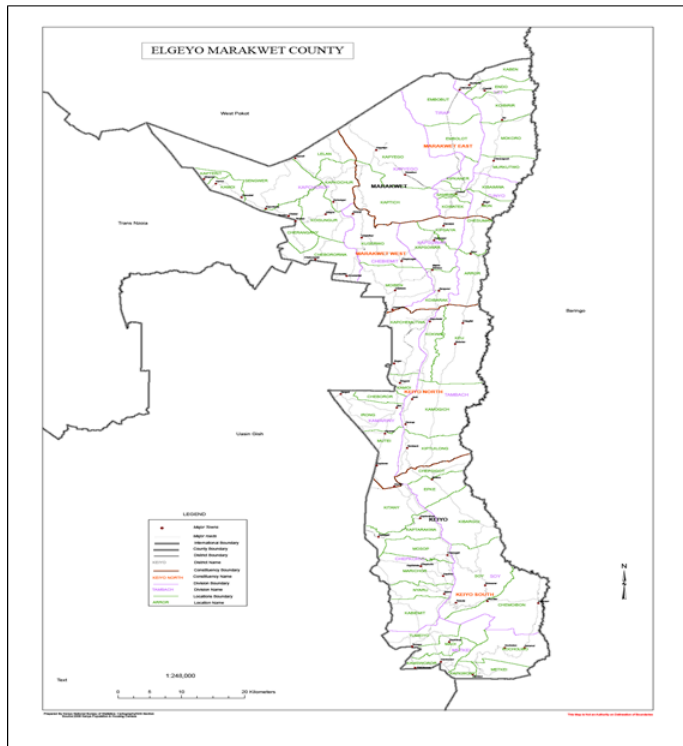


Figure 1: Map of Elgeyo Marakwet County courtesy of Elgeyo Marakwet(2023)

The county has a forestation cover of 43% with the highlands rising to 3300m above sea level and low temperature of 13°C. The main forest situated in the county is the Cherengani hills which is a major source of many streams that flow into Lake Victoria. The geography of the county consists of the highland and lowland regions, which are separated by a steep escarpment. Due to the geographical differences in the region, the diverse vegetation flourishes with medicinal plants and herbalists have a large variety to collect.

3 Methodology

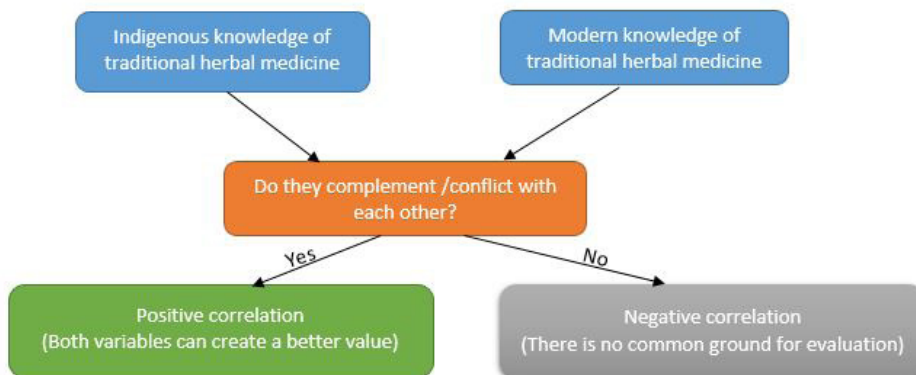


Figure 2: Methodology chart

The methodology used a mixed approach via systematic literature review followed by correlation analysis through systematic literature review of both indigenous and modern knowledge on applications of traditional medicine (Lame, 2019). The variable data sets used in the study are indigenous knowledge and modern knowledge of traditional herbal medicine. If a common ground is found where data can be compared and contrasted, the conclusion is a positive correlation. If no data found or lacking between either variable, a negative correlation is found; thus the selected knowledge is not added into the study.

4 Data collection

The study adopted a systematic literature review of published peer-reviewed articles, journals, books, databases and other primary sources of information relating to indigenous knowledge, traditional herbs, and their uses and applications in Elgeyo Marakwet County in Kenya. These were sourced from Google Scholar, PubMed, university repositories, and research publication sites databases. Other studies on traditional herbs' collection, administration, and preparation methods were also analyzed to consolidate locally available herbs and locally used methods to contribute to a verifiable deduction.

The main articles used in this study for indigenous knowledge are "Traditional Healers in Sangurur, Elgeyo Marakwet County" (Kigen, 2017), "The governance of traditional medicine and herbal remedies in the selected local markets of Western Kenya" (Chebii et al., 2020) and "A study of the medicinal plants used by the Marakwet Community in Kenya" (Kipkore, 2014).

Modern knowledge articles in the study include: "WHO guidelines on good herbal processing practices for herbal medicines" (WHO, 2023) and "Traditional medicine: report by the Secretariat". Additional sources added to the study indirectly contributed to indigenous and modern knowledge sources.

