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Ethnomedicines in the 21st century: challenges and opportunities in the contemporary world

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ABSTRACT

The ethnomedicine industry inherently developed *de novo* in the evolutionary history of humanity to provide healthcare services. This industry has existed long before the currently preferred conventional medicine and by then was the only trusted means of healthcare to humanity. Ethnomedicine has evolved and diversified into specializations along ethnic groupings worldwide. Nevertheless, attitude towards ethnomedicine is usually polarized varying from contemptuous dismissal to romantic glorification. Rarely does one come across people with balanced views. The discussion is based on 9 issues: view of ethnoknowledge of health from the early days, discovery and development of ethnomedicines, specializations in ethnomedicines, challenges and limitations, terminologies that shape ethnomedicine industry, merits and demerits of ethnomedicines, existing opportunities and the way forward. The ethnomedicine industry, just like any other field of professionalism, was not without challenges and limitations that affected its realization of full potential. In this discussion, 24 challenges and limitations are outlined but not limited to:- lack of information on standards, safety and efficacy, capacity building of ethnopractitioners, colonialism, climate change, witchcraft, socio-politics, recognition of ethnosystems, research and biased documentation, emerging diseases and pathogens, market value-chain, *in-situ* and *ex-situ* conservation, anthropogenic activities, sources of ethnomedicines, legal frameworks, harvesting, preparation, administration and storage methods, gender issues, poor remembrance of ethnomedical knowledge, existence of quackery, sources of ethnomedicines, biopiracy and bioprospecting, lack of mechanisms for monitoring and evaluation of ethnomedicines, advancement in human evolution and civilization, biological evolution and invasive alien species, stigmatisation due to poor perceptions and attitudes about ethnomedicines and competitive supremacy amongst ethnopractitioners and conventional practitioners, have all not favoured the industry. However, the use of ethnomedicines has tremendously increased and continues to increase albeit the above challenges and limitations facing the industry. The challenges and limitations are broadly and critically discussed while outlining opportunities and giving away forward.

KEYWORDS: Ethnoknowledge, Ethnicity, Culture, Indigenous, Ethnomedical systems

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INTRODUCTION

Ethnopharmaceutical agents have existed before humanity while ethnomedicines, particularly their zoopharmacognosy, geophagy and herbalism, are as old as human life on the planet Earth, evolutionary wise (Romero-Daza, 2002; Popović *et al.*, 2016). The ethnomedicine industry has existed long before conventional medicine and by then was the only trusted means of healthcare to humanity in all spheres of life: health, culture, communication and socio-economics (Wanzala *et al.*, 2023; WHO, 2023a). However, literature indicates the practice of Ethnomedicines may have begun some 4000 years ago (Popović *et al.*, 2016) but it is not known exactly with certainty. Nevertheless, Ethnomedicines has fundamentally evolved

and continues to evolve alongside humanity under different environmental pressures and circumstances to be what it is today as a fruit product of this long journey of biological evolution (McMillen, 2012). With the advancement in human evolution and the invention and development of conventional medicine and biotechnology, gradually Ethnomedicines started getting out of favour with people, more particularly when missionaries and Christians in particular, suspiciously labelled it as satanic, cult, witchcraft, myth, filth, quack, evil, apprehensive, ungodly etc. (Wanzala & Walingo, 2019). For unknown reasons, this revolt against Ethnomedicines was more of the West ideology than any other part of the world, probably as a strategic mechanism tool for colonization as outlined in Lord Macaulay's address to the British Parliament on 2nd February 1835 after visiting and

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surveying the entire continent of Africa. Alternatively, was the revolt against Ethnomedicines due to fast evolutionary changes under the pressures of a globalizing world (Heinrich, 2010) and the preference of the Western world to conventional medicine and biotechnology? Whichever is applicable, it is self-evident from the literature that nearly all humans around the world rely on ethnomedicines directly or indirectly as probably food nutrients and/or nutraceuticals in many different defined formats (Heinrich, 2010; Wanzala & Walingo, 2019) and as well as a source for primary healthcare services (Etkin, 1993).

From the aforementioned, the World Health Organization (WHO) and United Nations Children's Fund (UNICEF) in their efforts to provide optimal healthcare services globally noted with great apprehensions the role of the ethnomedicine industry and its ethnopractitioners in providing comprehensive primary healthcare services. Therefore, in the Alma-Ata Declaration of 1978, adopted at the first ever International Conference on Primary Health Care (PHC), WHO together with UNICEF, recognized Ethnomedicines as one of the major components to be used by Governments and States of the twentieth century to achieve health for all by 2000, more particularly in developing countries (WHO/UNICEF, 1978). Today, it is 45 years since this declaration was made and the role of the ethnomedicine industry in achieving the goals of PHC was realized at Almaty, Kazakh Soviet Socialist Republic, Soviet Union. It is well noted that the United Nations, Governments and States, international organizations as well as multilateral and bilateral agencies, non-governmental organizations, funding agencies, all health workers and the whole world community have tremendously expanded the approach to PHC to include a wide range of components of Ethnomedicines through adoption of international and national resolutions and declarations as previously outlined (Wanzala & Walingo, 2019). However, the question remains, where are we today in terms of reaching the goal of utilizing the ethnomedicine industry in PHC to help achieve health for all as WHO and UNICEF envisioned it?

To achieve this target effectively and efficiently, the international community, Governments and States got focused on developing the framework for identifying and utilizing ethnopharmaceutical agents applicable in Ethnomedicines, particularly by local and indigenous communities, uniquely known by different names as Ayurveda, Siddha medicine, Unani, ancient Iranian medicine, Iranian (Persian) traditional medicine, Arabic indigenous medicine, Islamic medicine, traditional Chinese medicine, traditional Korean medicine, ancient Greek medicine, Haitian folk medicine, Native American traditional herbal medicine, *Uyghur* traditional medicine, Irish medical families, Japanese *Kampō* medicine, traditional Aboriginal bush medicine, Georgian folk medicine, Acupuncture, Celtic traditional medicine, *Muti*, *Ifá*, native healing powers and traditional African medicine (ancient Egyptian medicine), traditional medicine, folk medicine, indigenous medicine, natural medicine, home remedy (granny cure), herbal medicine, integrative medicine, complementary medicine, anthroposophic medicine (massage, exercises, counselling and substances from plants, animals, soils, water, minerals, microorganisms etc.),

alternative medicine, pseudo-medicines, magical medical practices, quackery medical practices, homeopathy, skepticism etc (Heinrich, 2010; Wanzala *et al.*, 2012; Wanzala & Walingo, 2019). These wide-ranging medical ethnopractices have sustained and been achieved due to a globally rich biological diversity closely associated with diversified world ethnic groupings where each contributes an exceptional and yet valuable ethnopharmacopoeia (Abdullahi, 2011).

Following the aforementioned, this manuscript is therefore written and discussed in regard and recognition of Articles 6-19 of the United Nations Convention on Biological Diversity (CBD) that was adopted during the Earth Summit in Rio de Janeiro, Brazil on 5th June 1992 and came into force on 29th December, 1993. The CBD is a multilateral environmental agreement, which ensures that contracting party members worldwide and within their respective jurisdiction, conserve biological diversity, use it sustainably including its components and the fair and equitable sharing of the benefits arising out of the utilization of its genetic resources, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies and by appropriate funding. About 196 countries have so far ratified the CBD.

This discussion further recognizes a set of rules and principles governing the use of genetic resources and associated ethnoknowledge as established by the CBD, collectively called Access and Benefit Sharing (ABS). The ABS principles largely focus on mutual agreement, sound discussion, formulation and signing of:- 1. Free Prior Informed Consent (FPIC), 2. Mutually Agreed Terms (MATs) and 3. Material Transfer Agreements (MTAs), between the users and holders/owners (who can be collectors, growers, associations, and/or any ethnically authorized users and as trusted custodians in the community), who can be able to authoritatively supply such materials when need arises.

The recognition of CBD and ABS is in accordance with Nagoya Protocol as a supplementary agreement to the CBD on access to genetic resources and the fair and equitable sharing of benefits arising from their utilization as was adopted at the tenth meeting of the conference of the Parties on 29th October, 2010 in Nagoya, Japan and entered into force on 12th October 2014. And another supplementary agreement to the CBD adopted on 29th January 2000 and entered into force on 11th September 2003, is the Cartagena Protocol on Biosafety to help govern the movements of living modified organisms (LMOs) resulting from modern biotechnology from one country to another is also equally considered in the discussion. All these protocols have a bearing and provide critical guidelines, procedures, processes and standards on the sustainable utilization of resources relevant to Ethnomedicines.

Reference is hereby made to Witchcraft Act 1925. In Kenya, this Act commenced on 12th November, 1925 as Act No. 23 of 1925. The Act borrowed heavily from the British jurisprudence on the matter and whose rules and principles were enforced by colonial masters, the British Government, which had no time

for and interest in African and Asian/Indian affairs at the time (Mutunga, 1977). The Act, in its totality, targeted to suppress the utilization and application of ethnomedicines, particularly the parts of ritual and herbal medicines practiced by local and indigenous communities. This Witchcraft Act 1925 was lifted into the Kenya statute book during independence and has never been amended. Again, following the promulgation of the Kenya Constitution in August 2010, this act has not been reviewed to be aligned to the new constitution of Kenya. The Witchcraft Act of Kenya therefore is currently under considerations for review by the Kenya Law Reform Commission (KLRC) (KLRC, 2014).