5 Results and discussions

The traditional medicinal plants/herbs found in Elgeyo Marakwet are tabled in Table 1. Traditional medicinal plants are arranged with taxonomic names alongside their method of preparation and illnesses and disease treated. The voucher number listed is a reference to the specimens stored in The University of Eldoret Herbarium: the number can be used for retrieval of the plant species available in their records.

Table 1: Traditional medicinal plants, their taxonomies, preparation, ailments and diseases.

Botanical name	Voucher Number	Local name	Parts Used	Preparation Method	Illness treated
<i>Acacia hockii</i> De. Willd	WBHG/13/026	Churur/ Chuiya	Barks, Roots	Boiled or dried and ground to powder	Abdominal (colic) Pains and cancer
<i>Acalypha fruticosa</i> Forsk.	WBHG/13/101	<i>Samiyon</i>	Leaves	Crushed and applied on the site	Scorpion/bee stings
<i>Acanthus eminens</i> CB. Clarke	EH/128/15/066	<i>Tekelte</i>	Whole Shrub	Boiled or dried and pound to powder or burnt to soot	Abdominal cramps, joint pains

Botanical name	Voucher Number	Local name	Parts Used	Preparation Method	Illness treated
<i>Acokanthera schimperi</i> (A.D.C.) Shweinf.	EH/12/15/030	<i>Keelwo/Ng'wono</i>	Bark	Powder	Antivenom
<i>Allophylus abyssinicus</i> (Hochst) Radlk	EH/12/15/020	<i>Losin</i>	Fruits	Chew	Skin problems, fatigue, boost immunity
<i>Aloe spp.</i>	WBHG/13/095	<i>Chepkenderetwo</i>	Leaves	Crushed and sap applied/ Sap applied on the operated area	Wounds/ Craniotomy (surgery)
<i>Basella alba</i> L.	EH/12/15/077	<i>Kiraita</i>	Leaves	Boiled	Synergistic, abdominal pains, joint pains, lumbago, anemia, blood cleanser
<i>Casseearia battiscombei</i> R.E. Fr.	EH/12/15/027	<i>Liss</i>	Bark and roots	Boiled or dried and pound to powder	Joint, abdominal pains and infertility
<i>Carissa edulis</i> (Forssk.) Vahl	WBHG/13/091	<i>Legetetwet</i>	Roots/ Fruits	Boiled and added to other herbs or used alone / consumed whole	General malaise/ Appetizer
<i>Croton dichogamus</i> Pax	WBHG/13/064	<i>Kerehwo</i>	Higher parasites on this plant, Bark, roots and flowers	Burnt and ash licked, Boiled	“Kipei” condition (abdominal pain and oral thrush), Chest congestion (wheezing)
<i>Datura stramonium</i> L.	EH/12/15/081	<i>Arap bataa</i>	Seeds, Leaves	Fry and crush (seeds), leaves are smoked	Toothache (apply), asthma (inhale smoked leaves)
<i>Doryalis abyssinica</i> (A. Rich) Warb.	EH/12/15/016	<i>Mindilwo</i>	Bark, roots, fruits	Boiled, dried and pound to powder, chewed (fruits)	Seizures (epilepsy) muscle pains, joint pains, invigorant, blood cleanser, synergistic plant, skin rashes
<i>Ensete ventricosum</i> (Welw.) E.E. Cheesman	WBHG/13/002	<i>Sosurno</i>	Tip end (flower)	Crushed, dried and burnt. Ash licked	Heartburn

Botanical name	Voucher Number	Local name	Parts Used	Preparation Method	Illness treated
<i>Eudea divinorum</i> Hiern	EH/12/15/070	<i>Kapcheptuin/ Uswa</i>	Fruits/ Twigs; Bark	Chewed/ Pound and applied to incision on bitten site	Abdominal upsets, skin disorders, blood cleanser, invigorant, prophylaxis of cancer, and respiratory disorders; Toothbrush and anti-venom
<i>Ficus thonningii</i> Blume	EH/12/15/036	<i>Simotwo</i>	Bark, roots	Boiled, powder	Arthritis, liver disease, edema
<i>Maerua cordata</i> (Gig.) De Wolf.	EH/12/15/099	<i>Chepan'yiny</i>	Roots	Chewed	Colic pain in adults , anorexia, blood cleanser
<i>Myrsine africana</i> L.	EH/12/15/071	<i>Sekeletwa</i>	Bark, roots, fruits	Boiled, dried and ground to powder, chewed (fruits)	Respiratory disorders
<i>Olea Africana</i> Mill.	WBHG/13/032	<i>Remit</i>	Dried Bark; bark	Pound to powder; boiled	Eye ailments
<i>Olea capensis</i> L.	EH/12/15/083	<i>Masat</i>	Bark	Boiled, dried and pound to powder	Deworner, blood cleanser
<i>Podocarpus falcatus</i> Mirb	EH/12/15/038	<i>Been</i>	Bark, roots, higher parasites	Boiled, dried and pound to powder, burnt to soot	Liver and spleen diseases, peptic ulcers
<i>Rotala tenella</i> (Guil and Per)	EH/12/15/093	<i>Chepkitiot/ Kitonde</i>	Whole plant	Boiled or consumed while raw	Blood cleanser, lumbago, peripheral neuropathy, muscle cramps, joint pains, pre-and post-menopausal syndromes, obesity, cardiovascular/ cerebrovascular disorders
<i>Schefflera volkensii</i> (Engl.) Harms	WBHG/13/088	<i>Tingwon</i>	Dried resin	Sniffed; smeared on body	Inhaled to clear blocked nose; Perfume
<i>Warburgia ugandensis</i> Sprague	EH/12/15/002	<i>Sokwo</i>	Bark, tender leaves	Boiled, burnt to soot, dried and pound to powder	Respiratory disorders, headaches, allergies

The medicinal plants species and herbs collected number 183 with 12 miscellaneous products used for traditional herbal purposes alongside or singularly for treatment. The medicinal

plants/herbs used majorly consisted of barks, roots, and leaves. Fruits and seeds consisted of a small portion of traditional medicinal herbs. In terms of local use, *Warburgia ugandensis* and *Zanthoxylum chalybeum* were the most employed for treating five conditions. (Kipkore, 2014) In contrast, *Rotala tenella* treated the most conditions reaching nine in total.

The table below shows the percentage of preparation methods used in making herbs according to the herbs collected.

Table 2: Percentage of herbs according to preparation method

Mode of preparation/ administration	Herbs Percentage (%)
Boiling in water	41.35
Chewed	15.79
Burnt to soot/ ash	11.65
Crushed	9.40
Pound to powder	6.77
Dried	6.02
Consumed (cooked)	3.38
Consumed (raw)	3.00
Soaked in water	1.87
Sniffed	0.38
Smoked	0.38

Boiling the herbs was the most popular preparation method for most herbs while smoking and sniffing were the least used form of traditional herb preparation. Boiled herbs mixed into tinctures with synergistic herbs form much stronger concoctions. A significant portion is raw and administered through either chewing or consumption. Crushing herbs delves into extracting the raw sap or juices from the herbs, which is common in applying salve to wounds. Pounding into powder involves grounding the solid herb into finer granules or particles. Some herbs require prior preparation for the procedure via drying. Burning herbs to soot is different from ash; the former is mainly a black, very fine product, while the latter is a charred black or fine white product. Sniffing involves inhaling the herb's fine particles through the nose instead of smoking, where the ignited herb's smoke particles are inhaled through the mouth.

5.1 Challenges of traditional medicine

Traditional practitioners and experts debated the significant challenges of traditional medicines. Based on these sources, the most significant proved to be a lack of adequate documentation, incompetent practitioners and inadequate capital to operate the business.

Most sources of traditional knowledge are scarce in the daily lives of common practitioners and people alike. According to a recent study, most of the knowledge acquired by traditional medicine practitioners is hereditary (Chebii et al., 2020). The current advent of such inadequacy, despite the presence of policies, bills, and existing bodies of government institutions, invites erosion of deep-rooted culture and practices. Given a case where there is no vested interest to support such practitioners financially while implementing mandatory investment from the former to support their businesses, the zero-sum game will affect the consumers who rely on these practitioners to survive.

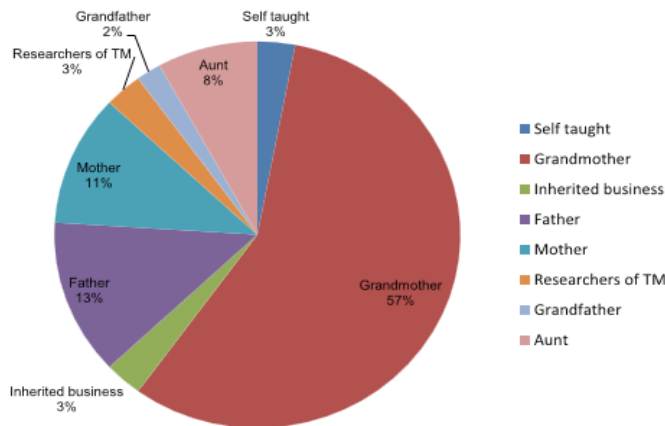


Figure 4: Sources of traditional medicine knowledge for most of the traditional medicine knowledge (Chebii et al, 2020)

5.2 Good application practices for preparation of traditional herbal medicines

The methods of preparation of traditional herbs found in Elgeyo Marakwet County can be summarized into: Boiling, chewing, burning to soot/ ash, crushing, pounding to powder, drying, raw and cooked consumption, soaking, sniffing and smoking. Streamlined herb preparation practices are available for the average person to follow. The most effective practices have been tried and tested to yield the best possible results for the widest range of herbs using specific criteria in preparation. This set a base minimum to producing highly effective medicine for knowledgeable individuals and promoting them to gaining the maximum medicinal benefit from these herbs.