The discussion refers to several Kenyan Acts but not limited to: - the Protection of Traditional Knowledge and Cultural Expressions Act 2016 (PTK&CE Act 2016), the Pharmacy and Poisons Act (Cap 244) and Health Act 2017, where ethnomedicines is a component and partly explained on its practice, respectively.

The Early Mankind and Health: View of Ethnoknowledge of Health

From the very beginning of mankind, humanity faced a lot of challenges and among them was how to solve health problems. Anthropological and archaeological studies have revealed how the health problems were a stumbling block to the civilization of humankind (Maitai, 1996). Ethnomedical knowledge, which is as old as humanity, is deeply rooted in the history of humankind and explicitly illustrated and well documented in various religious books (Bible, Koran, Judaism book, Buddhism book, Vedas (the most ancient sacred scriptures of Hinduism, written in four major volumes) etc.) and the classical treatise books such as “*Kama Sutra*”. The *Kama Sutra* is the classical Indian treatise on the Art of Love and articulates issues of ethnomedical knowledge. It is the earliest of the surviving Hindu love manuals, written around the second century A.D. by a sage called Vatsyayana. Other later texts, such as the *Ananga Ranga* and *Koka Shastra*, drew their inspiration from the *Kama Sutra*. The ethnomedical knowledge is also well documented in many other worlds known folkloric books such as the medical papyri of ancient Egypt in Africa. For instance, an illustration of the importance of ethnomedical systems is shown in the Bible in the Book of Ecclesiasticus: Chap. 8: 8-12. The concepts of ethnoknowledge regarding disease/illness and physical and spiritual healing in the context of Biblical knowledge are well documented and understood (Genesis: Chap. 2: 8-17 and Ecclesiasticus: Chap. 38: 1-15).

The early humans showed a lot of ingenuity in evolution history by discovering many varieties of plant and animal ethnoremedies they could use in their lives for managing health-based problems such as ethnomedicines, foodstuffs and nutraceuticals. Globally, this ethnoknowledge, skills, innovations, techniques and ethnopractices have ethnically evolved in time and space so well over human generations that they are inherent in people’s culture and have become part and parcel of people’s lives (Martin *et al.*, 2001). These centuries’ old practical ethnoknowledge and accumulative ethnoexperiences

have been mainly acquired by a trial and error method, which caused many a fatality in the process (Le Strange, 1977). The evolution of ethnoknowledge and ethnoexperiences involved the invention and development of ethnoremedies almost to every existing health problem affecting humans and their livestock as well as plants (Martin *et al.*, 2001; Guèye, 2002). Succeeding generations and civilizations have improved upon these ethnoremedies to suit their local needs and aspirations and to ensure that they best fit in their acceptable changing cultural framework and environments (Mathias-Mundy & McCorckle, 1989), henceforth the loss of this useful ethnoknowledge as recorded information is at its minimum level and in secretive coded format. Today, Indigenous Knowledge (IK) manifests as a facet to facilitate sustainable developments and henceforth improve the living standards of the rural poor (IK&DM, 2004) because it has withstood the test of time.

Nevertheless, attitude towards ethnomedicine is usually polarized varying from contemptuous dismissal to romantic glorification. Rarely does one come across people with balanced views. This is what makes ethnomedicine contentious.

Theories of Discovery and Validation of Ethnomedicine: Methods and Events

At a very early stage of evolution (probably as old as humankind), humans discovered, perhaps through survival instincts, that there were curative agents (medicine) for the many diseases that afflicted them. This knowledge was passed down orally from generation to generation. The lack of documentation of such remedies makes it difficult to know how long a particular remedy has been in use and whether the preparation or administration method has ever been altered or not. Unlike conventional medicines, which are only approved for public use after carefully planned laboratory research followed by field trials on animals both for toxicology and effectiveness, ethnoremedies/ethnomedicine depend only on historical evidence of use as proof of safety and effectiveness. However, there are some possible ways humans would have used to discover and validate these ethnoremedies/ethnomedicine. These possible ways include the following: -

1. During the gatherer-hunter stage, humans would have observed that ingestion of certain plant “food” material (roots, seeds, fruits etc) was followed by some profound physiological changes such as sedation, euphoria, hallucination, diarrhea, vomiting, etc. In some cases, the unfortunate happened, he died. He therefore learnt to associate some pharmacological effects with specific plants. For example, the distant relative of to-day’s Maasai who, in search of food consumed “*seketet*” (seeds of *Myrsine africana*) and later observed dead roundworms in the stool, must have realized he had discovered an anthelmintic, which he could use when the need arose. Somewhere in Mexico, a native Indian who consumed “god’s flesh” i.e. the Mexican mushroom, (*Psilocybe mexicana*) and experienced hallucinations realized he could use the mushrooms before rituals, whenever he wanted to communicate with God.

2. Through self-medication by animals. During the gatherer-hunter stage and even much later, man observed that when wild animals ate some plants, they exhibited abnormal behaviour. For example, somewhere deep in the Congo rainforest, a native observed with amusement, wild boar digs up the roots of *Tabernanthe iboga* and eats the roots, only to go into a frenzy, jumping around and probably trying to run away from frightening visions. He immediately associated the plant with hallucinations. Yet another person in Abyssinian highlands observed that wild goats, which had fed on shoots of *Miraa* (*Catha edulis*) were excessively stimulated. When, out of curiosity he chewed the shoots, he became hilarious. It is generally believed that when wild animals are sick, instinct guides them to appropriate health remedy (Buchanan, 2002), a field of study called zoopharmacognosy.
3. Apart from the accidental discoveries referred to in (1) and (2) above, there is evidence that man actively looked for medicine at the early stages of evolution, making use of the *Doctrine of Signatures*. According to this doctrine, the physical characteristics of the plant (colour, shape, form etc.) and its productivity were indicative of possible medicinal value. Thus, *Rauwolfia* root (Indian name “*Sarpagandha*” means snake repellent) was used in Ayurvedic medicine for snake bites because it is shaped like a snake. *Chenopodium* (wormseed) was used as anthelmintic. Saffron flowers (yellow) were used for jaundice. Plants with heart-shaped fruits were used for heart diseases. Plants with roots shaped like male organs were used for impotence problems, etc. In addition, plants that bear a lot of fruits are thought to have agents that promote fertility, plants that exude milk-like substances are thought to be able to improve milk yield, plants that produce red liquids are thought to be able to enhance blood, etc.
4. Through dreams, visions and spiritual inspirations, humans discovered a wide range of ethnopharmacological agents from plants, animals, microorganisms, soils, water, atmosphere and minerals.
5. Through serving an apprenticeship as an assistant to veteran ethnopractitioners, humans learned and trained to offer all kinds of healthcare services to their own communities.
6. During ceremonies and age-group initiation activities that involve informal education programmes from the council of elders of a given ethnic grouping, humans learned and trained as ethnopractitioners.
7. As a form of inheritance from parents and or grandparents. Evidence based on historical use of a treatment is the most widely used criterion to determine whether a treatment is safe and effective or not. In most cases, ethnopractitioners will try to find out how many people use the same medicine for treatment either on animals or humans: the more users, the higher the credibility of the treatment.
8. During barter trade. Ethnomedicine has always been marketed at the level of barter trade, where monetary is not involved. Depending on the quality and quantity of the product of the patient, the ethnopractitioner could decide to reveal the entire medical secrets to him/her so that after using it and healing, he/she could also start practicing traditional medicine in the community.
9. During annual meetings of ethnopractitioners. Amongst the ethnopractitioners, they learnt and trained from one another and exchanged ethnomedical knowledge, products and operating tools.
10. Plants with pleasant smell (fragrance) were used to mask perspiration and flavour food. They were also used to spice and preserve food. This is how some of the naturally occurring nutraceuticals were discovered. Christopher Columbus, Vasco da Gama and many other ancient explorers made their journeys to find an alternative route to the “land of spices” (Maitai, 1996).
11. In ethnoveterinary medicine, livestock farmers in villages, sometimes carry out trials in an attempt to find an ethnotreatment for a particular disease and or ill-health condition that might either not have a treatment at all or where current conventional treatment might not be very effective as expected. These trials are conducted in villages and are also used to determine the safety, standards and efficacies of a new ethnomedicine and are often carried out on domestic animals where the safety of ethnomedicines is in doubt.
12. Documented research findings. In the last few decades, there has been a rush to document traditional remedies. Researchers have been surprised to discover that many of the traditional health remedies used in Africa are also used in South America or Asia. Sometimes, the same plant remedy is used for different treatments. Whether structured conventional trials have been carried out or not on their effectiveness, these documented treatments can easily be accepted as alternatives to unavailable or high-cost conventional treatments.

Categorization of Ethnopractitioners

Providers of ethnohealthcare delivery services (healers) are persons who are recognized by their respective communities in which they live as competent to provide healthcare services to people, animals and plants in those particular communities and beyond by using plant, animal and mineral substances and doing special *actions* and or by saying special words called *spells*, either singly or in combination. The healers use methods based on the social, cultural and religious background as well as on the knowledge, attitudes and beliefs that are prevalent in the community regarding physical, mental (psychological), social, spiritual and physiological balance and well-being of humans as well as animals and plants and focusing on the causes of diseases and disabilities in communities. Diseases attributed to both naturalistic and supernatural causes can be treated by traditional healers who exist in each African village. This categorization is based on the ordainment process one undergoes before qualifying as an ethnopractitioner. The categories of health ethnopractitioners in an African context include the following but not limited to: -

1. Herbalist: Treats and prevents disease(s) and or ill-health condition(s) that affect physical, mental (psychological), social, spiritual, economical and physiological balance and well-being of humans as well as that of animals, plants and the entire environment using plants, plant parts and plant products, singly and or in combinations.