5.4 Preparation by boiling or decocting

Preparing traditional herb decoctions involves extracting the medicinal substances using water heated to boiling temperature. According to the World Health Organization Expert committee on specifications for herbal pharmaceutical preparation guidelines, decoctions are fluid based extractions where soluble and heat stable active constituents of the herb or herbal material dissolved into the solvent, which may include water or other liquids such as milk or vinegar (WHO, 2023). Herbalist James Green narrows down the preparation method into a simple to apply recipe. (Green, 2000) The combination of both principles derives the following procedural method:

- Use one tablespoon to one teaspoon of herb to a cup of water.
- Add the herbs to cold water to a pot.
- Place the pot on a stove and bring to boil at 40°C.
- Cover the pot with a lid and lightly simmer for 20 – 40 minutes.
- Remove the lid and let the decoction cool to drinking temperature.
- Finish up by straining out the herbs.
- The herbs are reusable in the future for a new decoction as long as the decoction is still strong after brewing.
- Refrigerate the left overs and use within 48 hrs.

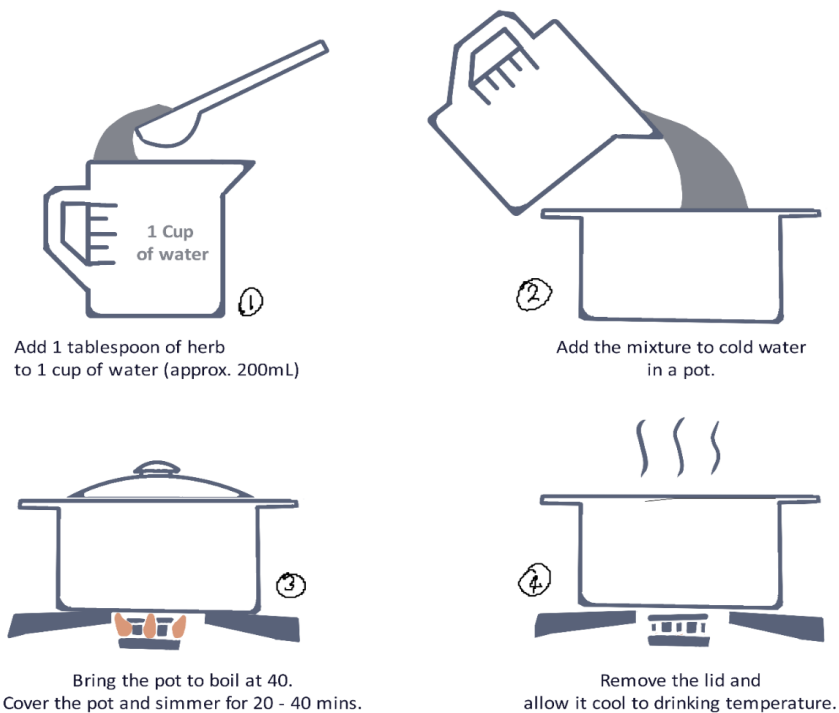


Figure 5: Boiling procedure 1. Source: Author.

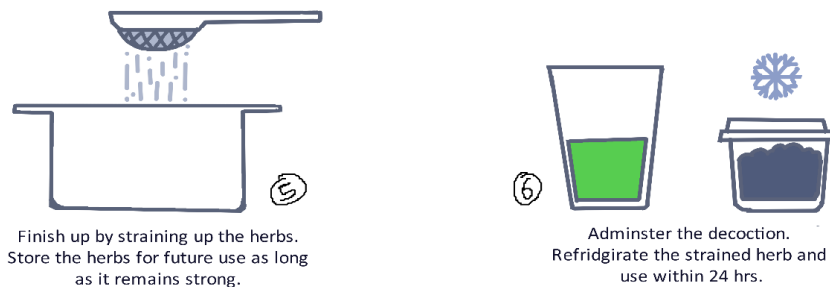


Figure 6: Boiling procedure 2: Source: Author

The preparation of traditional medicinal herbs above 40°C is unsupported due to denaturation of the medicinal products and chemicals unless further research developed supporting the claim is published (WHO, 2023).