2. Spiritualists (using powers from ancestral spirits, gods' spirits and evil spirits): People who believe that dead people, through their unique spirits that hover around the world, are able to communicate miraculously with people who are still alive in a way of either offering protection and/or harming livelihoods. The living people with the capacity to communicate with the spirits of the dead, offer spiritual healing using powers from ancestral spirits, gods' spirits and evil spirits, in combination and/or single format.
3. Traditional birth attendants (TBA): These are ethnically ordained specialists in assisting pregnant mothers to deliver safely in communities.
4. Diviner: Someone who finds out about one's future by receiving unique signs and/or communication from the world of spirits, usually by using powers from ancestral spirits, gods' spirits and evil spirits.
5. Rainmaker: Someone who is ethnically ordained to use magic powers to cause rainfall and hailstones (frozen rain). They are believed to be capable of bringing about or stopping rain, by manipulating the environment meteorologically (e.g. by way of burning particular kinds of wood and/or otherwise attempting to influence the movement of clouds through the application of certain special herbs and spells).
6. Magician: Someone who uses mysterious powers that some people believe can make impossible things happen; doing *special actions* and or saying *special words called spells* singly and or in combination. These people too are believed to remove witches.
7. Astrologer: Someone who studies and specializes in Astrology (the study of the movement of the stars and planets and how some people think they influence people's characters and lives) to tell people about their future lives.
8. Ritualists (practice ritual medicine): People who conduct formal ethnic ceremonies and do *special actions* and/or say special words called *spells* with a view to treating and preventing disease(s) and/or ill-health that affect physical, mental (psychological), social, spiritual and physiological balance and the well-being of humans as well as that of animals and plants in that particular environment.
9. Zoopharmacologists: People who use live animals and or certain parts of organs/tissues and flesh of slaughtered animals as well as animal products as remedies to ill-health-based problems in society.
10. Seers: People who know and foretell what will happen in the future.
11. Traditional surgeons: Ethnically specialized persons who perform operations involving cutting for the sake of healing and/or improving the health status of the subject in question.
12. Blacksmith: An ancient engineer ethnically ordained with a special house (*Lirumbi* in Luhya language in Kenya) equipped with tools for designing and manufacturing metallic items applicable in all spheres of human life.
13. Circumciser: An ancient person ethnically ordained to circumcise.
14. Priest: In some societies, there are intermediaries between individuals or whole communities and specific deities (a postulated preternatural or supernatural immortal being, who may be thought of as holy, divine, or sacred, held in

high regard and respected by believers). Various called indigenously as *Dibia*, *Babalawo* etc., the priest usually presides at the altar of a particular deity of an ethnic grouping. The practice of ethnomedicine is an important part of indigenous religion in the society. Priests are reputed to have profound professional knowledge of illness (pathology), surgery and ethnopharmacology (knowing ethnofunctions of roots, barks, leaves and herbs of different plant species). Some of them are also reputed to diagnose and treat mental and psychological ill-health problems in society.

15. Healer: This is an ethnically ordained ethnopractitioner. The role of a health ethnopractitioner is broader in some respects than that of a contemporary medical doctor. The healer advises on all aspects of life, including physical, psychological, economic, spiritual, moral and legal matters. He also understands the significance of ancestral spirits and the reality of witches to provide associated counsels and remedies, accordingly.

The African healers (African health ethnopractitioners) may have one or more of the above specializations depending on the level and standard of ethnic ordainment and the level of profound ethnoknowledge, techniques and skills that are based on many years of careful empirical observations, hands-on practical experiences, training and apprenticeship. An African health ethnopractitioner must be a morally upright person able to inspire trust amongst the citizens and charge affordable fees. Such a healer commands much respect in his or her community.

Naturally, the specialization is good such that one person will not be overwhelmed with clients and avoid unnecessary competition in the same ecological niche. Unfortunately, this is not the case, instead the specialization has caused unfair competition amongst the ethnopractitioners, resulting in others ruining their professional careers and those of colleagues as a business enterprise. They compete to the extent of killing one another and spoiling the careers of others such that they are no longer useful to serve the intended purpose of undergoing the tedious process of ordainment.

Challenges of the Sustainable Utilization and Application of Ethnomedicines

From the very beginning of life, ethnomedicine was the only form of healthcare system for humanity. Following the arrival of conventional medicine due to the advancement in human civilization and evolution, ethnomedicine has ever since remained side-lined from the normal national healthcare systems. Nevertheless, a considerable number of people seek ethnomedicine interventions for the prevention, treatment and management of a wide range of diseases, including in situations of palliative care and rehabilitation (WHO, 2023a). World Health Organization has further noted that a good number of its member countries have integrated ethnomedicines in their national healthcare systems by making sure that ethnomedicines:- 1. is part of the essential medicine lists, 2. is part of the essential health service packages and 3. are covered

by national health insurance schemes (WHO, 2023a), thus giving ethnomedicine an international recognition platform and space in Universal Healthcare Coverage (UHC) of the national healthcare systems of member countries.

The ethnomedicine industry, just like any other field of professionalism, developed and evolved but was not without limitations and challenges that affect its realization of full potential. The chief amongst these challenges and limitations include but not limited to - lack of information on standards, safety and efficacy, poor remembrance of ethnomedical knowledge, existence of quackery in the operational systems of ethnomedicines, diminishing sources of ethnomedicines, biopiracy and bioprospecting, monitoring and evaluation of ethnomedicines, advancement in human evolution and civilization, colonialism and enactment of laws that undermine its utilization, introduction of invasive alien species, stigmatisation due to poor perceptions and attitudes about ethnomedicines and competitive supremacy amongst ethnopractitioners and conventional practitioners (Abdullahi, 2011; Sifuna, 2022). However, the use of ethnomedicines has tremendously increased and continues to increase albeit the above challenges and limitations facing the industry (Kasilo *et al.*, 2019; WHO, 2023a). This section broadly and critically discusses the current challenges and limitations facing the industry of ethnomedicine.

Impact of Colonialism with Reference to African Countries such as Kenya: Each of Africa's multiplicity of communities has its own well developed ethnomedical system. Aetiologic agents causing diseases and subsequent treatment procedures tend to be similar in these communities with minor differences depending on the ethnic diversity of the community, geographical location and community's interactions at the levels of knowledge exchange. The Western-based contemporary medical systems were introduced upon the arrival of christian and other faith-based missionaries and later reinforced by the colonial masters and succeeding governments to ensure complete erosion of African culture and adoption of Western cultures (Lord Macaulay, 1835). Under these conditions, the African ethnomedicine was suppressed and then ignored in the Western-made-colonies in Africa. The Africans were brainwashed and made to believe and understand that their ethnomedical system was:-

1. Inferior to Western-based contemporary medical system.
2. Satanic in nature.
3. Embracing the practice of witchcraft in the society, henceforth, the introduction of Witchcraft Act 1925 in Kenya.
4. Embracing the practice of evil spirits and magic powers to harm people in the societies.
5. Purely the acts of devil worshipping in the societies.
6. Unhygienic in nature and is the causal agent of ill-health in the societies.
7. Unprofessional with no standards, reference records and informally practiced.
8. Purely the creation and imagination of human mind to satisfy health curiosity.
9. Illegal type of medical system without constitutional law.

10. A non-validated medical system embraced by quacks.
11. An ineffective medical system, which does not heal anything in life.

Many people in African societies were convinced beyond any reasonable doubt and as a result, abandoned the African ethnomedical system and associated cultures completely in favour of the Western-based contemporary medical systems. The ethnopharmacological agents and associated culture went into disrepute and the development of the entire ethnomedicine industry therefore became retarded since the colonial period/era. A lot of work consequently has to be done to salvage and give decency to ethnohealth resources used by the majority of the African people. This is the imperative of ethnomedicine industry.

However, soon after the introduction of contemporary Western-based medical system, many health-based problems associated with it have ever since emerged in the societies, including but not limited to:-

1. Aetiologic agents' resistance to conventional medicine.
2. Emergence of non-curable diseases with drugs and services of western-based contemporary medical systems in the societies.
3. Poisoning effects from drugs used in the Western-based contemporary medical systems.
4. Escalating high costs of drugs and services are just beyond the reach of the target African population.
5. Unavailability and irregular provision of drugs and services of Western-based contemporary medical systems.
6. Inaccessibility of drugs and services at physical distance.
7. The Western-based contemporary medical systems required the knowledge of external expert personnel for its use/application.
8. Shortage of trained health workers to offer the Western-based contemporary medical systems at all levels.
9. Impersonal care, (i.e. distance between medical staff and patient).
10. Purposive causation of shortage of drugs and services in health facilities.
11. Abuse and harassment of patients in health facilities.
12. Supply of drugs and services of Western-based contemporary medical systems as a business strategy beyond the initial intended purpose.
13. Lack of technical-know-how in the management and sustainable use of equipment and facilities provided from the Western world.
14. Patients' expectations of instant cure are pertinent issues that can't be ignored.
15. Both chronic and acute side effects are ever emerging from the use of drugs and services of Western-based contemporary medical systems.

These problems associated with contemporary medicines have caused dissatisfaction in contemporary biomedicine and led people, even in the developed countries to seek ethnotherapies in their respective communities.