5.5 Preparation chewing

Chewing is extracting the medicinal compounds from the traditional herbs using concise chewing techniques to acquire the greatest benefit. Proper chewing procedure ideally requires one to chew until the product is a paste. In this case different mechanical principles: the jaw movement, the chewing force, chewing cycles and duration of a chewing cycle plays a major role in absorbing herbal nutrients. (Sun-Waterhouse, 2021) Harder herbs will require more chew cycles and force compared to softer herbs. The traditional herbs in this study need chewing until they lose their potency. Swallowing the herb is not recommended. The following is the process of chewing traditional herbs:

- Wash the herb thoroughly.
- Chew the herb continuously until it loses potency.
- Spit out the herb and rinse the mouth.

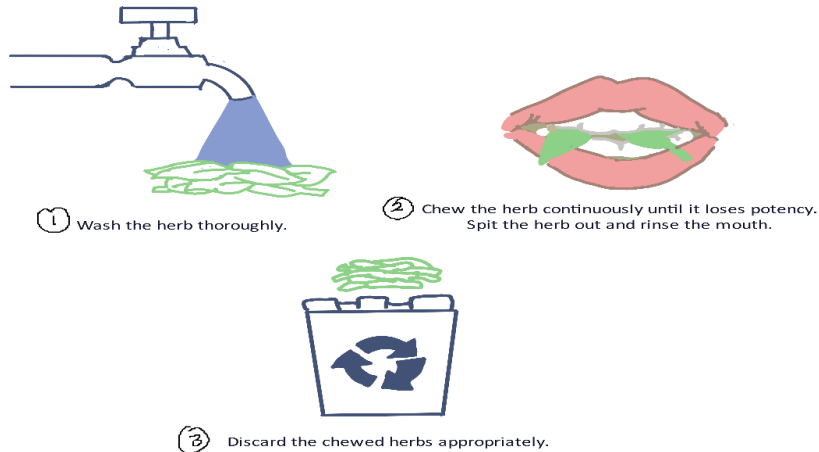
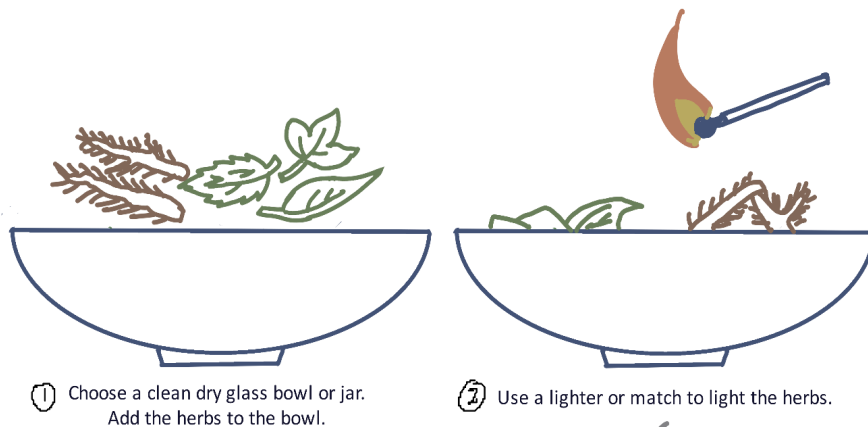


Figure 7: Chewing procedure. Source: Author.

5.6 Preparation by being burnt to soot or ash

Traditional herbs are burnt when dry or fresh, in most cases they are burnt while dry. In order to burn, the traditional herb exposed to an open flame and undergoes ignition in a glass jar or ceramic bowl (Prisker, 2022). The procedure to prepare soot and ashes of herbs is as follows:

- Choose a clean dry bowl or glass jar.
- Place the herbs in the bowl.
- Use a lighter or match to light the herbs.
- Once lit, allow them to burn for a few minutes.
- Extinguish the flame and acquire the components.



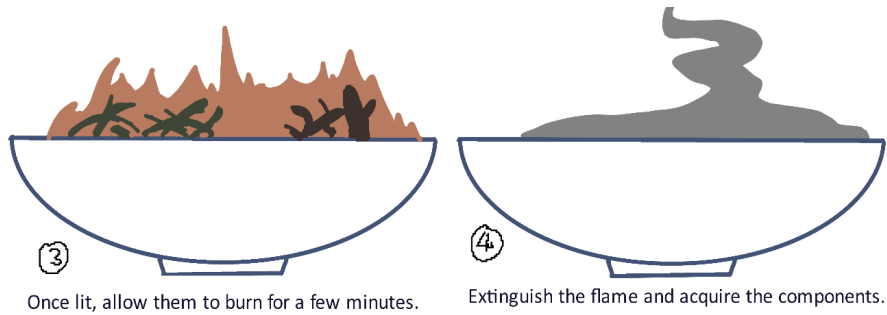


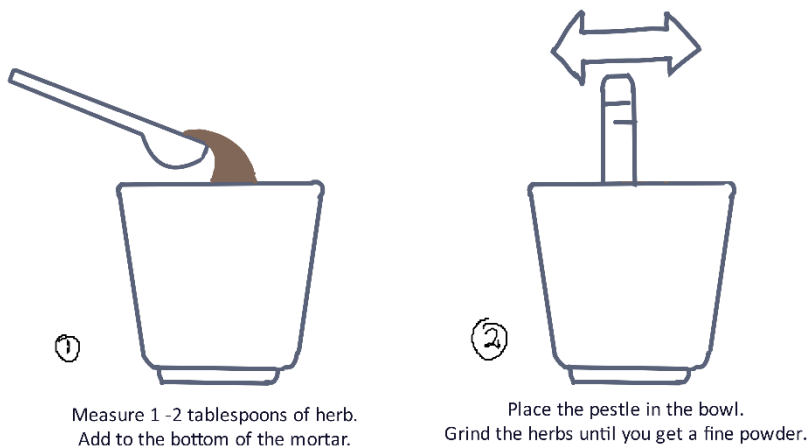
Figure 8: Burning procedure. Source: Author.

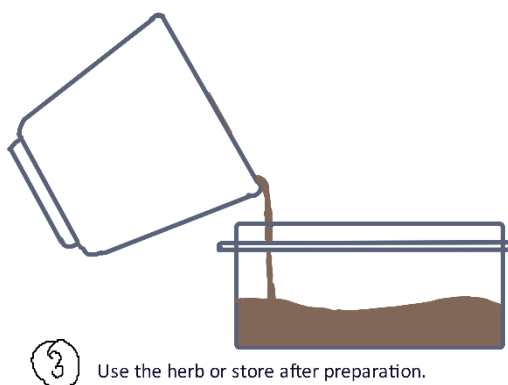
5.7 Preparation by pounding to powder or grinding

The primary purpose of grinding and pounding is to destroy the tissue and cell structures in order to expose the chemical components for absorption (WHO, 2023). In traditional medicine, the traditional herbs are ground and pulverized into fine particles suspended in warm water for administration; administered directly by licking; or combined to other mixtures. The herbs extracted via grinding using a mortar and pestle and electronically using a domestic coffee grinder (Ideboen, 2019). The best process for grinding follows:

Mortar and Pestle

- Measure 1 to 2 tablespoons of dried herbs to the bottom of a mortar.
- Place the pestle in the bowl. Begin grinding by firmly placing the into the bottom and the sides of the bowl to crush the herbs.
- Continue until you have a fine powder.
- Use the herb or store the herb after preparation.



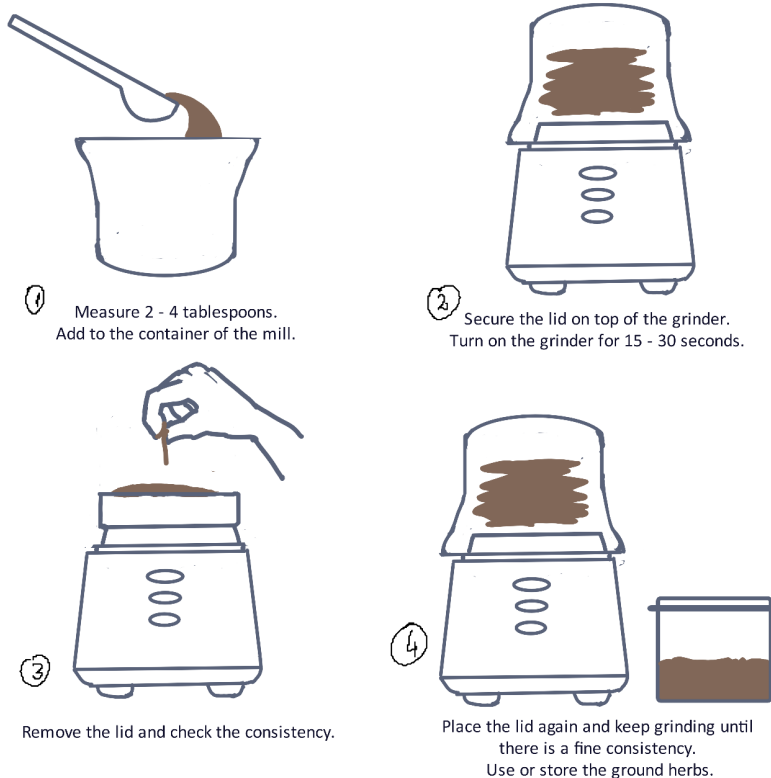


③ Use the herb or store after preparation.

Figure 9: Grinding procedure 1. Source: Author.

Coffee grinder/ spice mill

- Place 2 to 4 tablespoons of dried herbs into the container of the mill.
- Secure the lid on top of the grinder.
- Turn on the grinder and mill for 15-30 seconds.
- Remove the lid after grinding and check the consistency/ texture.
- Place the lid again and keep grinding until the herbs are fine and powdery.



① Measure 2 - 4 tablespoons. Add to the container of the mill.

② Secure the lid on top of the grinder. Turn on the grinder for 15 - 30 seconds.