After independence, and particularly during the 1970s, a lively debate raged in many African countries regarding the

place of African ethnomedicines in the development of health services at the beginning of Renaissance era. These debates led to the development of a number of research initiatives whose purpose was to make the case for the recognition of African ethnomedicines as a critical component of national health systems. By the mid-1970s, many African states/countries were faced with acute problems of inadequate provision of primary healthcare services to their rapidly growing populations. Even the shift in their policy from curative to preventive and promotive services did not provide eminent solutions to these health-based problems. As a result, from 1975, UNICEF and WHO began to emphasize the inclusion of African communities' ethnohealthcare services in primary healthcare (PHC) approaches that were adopted at the 1978 Alma Ata International Conference whose goal was, "Health for All by 2000." In addition to these efforts, in 1977, WHO urged governments and states world all over to include ethnohealthcare systems in their national primary healthcare systems. For instance, here in Kenya, in the National Development Plan of 1979-1983, the government, like any other African countries, officially acknowledged that the industry of ethnomedicines was an important part of life of the people, particularly in the rural areas and therefore encouraged research in order to provide the scientific basis and rationale for the ethnomedicines used by the ethnopractitioners. Between 1986 and 1991, the Kenya Government drew up health guidelines on PHC, which embraced the utilization of aspects of African ethnomedicines in official national healthcare delivery services. To strengthen this initiative by the government, the resolutions and recommendations of WHO regarding the use of ethnohealthcare systems in national healthcare developmental plans of governments and states, particularly in developing countries, were reaffirmed at the 40th World Health Assembly held in May 1987 (Wanzala & Walingo, 2019).

In Kenya, such research initiatives into ethnomedicines witnessed some significant developments such as the development of the Centre of Traditional Medicine and Drug Development at Kenya Medical Research Institute (KEMRI), Nairobi, Kenya, Traditional Medicine Unit of the Department of Pharmacy, University of Nairobi, Kenya, Registration of herbalists and their herbal products by the Department of Culture, Ministry of Sports, Culture and Social Services, Government of Kenya, and Traditional Medicine Centre at Kenyatta University, Nairobi, Kenya. In addition, there has been development of tertiary institutions to train middle level personnel in ethnomedicine at certificate and diploma levels, such as Dr. Jack Githae's Colleges of ethnomedicine at Naivasha and Nyeri towns in Kenya.

In light of what has been observed in different parts of Kenya since 1979, it is justifiable to state that, in spite of the policy enunciations mentioned above, not much has been done in terms of full recognition for the industry of ethnomedicine, provision of legal support for its technical development through research and development, and the development of registration and certification procedures for the health ethnopractitioners. Therefore, the issue of placing ethnomedicine in its rightful position in Kenya's official national healthcare system is far

from settled. While the matter awaits settlement, most Kenyans continue to use ethnomedicine in a variety of ways.

Legal Framework of Ethnomedicine with Special Reference to Kenya: Every ethnic grouping legally regulated the industry of ethnomedicines in terms of standards, safety and efficacy, right from the ordainment process of the ethnopractitioners to the dispensing of ethnopharmaceutical agents and rituals (comprising ritual medicine). First, is the issue of identification of ethnopractitioners in society, a process that is associated with unique signs of bitter suffering diagnosed by a professionally ordained individual. Secondly, is the identification of the correct procedures defining the process of ordainment and the assembly of the items required to perform the determined ethnopractices. Thirdly, is the ordainment of the identified person in the community in a legally accepted framework of that particular ethnic grouping, accompanied with specific songs, procedural events and oathing oratory. Fourth, is the field guidance on legal identification, harvesting, preparation, carrying, storage and dispensing of the ethnopharmaceutical agents and rituals. Fifth, is conducting the ethnopractice following the ordainment process. All these five steps are ethnically the composition in a summarised format, the legal framework of the industry of ethnomedicine of any one particular ethnic grouping together with its extremely rich informal education for learning, training and apprenticeship, depending on the ethnofield of specialization. This particular information and ethnoknowledge is not known to many people especially conventional educationist like Sifuna (2022), who describes the sector of ethnomedicine as weird, witchcraft, sorcery, wizardry and quackery because of its proneness to quackery as a result of lack of requirements for conventional academic and professional qualifications, has no standards, safety measures, efficacies etc. Unfortunately, up to date, the above-mentioned step-wise useful ethnoprocedures of the legal framework of ethnomedicine remain largely undocumented in all ethnic groupings in our respective societies. It therefore follows with logical necessity that as ethnoknowledge becomes largely eroded in our indigenous and local communities (Wanzala *et al.*, 2012; Kigen *et al.*, 2013), so is the legal framework that governs the respective ethnic groups with the result that the conventional governance now takes precedence in all respects. This drastic shift from ethnoknowledge-based legal framework of livelihood management to the current conventional governance system, created not only confusion amongst succeeding generations in the societies but also caused great loss of useful ethnoknowledge, which is not easily retrievable by any means, other than considering it completely extinct. The realization that we salvage the remained ethnoknowledge-based legal framework for the management of livelihood, is witnessing the introduction and implementation of conventional governance system with colonial connotation to manage the industry of ethnomedicines, a situation being equated to non-sustainable failed top-down approach mechanisms previously imposed on developing nations by the west world. This approach is unique, mentally unrealistic, disturbing and appears retrogressive in nature for it is not inherent in the cultural beliefs, taboos and norms of the affected indigenous and local communities, thus not resonating with people's aspirations in life other than undermining the

use and applications of ethnomedicines. For instance, from the international point of view, the United Nation CBD's Articles and associated protocols (of Nagoya and Cartagena) provided the much-needed modern guidance for the process of member parties enacting relevant conventional national laws on the sustainable utilization and application of ethnomedicines. For instance, in China, since 1949 the government has introduced several policies that protect the practice and sustainable utilization of ethnomedicine (Gagwani & Cheprasov, 2023). And the WHO Global Survey on ethnomedicines revealed that about 100 countries in the world have put in place ethnomedicine-related national policies, regulations and strategies to guide the sustainable utilization of ethnomedicines (WHO, 2023a). For instance in Kenya, such laws, policies and regulations were comprehensively reviewed by Wanzala and Walingo (2019) and include: - Witchcraft Act 1925, Science and Technology of 1977 (Cap 250, Laws of Kenya), Science and Technology (Amendment) Act of 1979, Kenya Development Plan 1989-1993, National Drug Policy, 1994, Industrial Property Act (Act No. 3 of 2001), National Policy on Traditional Medicine and Medicinal Plants, 2005, National Policy on Traditional Knowledge, Genetic Resources and Traditional Cultural Expressions, 2009, Pharmacy and Poisons Act (Cap 244 Laws of Kenya), Public Health Act (Cap 242 Laws of Kenya), Science, Technology and Innovation Act of 2013 (Act No. 28 of 2013), PTK&CE Act 2016, Health Act 2017, Traditional and Alternative Medicine Policy Draft, 2018, National Policy on Culture and Heritage, National Traditional and Alternative Practitioners Council (NTAPC), 2018, Traditional and Alternative Health Practitioners Bill 2019 and Health Laws Act No. 5 of 2019. However, for some legal matters, the appropriate guidelines and regulations to inform the implementation process by concerned officers, both at the national and county governments in Kenya is by large comprehensively lacking and remains an unaccomplished task in history (Kigen *et al.*, 2013; Chebii *et al.*, 2020; Sifuna, 2022). On the other hand, some laws are not sufficiently developed, whereas some policies, regulations, procedures lack Parliamentary legislation for anchorage and support during the implementation process such as the draft regulations developed for the implementation of PTK&CE Act 2016 in 47 counties in Kenya may not legally work well unless the Act itself is properly amended in the Parliament. From the aforementioned, a national taskforce is hereby recommended to re-examine all legal entities mentioned above, harmonize them into a draft Act, propose draft policies, institutional arrangements (such as the NTAPC with its appropriate operational structures) and present them to the Parliament for discussion and subsequent approval and operationalization by an appropriate statutory arm of the government.

The most appropriate way is to salvage the remnants in ethnomedicine industry, put them together by way of sustainable documentation and use them to develop an acceptable well-structured sustainable system of governance that incorporates both ethnoknowledge-based legal framework and conventional governance so as to be applicable in the society without suspicion and subsequent rejection (Kala, 2017). There is need therefore to enact a specific Act of Parliament to address all the issues concerning the industry of ethnomedicine as an

independent system of knowledge, away from the current, Health Act 2017 and any other related Act of Parliament. And because of the interdisciplinarity and intersectorality nature of the industry of ethnomedicine, the composition of NTAPC in the proposed Act must be inter-ministerial, that is, members must be drawn from different ministries such as: - Ministry of Health, Ministry of Sports, Culture and Heritage, Ministry of Environment and Forestry, Ministry of Tourism and Wildlife, Ministry of Devolution, Ministry of Sports and Gender, Ministry of Interior and Coordination of National Government and Ministry of National Treasury and Planning.