③ Remove the lid and check the consistency.

④ Place the lid again and keep grinding until there is a fine consistency. Use or store the ground herbs.

Figure 10: Grinding procedure 2. Source: Author.

5.8 Preparation by crushing

Crushing herbs is similar to grinding herbs. Grinding and crushing are slightly similar as the former uses dried herbs while the latter uses fresh or softened herbs. Crushed herbs in some preparation methods, extract the solvent through straining the herb itself; the resultant solvent administered to the patient, or applied for other domestic uses. According to its definition, infusion extraction involves macerating the herb in a cold or warm solvent to acquire the chemical components present in the herb (WHO, 2023). The infusion process involves pouring hot water on the herbal material and allowing it to steep over time. The following is the process of preparing the herb by crushing/ infusion preparation:

- Prepare hot or cold water/solvent according to the traditional herb to be crushed.
- Acquire a pestle and mortar.
- Place the herb in the bottom of the mortar and crush using a pestle.
- Add water or solvent to the mortar and allow to steep for 5 to 20 minutes.
- Strain the herbs using a sieve and enjoy the liquid prepared.

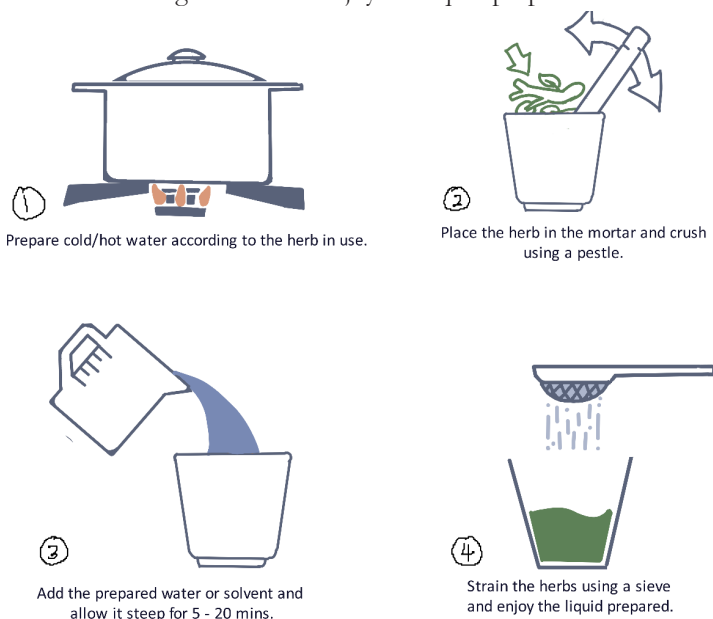


Figure 11: Crushing Procedure. Source: Author.

5.9 Preparation by drying

The ideal dried traditional herb reaches a moisture content below 12%, which occurs through sun, shade, or artificial heat drying methods. (WHO, 2023) Artificial heat, sun drying and shade drying herbs, chosen according to the herbs characteristics; volatile herbs are shade dried while low moisture content traditional herbs are sun dried over long periods.

Sun drying traditional herbs procedures follows placing them in the open air on a drying frame at least 15cm off the ground, away from contamination (vehicle exhaust, dust) and protected from insects.

Shade drying is a slow process where the traditional herbs are protected from direct sunlight without artificial airflow. The procedure preserves the color and aromatic component of volatile herbs including flowers and leaves.

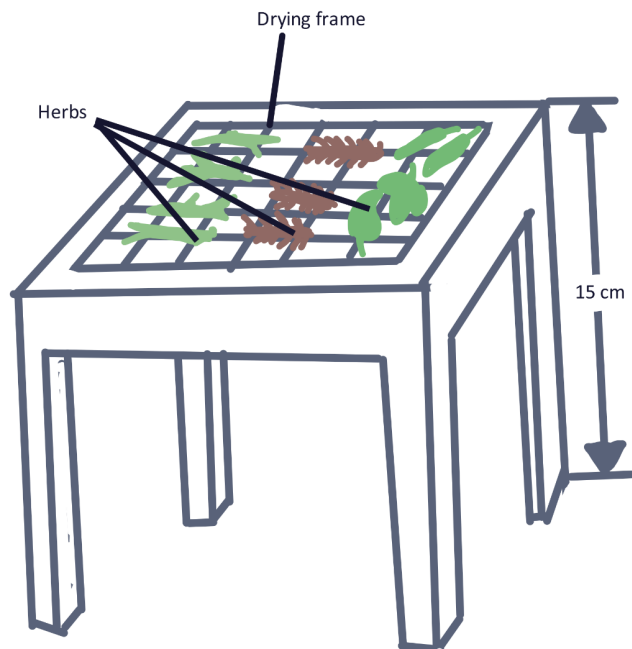


Figure 12: Drying frame diagram. Source: Author.

Artificial heating is essential for areas with low sunlight and high humidity. The heating must occur in moderation and prevent loss of the most effective components of the herb. The effective temperature of heating traditional herbs is 60°C for bark and 40°C for shoots and leaves.

5.10 Administration by sniffing

Traditional medicines administered via sniffing affect the respiratory systems and commonly present as a dry powder or a liquid preparation. Steam inhalation is the most prominent method of administration via sniffing the vapor of the traditional herb (WHO, 2023). A warning issued concerning several herbs containing oils, may burn sensitive mucous membranes in the respiratory tract. The procedure for preparing herbs for inhalation includes:

- Pour 2 to 4 litres of water into a pot.
- Bring the pot to boil.
- Take the water off the heating element or cooker.
- Pour the herbs into the pot and allow to simmer for a few minutes
- Place the pot on a table positioned where the head above the pot without being burnt by the pot.
- Drape a blanket over the pot creating a vapor cocoon over the head.
- Sit under the drapes with the head hovering over the pot.
- Breathe in the vapors while keeping the eyes closed not to get irritated.
- If the vapor cocoon gets too hot or intense, remove the head and rest for a while and return when ready.

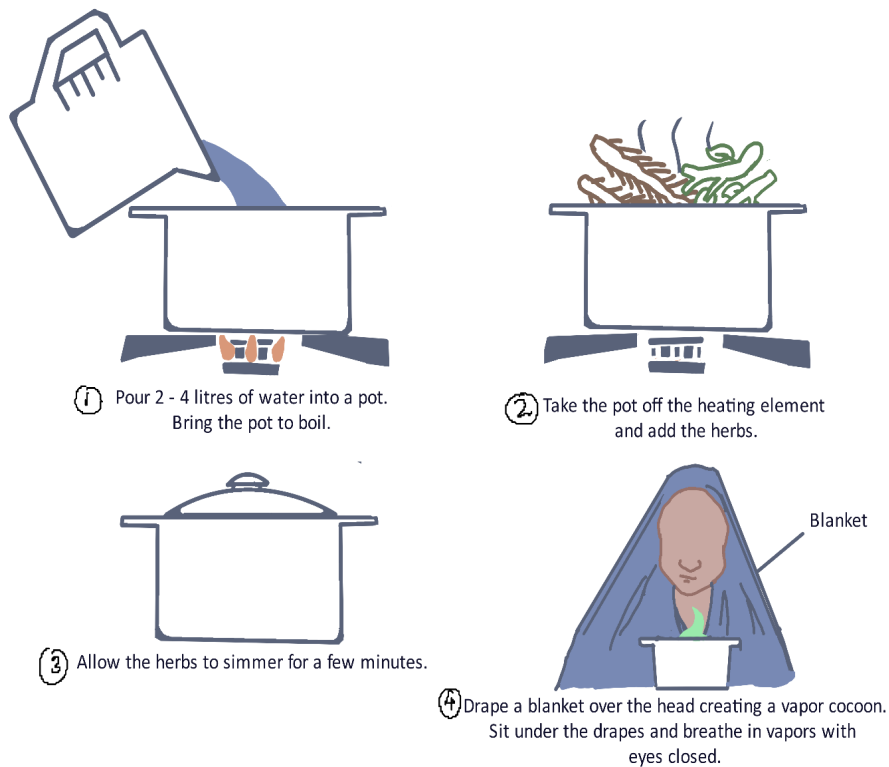


Figure 13: Sniffing/ inhalation procedure. Source: Author.

6 Conclusion

The regression study yielded positive correlations between indigenous and modern applications of traditional medicine. The major means of preparation covered will support most conventional traditional herbs; however, studies still need to be made correlate the remaining forms of indigenous knowledge. Steps towards improvement of application of such medicines still require testing and sharing, to allow most people access to such valuable information. The improper application of such common medicines lead to myths that counteract the importance of such medicines to the community as a whole. Knowledge concerning traditional medicine application is an important craft that needs preservation with further investigation to treat locally known illness and improve the environment and livelihood of residents living near and around these areas.

7 Recommendations

Indigenous knowledge on the use of herbs needs proper preservation, research, and documentation to ensure the knowledge is safe albeit within sensitive channels or the general library of knowledge and information. Natural forests and woodlands, where the medicine grow naturally, requires strict policies to safeguard against over-harvesting, exploitation, and human encroachment. Medical practitioners in this field require aid in demystifying myths and taboos inflicting harm their businesses and livelihoods. Promoting traditional medicine in the community, beside conventional medicine, will benefit the community to consider which alternative may suit their needs when ill. Imparting knowledge about the health benefits,

treatable illnesses, and quality of life improvements brought about by traditional medicine and proper practices is the responsibility of the society, legal bodies, and practitioners through running awareness campaigns, and local seminars which will allow people to emulate an open mind when dealing with future health problems.

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