The Pharmacy and Poisons Board (PPB) of Kenya, in its current conventional state, cannot in any ways claim to be knowledgeable enough to register all categories of ethnopractitioners, all ethnopharmacological agents and other healing aspects in the society as well as monitoring the practice of ethnomedicines in the field (GOK, 2010). As far as ethnomedicines is concerned, PPB is inadequate in terms of knowledge content and personnel to oversee the ethnopractices in the field in such common areas as those of bone setters, birth attendants, African diagnosis procedures, spiritual ethnomedicine by visions and dreams, ritual medicines, rain-making ethnoinstruments for eyes' treatment, ethnoengineering huts and associated instruments for ethnotreatment etc. The most critical challenge is that all these ethnohealth practices are strictly home-based. Additionally, the PPB does not understand and has no knowledge about African Ordainment processes that produce ethnopractitioners they claim to monitor and evaluate in the field, and secondly, its personnel do not know and understand the existing varieties of African diagnosis procedures utilized before ethnotreatment, more particularly in the field of zoopharmacognosy. The enacted Pharmacy and Poisons (Conduct of Clinical Trials) Rules, 2022 for the conduct of clinical trials involving traditional or alternative medicines in Kenya do not put into considerations the above mentioned aspects of ethnomedicine environments. In conclusion therefore, PPB in its current composition, has no ethnomedicine capacity (Torri & Hermann, 2011) to deliver constitutionally to the advantage of the stakeholders unless an independent statutory body is constitutionally put in place with an independent Act of Parliament. Following these aforementioned inadequacies of PPB, it follows with logical necessity that this function should be solely the prerogative work of a well constituted NTAPC as an autonomous statutory body of the Government of Kenya (GOK) in order that the government shall be able to align ethnomedicines in Universal Healthcare Coverage (UHC) strategic plan of the national healthcare systems to provide an integrative approach of inclusivity (Torri, 2010; Vandebroek, 2013).

Misinterpretation/Misunderstanding of the International Law/Treaties/Rules/Guidelines: The CBD refers to ABS in relation to genetic resources but the exact scope of this term has not been fully determined. Some legal minds and experts understand the concept to include not only genetic information but also the biochemical substances in living organisms. How about fossil records without either DNA or RNA but with other biochemical substances? Probably, further interpretation of the appropriate CBD Articles related to genetic resources and as

described in the Nagoya and Cartagena Protocols is however, needed at the international level to allow the development and implementation of appropriate laws in member countries. At national level, for instance in Kenya, the development of regulations and standards for the implementation of the PTK&CE Act 2016 at the grass root level remains shadowy and the greatest impediment to the development of the industry of ethnomedicines. This is indeed compounded by the fact that succeeding governments, each having its own new and unique national agenda, that doesn't recognize the previous one in order that the governance system allows for the continuity of national development programmes. For instance, in Kenya, the development of the industry of ethnomedicines can make an impact only if the national priorities and agenda for research, industrial development, innovation, science and biomedical sciences, technology etc. holistically includes ethnoknowledge, cultural health ethnopractices, ethnomedicines in general etc.

Quackery in the Industry of Ethnomedicines: Also known as “health fraud”, quackery is the “inappropriate medical practice with pretense, professionally and or publicly, having skills, information/knowledge, experience, qualifications and or credentials that are not acquired in any ways for socio-economic gains. Furtherance to these ethical implications and complications of offering health solutions that do not in reality exist, quackery influences people to forego the state-of-the-art treatments that are more likely to help them, in favor of ineffective treatments given by the individual practicing quackery (the quack) (Angell & Kassirer, 1998; Cassileth & Yarett, 2012). Because of lack of evidence-based science in support of ethnomedicines (missing biological plausibility, testability, repeatability and or evidence of effectiveness), many people in conventional medicine profession have criticized and labelled it works of quackery (Shippee *et al.*, 2013). However, in the contemporary world, this narrative no longer exists as studies of ethnomedicines, particularly the field of ethnopharmacology, have led to the drug discovery industry whose products are directly applicable in conventional medicine, thus providing the much needed evidence-based science in support of ethnomedicines. Existence of quacks driven by competition and lust for money, fame, jealousy, hatred etc, undermines the ethically set standards of ethnoprofessionalism given to the ethnopractitioners during the ordainment process. The claimed “herbal doctors” and “virtual patients” on social media are rampant (Ayeni, 2023) and costing the industry a great deal. Loopholes in the law compounded with corruption, nepotism, tribalism, favourism etc., have expedited the practice of quackery in the industry of ethnomedicine (Okumu *et al.*, 2017). If globalization is not well monitored and evaluated on an evidence-based scale, it may lead to loss of ethnoknowledge as well as enhancing the practice of quackery (Voeks, 2007; Vandebroek & Balick, 2012).

Capacity Building in Ethnomedicine Industry: The concept of capacity building in this review may be considered in the same context as that of Torri and Hermann (2011) to imply the capacity to use and apply ethnomedicine knowledge to enhance socio-economic growth and development of the indigenous and local communities, thus securing its survival in

future. The innovative creation and reinforcement of capacity building also require capacity strengthening processes to be put in place in order that an everlasting solution is realized (Torri & Laplante, 2009), usually meant to maintain the control mechanisms of certain standards, efficacies, quantities etc of given ethnopractices, which have achieved certain levels of prominence of acceptance in the society. Otherwise, this useful ethnoknowledge is fast disappearing with UNESCO estimating that at least 43% of 6,000 languages spoken in the world are endangered, most if not all of these are Indigenous languages representing a great loss of ethnoknowledge (Marrie, 2019). It is indeed a great loss because languages provide a vital mechanism through which ethnoknowledge is programmed, articulated and transferred to the next generation henceforth, continuity of maintenance within succeeding future generations. Generally, there are four levels of ethnomedicine capacity: -

1. Ethnomedicine capacity originating from the interactions between ethnopractitioners of ethnomedical systems such as Ayurveda, Sidha, Unani, Amchi etc and conventional scientists focused to generate value addition knowledge, innovations and patents for socio-economic enhancement and livelihoods improvement (Torri & Laplante, 2009).
2. Ethnomedicine capacity originating from the interactions amongst conventional scientists focused towards producing ethnoknowledge-based new molecules and generic ones in laboratories for development into commercially valuable products in the society (George, 2011; Newman & Cragg, 2016; Atanasov *et al.*, 2021).
3. Ethnomedicine capacity originating from the interactions amongst the ethnopractitioners and their immediate family members through kinship, inheritance, apprenticeship, trade, ceremonies, trophies, ethnopractices etc (Wanzala, 2009; Wanzala *et al.*, 2012). Apprenticeship is commonly used as a friendship affair of capacity building merely based on memory and oral transmission, and jealously guarded within family lineages of given ethnic groupings in a society.
4. Spiritual ethnomedicine capacity originating from visions and dreams of both the living and dead in mentoring a given individual in the society in matters of ethnoknowledge including that of ethnomedicines. However, the reference here is not made to church-, mosque-, God- and denomination-based spiritual but instead, ethnic spirituality that exists within lineages of families and individuals (Anquandah, 1997). Ethnomedicine uses animal- and plant-based materials, natural components like minerals, soils, air etc. and natural practices for treatment like yoga, meditation and spirituality (Mahapatra *et al.*, 2019; Gagwani & Cheprasov, 2023). Spiritual healing is inherently ancestral in nature and usually involves the psychological unification and synchronization of the ancestors, spirit, mind and body in order to achieve the intended wellness (Kenneth & Herbert, 1999). It is also known as super-natural and or magico-religious ethnopractices for curative and preventive measures (Das *et al.*, 2008; Sonowal & Barua, 2011). However, some people consider the spiritual aspect of ethnomedicine industry as being controversial and just masked in mystery with limited success upon application (Anquandah, 1997). Nevertheless, in dreams and visions, one is spiritually guided, shown and trained on the various

ethnopractices of different aspects of ethnomedicines whose effectiveness and efficiency is based on the ability to remember and implement the nightmares appropriately (Author's experiences in life) - *this is fundamentally a unique world beyond the living humanity.*

Humans believe the existence of “vital life forces”, which permeate the whole universe. God and gods (super natural beings) are the sources of these vital life forces in the universe and have ultimate control over them; the spirits have access to some of them. A few anointed humans, such as ethnopractitioners, shamans and priests, are believed to have the ability to tap, manipulate and use the vital life forces. The vital life forces may be benevolent or malevolent and can be used in positive or negative ways. Because these forces are essential and present everywhere, they cannot be neglected in ethnohealing practices.

Health is considered to be the absence of disease, ill-health (a state of health that is not good, especially over a long period of time) and intervention by evil spirits. Illness/disease is therefore considered as the result of a disturbance in the physical, mental (psychological), social, spiritual and physiological equilibrium, and lack of their balance and subsequent well-being of the affected victims and this state of affairs can be caused by natural and supernatural forces. Improper actions by humans cause relationships to be broken, and this allows these forces to cause disease.

The training, whether apprenticeship, family grooming, informal or formal, rises the level of recognition and value of the indigenous and local ethnoknowledge, increases the capacity to study, document and monitor ethnoknowledge and enhances its sustainable utilization at all levels and henceforth, transfer within succeeding generations (Torri, 2010). However, lack of written records of the ethnomedical practices make it difficult to make objective reference and follow up the practice in evolutionary history of succeeding generations (Kambewa *et al.*, 1998; Catley, 2003; Wanzala *et al.*, 2005). Making written records for future reference is in itself an empowerment tool and henceforth, part of capacity building amongst ethnopractitioners (Wanyama, 1997; Toyang *et al.*, 2007).

In the past, the concept of ethnomedicine was always synonymous with the old generation (Das *et al.*, 2008; Mpofo & Miruka, 2009), which normally has little and or no literacy, sufficient to manage the ever rising and challenging issues of human, animal and plant health based on their inherent ethnoknowledge but this particular generation has the capacity to transfer ethnoknowledge to future generations. However, current life style, faith, formal education system and ICT technologies have obscured the usual oral transmission of ethnoknowledge from elders to young generations as was initially intended (Marrie, 2019). The recommendation that the transfer of indigenous and local ethnoknowledge be made through schools' curricula (Mpofo & Miruka, 2009), may not work sustainably because of family confidentiality associated with it and due to its diversity, a number of items may be left out. Probably, as Marrie (2019) suggested, it could be appropriate in the era of digital technology, innovative products be designed

that prioritize the ethnoknowledge holders and revitalize how the ethnoknowledge is transmitted amongst the youth to help preserve and pass on the current culture to future generations digitally. For capacity building to be effective and efficient, all ethnic ordainment processes, informal trainings and learning processes, and ethnopractices inherent in indigenous and local people's cultures must be recognized, adopted and documented, supported by governments and states and considered as an independent ethnoknowledge system by Acts of Parliament to provide anchorage and foundation upon which developed and related regulations, standards and policies can be sufficiently implemented for prosperity in life. Change from the western-based worshipping and beliefs, education system and lifestyle to indigenous-based cultural way of life may help salvaging the indigenous and local ethnoknowledge and its transfer to future generations (Wanzala *et al.*, 2012).

Sources of Ethnopharmaceutical Agents and Healing Powers: Sources of ethnopharmacological agents mainly come from the forests, bushes, grasslands, atmospheres, oceans, lakes, rivers, streams, mountains etc and include: - plant species, animal species, soils, minerals, stones/rocks, air, water, super-natural and or magico-religious powers, products of plant and animal species etc., which usually become diminishingly dangerous in time and space (Anquandah, 1997; Das *et al.*, 2008; Torri, 2010; Sonowal & Barua, 2011; Wanzala *et al.*, 2016a, b; Mahapatra *et al.*, 2019), depending on the nature of utilization. In Africa, some medicinal and aromatic plant species are cultivated, either on a small or large scale (Moeti, 2022). The super-natural and or magico-religious powers for healing are sourced from: - shrines, sacred mountains, hills and stones, soils, sacred trees, sacred animals, sacred waters of streams, rivers, lakes and oceans, sacred forests/bushes, sacred valleys, wind, sky, sun, moon, stars, rain, sunshine, clouds, grave sites and ethnic instruments of power and authority (Voeks, 1997). Sometimes, diseases and ill-health conditions are considered as an effort of ancestral spirits, gods' spirits and or may be evil spirits/demons to communicate a message to the living such as installing a person as a diviner, magician, a king, an elder etc, and or seeking special attention from the living by causing illnesses, suffering, acts of shame etc in a member of the community. This calls for the performance of specific rituals, which may include special sacrifices in order to appease the spirits, while at the same time restoring the health of the affected person. Sacrifices to ethnic gods were regarded as universal redeemer whenever any natural or unnatural calamity befell upon the individual, family or the whole tribe. Animals' blood, flesh and even the contents of the bowels possessed, in the opinion of the later descendants, marvelous healing powers. For instance, in Gikuyu community in Kenya, a goat would always be sacrificed to *Ngai*, their god in order to pray for good harvest, rain, thanksgiving, healing the sick and removing ill-health from affected persons, purification purposes, etc. Whereas the Bukusu of western Kenya worshiped and made sacrifices to *Were Khakaba* (god who gives) who was believed to exist on Mount Elgon and would give and take away life.

Providers of ethnohealthcare delivery services such as diviners are consulted to mediate the involvement of the spiritual world, diagnose the disease(s) and or ill health amongst

people and prescribe the ethnomedicines while the herbalists and zoopharmacologists are consulted to provide curative medicines from plants and animals, respectively. Occasionally, a number of providers of ethnohealthcare delivery services are simultaneously consulted, including the African ordained foretellers. Ethnodiagnosis is often carried out by using several mechanisms and/or senses: palpation, listening to patients' vocalization and respiration, percussion, taking the pulse, feeling for fever, observing subtle behavioral changes, pinching the skin, taste, touch, smell and visual observation of patients' clinical signs. Epidemiologically, assessment of the previous history, noting of weather and or climatic conditions of the environment and patients' medical history and genealogy, form part of the critical ethnodiagnosis procedures that inform ethnotreatment. An extensive ethnodiagnosis involves supernatural methods such as consulting spirits, oracles or divination. Sometimes special animals are used for diagnosis either by keenly looking at their outward appearance or slaughtering them and then consulting a diviner to observe the internal organs from which predictions about an event (a disease, any problems etc) is made zoopharmacologically.

Other remedial products in the ethnomedical systems include: use of special words called *spells*, prayers in combination with sacrifice, ceremonies and rituals, body massage and surgery, metallic bracelets and certain special metallic items and use of other vital ingredients such as honey, vegetable oils, ash, animal urine, animal butter, etc.

Revelation of useful ethnopharmacological agents sometimes occurs during ceremonies, apprenticeship, in visions and dreams as an inherent ethnoknowledge at individual level in an African spiritual world when well connected with ancestral spirits and appropriate cultural practices including respect for ethnic taboos and norms. The ethnoknowledge is also based on the level of maturity and trust of kinship in family lineages (level of keeping ethnic/family secrets) and levels of friendship and respect bestowed on the identified individual of interest in the society.

The most striking challenge is that most of these ceremonies are no longer conducted and the lifestyle in the digital era has drastically reduced conduct between the young and old generations, whereby building trust to help transfer ethnoknowledge is no more. This ethnopharmacological knowledge is majorly based on human memory (de Santana *et al.*, 2016) and henceforth, heavily affected by:- people forgetting, people confusing, people losing memory completely, people dying, people migrating etc.

Gender in Ethnomedicine Industry: Ethnopractitioners are not naturally selected on the basis of gender for the process of ordainment in the society. In all the cases other than the quackism ones, the ethnic practice of ethnomedicine is an inherent process, which somebody is born with like a spirit and is ordained when he/she becomes of age. The practice of ethnomedicine therefore should not have gender bias as a profession in any ways but this is not always the case in our societies. However, in some ethnic groupings, gender in ethnomedicine industry is skewed because of the existing taboos, norms, cultural beliefs

and deliberate practice of gender bias. For instance, Torri (2010) found out that in India, Thimmapuran (Tamil Nadu), ethnically, women were not deliberately empowered to participate in the practice of ethnomedicine, while at Adivasi in India, Marrie (2019) reported women ethnoknowledge was of great value in forest conservation, the main source of ethnomedicines. This phenomenon of discriminating women against the practice of ethnomedicines represents a social stigma in the society with the result that some ethnomedical knowledge become hidden from the society. Whereas here in Kenya, there are more women practicing ethnomedicine in Kamba community (in Southeastern Kenya) than men, while in Bukusu Community in western Kenya, the number of men and women practicing ethnomedicine is almost the same (author's experience while working in these communities with ethnopractitioners). Torres-Avilez *et al.* (2016) evaluated ethnoknowledge of medicinal plants based on gender at national, continental and global levels and concluded that there were no significant differences in the ethnoknowledge of the genders. Also de Santana *et al.* (2022) also found no significant differences in the ethnoknowledge of the genders but they noted a substantial trend for women to be more knowledgeable about the healing properties of herbaceous and cultivated plants. Professor Marrie (2019) once noted with great concern that, "*Women play a key role as the main transmitters of traditional knowledge within their communities. They are regarded as the main caregivers, but also the holders and custodians of traditional knowledge and culture. Women share their learning with their children. This knowledge can range from methods of biodiversity conservation and sustainable use of resources to warning signs deriving from natural phenomena. Women are frequently the primary managers or collectors of natural resources such as drinking water, fuel and medicinal plants. For example, women's knowledge of wild vegetables- an important component of traditional food systems- is key to food security and nutrition for their families.*"

The participation of women in ethnomedicine industry is fundamental in ensuring the sustainability of the ethnomedical knowledge within lineages of families as well as its transmission to the future generations (Voeks, 2007; Wayland & Walker, 2014).

Harvesting Plant Species for Ethnomedicines: Some herbs and zoopharmaceuticals are harvested and prepared at night only while other *materia medica* are harvested while ethnopractitioners are naked. Rituals, incantations and prayers are sometimes connected with the process of harvesting particular plant species and added special ingredients with a view to making a given plant *medica* very powerful. The collection and use of some medicinal plant species may involve special ethnopractices like the ones described below: -

1. Some plants are only collected and processed on special days at particular time e.g. at sunrise on Sundays only.
2. Before and after harvesting particular plant species, ethnopractitioners are not supposed to speak to anybody until they have finished their process.
3. Specific rituals are performed when hunting or harvesting certain plant species.
4. There may be other requirements such as a special initiation ceremony being conducted, a sacrifice being made or one

being naked and at night, very early in the morning and or in the evening.

These are indeed scaring facts in the ethnomedicine industry that are little known. For instance, members of the plants belonging to the genus: *Mandragora* presents a very interesting example of the use of spiritual forces of magical in nature in the ethnohealth systems. Mandragoras are plants thought to be little dolls or figures (objects) given to sorcerers by the Devil for the purpose of being consulted by them in time of need; and it would seem as if this conception had sprung directly from that of the *fetish*, which is nothing else than a dwelling-place (object) made by a shaman or medicine-man for the reception of any wandering spirit who chooses to take up his abode therein. Mandrake plants are scattered throughout the game world, and their roots can be harvested for use in alchemy/magic. Mandrake plants and their roots provide cure for various diseases, resist poison, damage agility, and fortify willpower effects. They are plants of love used to make barren women conceive and lure both men and women to bed for sexual intercourse and used at times of wars to fight and win against enemies. These plants are magically believed to cause disease again. However, the following description is a magic myth taken from Paul Christian, the author of *The History and Practice of Magic* (1963: pp. 402–403). This myth describes the processes of making mandrakes more powerful than they are.

“Would you like to make a Mandragora (roots of plants in this genus have long been used in magic rituals, today also in neopagan religions such as Wicca and Germanic revivalism religions such as Odinism), as powerful as the homunculus (little man in a bottle) so praised by Paracelsus (a title of Swiss alchemist, physician, astrologer, and general occultist)? Then find a root of the plant called bryony (is the common name for any of the twelve species in the genus: Bryonia having large leaves and small flowers and yielding acrid juice with emetic and purgative properties). Take it out of the ground on a Monday (the day of the moon), a little time after the vernal equinox (the moment when the sun appears to cross the celestial equator, heading northward; the point where the ecliptic intersects the celestial equator at that time). Cut off the ends of the root and bury it at night in some country churchyard in a dead man’s grave. For thirty days, water it with cow’s milk in which three bats have been drowned. When the thirty-first day arrives, take out the root in the middle of the night and dry it in an oven heated with branches of plants in the genus: Verbena; then wrap it up in a piece of a dead man’s winding-sheet and carry it with you everywhere.”

These are quite mysteriously challenging scenarios in the history of ethnomedicine industry that require serious considerations and reflections in order to select the parts that work well for humanity to be maintained.

Administration of Ethnomedicines

There are many different methods of applying or administering the prepared ethnomedicines to the patients in the society. The administration depends fundamentally on the:- 1. particular nature

of the disease and or ill-health condition to be treated, 2. existing cultural beliefs, norms and taboos of the patient in question, 3. type and nature of the preparation to be utilized, 4. state and or condition of the patient and 5. nature of the ordainment of the ethnopractitioner to administer the preparation. Some of these methods of administration of ethnomedicines are outline below but not in an exhaustive manner.

The juice made from boiled herbs, minerals/soils and beef is frequently drunk for internal treatment, used as bathing water for external diseases and or ill-health conditions, or used for both bathing and drinking. The same methods are used in applying soaked herbs. Drenching is the oral administration of preparations in a liquid form for both animals and even humans. The liquid is approximately measured and is usually given to animals using bottles, kettles or calabash spoons. Washing the animal with a decoction, an infusion or another non-plant mixture is the equivalence of human bathing, a common and widely used ethnoveterinary method. It is used in the treatment of ectoparasites such as lice and ticks and some infectious diseases such as heartwater (cowdriosis) and haemorrhagic septicaemia (Wanzala *et al.*, 2012).

Pounded stuff, unless further boiled or soaked, is commonly mixed with ghee, and simply rubbed on the affected part(s). Alternatively, it may not be mixed with ghee, but simply rubbed on the affected part or tied with an ethnobandage to support it. Sometimes the affected part of the body is cut open with a razor blade or pocketknife and then the ethnomedicine is rubbed in the small openings made (Wanyama, 1997; Toyang *et al.*, 2007).

Some of the ethnomedicine is chewed and or licked. The main purpose of chewing and or licking a drug plant/substance is to gradually extract its juice, the curative substance, saliva being used as an organic solvent. The extracted juice can be swallowed if it is for internal treatment such as stomachache, spat on the wound if it is for external application, or simply retained in the mouth for a long period if it is for some kind of mouth complaint such as toothache. Ethnoveterinary medicine in form of powders is usually administered in the form of salt and mineral licks. The ethnomedicine is mixed with salt or minerals, sand and cement in different proportions depending on the formula of the lick stone. Animals ingest the ethnomedicine by licking it together with the lick stone. Ash from the burned ethnomedicine is commonly licked for internal treatment, applied directly on the wounds if open or on small cuts (usually wherever the pain is located on the patient) made by a razor blade, or rarely, soaked in water and drunk. In most cases, the ash is mixed with salt.

The roasted succulent leaves are mainly applied externally by pressing them on the affected part of the body, and constantly reheating them to keep them hot, a process known as poulticing.

Although spraying is not a very common practice in ethnomedicine applications, it is sometimes applied to patients by experienced ethnopractitioners in the community.

A number of aromatic drugs are used in steam form, by first boiling them, and then letting the patient inhale the vapour

from the boiled stuff. Fumigation is a very common practice in ethnoveterinary medicine too. Dry powders or dry coarse materials are burnt in clay pots or on the ground so that the smoke generated engulfs the sick animal or human or the entire herd/family. Organisms on the animal, such as flies, mosquitoes and ticks are killed by the poisonous gas or smoke.

Quite often the ethnomedicine preparations are mixed with food/drinks and either eaten and or drunk, especially the bitter preparations. In Kenya, the Maasai, Saboti, Samburu, Turkana and Kalenjini communities for example, are fond of taking their ethnomedicines in milk (fresh and or fermented) and or blood, while the Luhya, Kamba and Kikuyu communities frequently take theirs in soup (meat and or vegetable soup). Another base food frequently used by East Africans for taking various ethnomedicines is gruel, preferably that made from wimbi (African finger millet), cassava and or maize flour. The modern generation in East Africa, of course, frequently takes their ethnomedicines in tea, honey and rarely in soup. Various types of African local brew are also used for taking plant- and animal-based ethnomedicines.

Injections are not often used in ethnomedicine applications. However, only a few very experienced ethnopractitioners can be able to administer the ethnomedicine by injection, mostly to the animals and rarely to humans.

Topical applications of ethnomedicine in the form of liquid, paste or powder are often used to treat skin lesions and eye diseases. A paste is made by grinding the ingredients to a powder and adding a small amount of water. A powdered remedy can be applied directly to the affected area, e.g. to treat wounds or eye problems.

Dispensing ethnomedicines: Terrifying and irritating mechanisms of dispensing ethnomedicines are applied; particular those involving nostril and body incisions, henceforth scaring there would be clients of the ethnomedicine industry. Scaring ones also include bathing at the crossroads at night and slaughtering of animals at the riversides, on the mountains, in the caves, on the ancestral rocks etc.

Whatever type of administration applied to the patient, this has been a subject of criticism and debate in the society, particularly among the christian community as that has always been equated to the practice of magic (Martin *et al.*, 2001) given that it is conducted in homesteads at uniquely built special houses, not constitutionally approved. There is great need therefore to identify and recognize such ethnopractices by providing value addition where necessary so that their continuity to support primary healthcare system is maintained and improved upon with special focus on hygiene of the ethnopractitioners and environment, risks involved with the apparatus used, security of patient, efficacy of the ethnomedicine, etc. The most disturbing feature in all these ethnomethods of administration of ethnomedicines is that they are not standardized as required by World Health Organization (WHO, 1996, 2007). However, there is need to have ethnoknowledge-based standards and regulations that are just above board and anchored in the law

(constitution) in order to develop a robust ethnomedicine industry that can be able to meet the people's aspirations and demands in the society.

Some Preparation Methods of Ethnomedicines

A number of forms are used for preparation of ethnomedicines for application depending on the existing cultural beliefs by the time of treatment, type and nature of the ethnomedicines, type and nature of the disease/ill-health condition, the patient, the method of application and the ordainment process of the ethnopractitioner administering the preparations.

Powder: Barks, roots, leaves and entire plants are dried and pounded until they form a powder. If desired, the powder is sieved to make it finer. The powder can be fed to sick animals and humans directly, mixed in for the case of animals or other food stuffs for the case of humans or used in the preparation of decoctions and poultices.

Poultice: Adding just enough hot water to plant material, usually in powder form, makes a poultice or a paste. The paste is then applied on the affected area. Poultices are used on inflamed areas, bruises or to soothe irritations, as well as to withdraw pus, toxins and particles imbedded in the skin.

Ointment and cream: An ointment is made by mixing finely powdered plant materials or extracts with butter or cooking oil. The ointment is applied to affected areas such as rashes or sprains.

Decoction: This is one of the most commonly used preparations. One or several plant materials are chopped into small sizes and added to water. The water is boiled for 15-30 minutes. Use only clay or steel pots; no aluminium utensils should be used for this.

Infusion: An infusion is made in the same way as tea. Boiling water is poured into a container in which powder or chopped plant parts have been put. The container is covered for 10-20 minutes until the medicinal components have been extracted. The water is filtered and given to the animal/human, cooled or warm.

Cold water extract: Some active ingredients are easily destroyed by heat. Therefore, a cold water extract can be made by soaking leaves and roots (cut in small pieces and pounded in a mortar) overnight in water. After filtering, the cold extract can be administered. The extract should be prepared from fresh material daily.

Tincture: Mixing water (70-80%), alcohol (20-30%) and plant materials makes a tincture. The plant materials are left in the mixture for one to several days until the desired medicinal properties have been extracted. The tincture is filtered and used internally or externally.

Fumigation: Dry or wet plant material is put in the fire and the smoke engulfs the animal. Fumigants are commonly

used against ectoparasites such as tsetse flies for the case of animals.

Unfortunately, these preparation methods have no standard guidelines and efficacies in the entire industry of ethnomedicine (WHO, 1996, 2007).

Some Storage Methods for Ethnomedicines

Ethnomedicines are usually stored in a solid dry form or in a liquid form as a decoction. If all the necessary steps have been taken for harvesting and processing, and the ethnomedicines are stored in the right way, the solid dry ethnomedicine may remain useful for several years. Liquid forms do not last for such a long time, although tinctures can be stored for at least 6 months. For most of the ethnomedicines, conditions of storage including shelf-life and environmental conditions are not known.

Ethnomedicines in solid dry format: Herbal products are best stored in powdered form. Adequately dried materials can be stored without further processing or can be ground into a powder. They should be put in a clean, dry cloth or a container with a tight cover. In this way, they will remain useful for at least two years (Author's own experience). After pounding, fresh plant materials can be mixed with honey and stored in a clean container. Ethnomedicine stored in this way will remain useful for a long time. The type of container depends on the existing cultural beliefs held by a given ethnic grouping. Commonly used containers include: - calabash, clay pots, Indian bamboo, plastic tins and bottles, glass bottles, animal horns, animal skin, pans, cloth materials, and polyethylene and paper bags. Containers are closed tightly to avoid contamination of the contents and loss of activity.

Ethnomedicines in liquid format: Decoctions can be preserved for a few months; tinctures can be stored for at least 6 months. To keep liquids for an extended time, it is very important to:- 1. clean and boil the medicinal ingredients and the containers (pasteurization), 2. use clean containers with good covers, 3. suspend containers in clean and dry places, and 4. add appropriate preservatives such as castor oil or limestone.

Storage locations: Ethnomedicines are stored in dry locations in houses, particularly in a special hut within a homestead. They must not be kept on the ground but suspended inside the hut, away from other people. Clay pots can be suspended by using a rope or placed above the ground on a three-stone stand.

These storage methods do not ensure the required safety of ethnomedicines and long shelf-life in order to make the clients build trust in the industry.

Some Preservatives for Storing Ethnomedicines

Preservatives are used to store ethnomedicines so that they remain in good conditions for a longer period of time than expected. Some preservatives have their own unique ethnomedicinal properties. Some of the preservatives used in ethnomedicine industry include the following: -

Alligator pepper: Alligator pepper (*Aframomum melegueta*) can activate the ethnomedicine and also act as a preservative.

Butter oil: Before powders are put in the storage containers, they can be thoroughly mixed with some melted butter. The butter should just be enough to wet the powder without forming a paste. In general, one-part butter should be mixed with 10 parts powder by weight.

Fat from cattle: Powder from herbal products can be preserved by mixing it with fat. Fat also helps plants to burn well for fumigation.

Ginger: Materials mixed with ginger can be stored longer.

Honey: Honey acts as a major medicinal component and preservative in fresh residues, decoctions and powders.

Limestone: Added to mixtures or decoctions, limestone helps to break down plant- and other traditional medicine materials to release the active ingredients, making the medicinal drug more effective.

Vegetable oils and butters: Vegetable oils and butters can be added to a powder or decoction and then boiled with limestone. The limestone helps to mix the fat with the liquid.

Wax from the *Danniella oliveri* plant: The wax of this plant is burnt together with the medicinal powder in a container.

Evidences are still lacking on the durability of the preservatives to maintain the medicines in the required state for a required period of time.

Anthropogenic Activities and Ethnomedicines: Anthropogenic activities have resulted in the modification of the environment to fit the needs and demands of humanity in the society. The modification process has caused severe effects such as global warming, environmental degradation, mass extinction of species and biodiversity loss, ecological crisis and ecological collapse (Crist *et al.*, 2022), which in turn have threatened the continued existence of the sources of ethnopharmaceutical agents applicable in ethnomedicine industry such as plant species, soils, stones/minerals, air, water, animal species etc, in their natural state. Therefore, without securing the security and safety of the biodiversity and the entire world environment, ethnomedicine industry is at a big risk (Alves & Rosa, 2007). Biodiversity is further threatened by land fragmentation (this involves land demarcation for settlement, development, urbanization etc) and its unsustainable practices (Sui *et al.*, 2022), that continue to affect the availability of ethnopharmaceutical agents applicable in the ethnomedicine industry.

***In-situ* and *Ex-situ* Conservation Strategies:** As outlined in CBD Articles 8 and 9 focusing on animal species, plant species, microorganisms etc. and the ecosystems and ecological complexes of which they are part of such as water, soil, minerals and air, presents a complex situation but a challenge to member countries. These conservation sites exist in member countries

and include - national reserves, national game parks, museums, woodlots, botanical gardens, homesteads, flowerbeds, individual lands, community/clan/family/individual shrines etc. Without enactment of stringent laws that provide the security and safety of species in these conservation sites, the unchecked anthropogenic activities will not allow their survival and continued use (Kasagana & Karumuri, 2011; Crist *et al.*, 2022).

Market Value-chain Supply of Ethnomedicines: The ethnomedicine market value-chain is composed of ethnopractitioners, considered as unprofessional and informal at the beginning and conventional actors considered as professional and formal towards the end. The complexity of the market value-chain is made worse by quacks and the practice of tribalism, corruption, nepotism and favourism for these adversely affects operating systems and processes in the industry such that personnel in-charge of offices (both in the public and private sectors) personalize resources and people do not get value for their products.

Ethnopharmacological agents are still collected from the wild in large amounts by gatherers (Kasagana & Karumuri, 2011), and this forms an important source of income in many poor rural and urban centres, particularly in developing countries. A small proportion of ethnopharmacological agents are sourced from protected and conserved sites such as national reserves, national game parks, museums, woodlots, botanical gardens, homesteads, flowerbeds, individual lands, community/clan/family/individual shrines etc. There is need therefore to develop interventions and create opportunities to benefit the poor producers a great deal and create awareness amongst them on the sustainable methods of harvesting and processing as well as sustainable conservation strategies of source organisms in both *in-situ* and *ex-situ* environments (Booker *et al.*, 2010). For the ethnomedicine industry to be fruitful and beneficial, capacity building and empowerment of ethnopractitioners, considered as unprofessional and informal at the beginning of the value-chain is indeed critical. As Hishe *et al.* (2016) analyzed and concluded, that in order for the industry to become competitive internationally and benefit all actors, the market value-chain must become more flexible, innovative and efficient, so that it can bring to the market relevant products in an opportune manner.

Climate Change: The impacts of climate change adversely affect the survivalhood of ethnopharmaceutical agents applicable in ethnomedicine industry such as plant species, microorganisms, animal species etc. and the ecosystems and ecological complexes of which they are part of such as water, soil, stones/minerals and air, etc, henceforth their availability for use (Cavaliere, 2009). Worse is what WHO (2023b) notes on the first-ever inaugural Health Day at the 28th UN Climate Change Conference of Parties (COP28) at the United Arab Emirates (UAE) Declaration on Climate Change and Health that, “The year 2023 has witnessed an alarming surge in climate-related disasters, including wildfires, heatwaves and droughts, leading to the displacement of populations, agricultural losses and heightened air pollution. The ongoing climate crisis has significantly increased the risk of life-threatening diseases

such as cholera, malaria and dengue.” These are indeed great challenges in the industry of ethnomedicine, more particularly where climate change causes extinction of species (sources of ethnopharmacological agents) and emergence and evolution of new aetiologic agents with no prior ethnoknowledge to the affected human population. These circumstances create challenging opportunities for research and discovery of invasive alien species.

Witchcraft and its Practice: Witchcraft is covered by the Witchcraft Act 1925 (Cap 67, Laws of Kenya). By definition, it is the use of magic and supernatural powers to cause harm, suffering and misfortunes in life of organisms (humans as well) including the ecosystems and ecological complexes of which they are part of such as water, soil, minerals and air (Hutton, 2017). Because of failure to differentiate witchcraft practices from those of ethnomedicines, many people have decided to reject the two lines, lest they become victims of witchcraft innocently. This therefore undermines the acceptance and practice of ethnomedicines in the society.

Socio-Politics versus Ethnomedicines in the Society: Biased development of government/institutional policies, vested interests, nepotism, favourism, tribalism, friendship etc, all undermine ethnomedical practices as well as interference with service delivery, development agenda, operations at all levels, planning and allocation of ethnomedical resources etc (McLaughlin *et al.*, 2021). Politicians and political opinion leaders in the society always give perception about use and application of ethnomedicines (Caulfield, 2020; Aprilio & Wilar, 2021).

Recognition of Established Ethnosystems in the Society: Well elaborate processes of African cultural ordainment systems for the ethnopractitioners exist but not recognized. Existence of specializations in ethnomedicine industry: - circumcisers, rainmakers, blacksmith, orators, spiritualists, herbalists etc. and cultural-based statutory bodies such as Council of Eldership, Age Groups and Transitions processes of Womanhood and manhood in the society with respect to their definitions and compositions are not documented and recognized within the cultural framework.

Documentation and Research into Ethnomedicines for ill-health Management in the Society: Ethnopractitioners, category of specializations, process followed, procedure, tools used, products used, results obtained/anticipated to get, prognosis if any etc. Challenging issues are; it is perplexing to access all results originating from research based on Ethnomedicines (such disciplines as ethnobotany, ethnopharmacology, ethnology, ethnomusicology, zoopharmacognosy, ethnozoology, witchcraft, ethnography) and appropriately utilizing them for the benefit of humanity. Additionally, comprehensive understanding of the synergism involved in ethnopharmacokinetics and further realizing the unique opportunities there in to study complex biochemical structures existing in biological systems is paradoxical (Heinrich, 2010). Documentation processes in ethnomedicine industry is elusive and biased by any standard, henceforth not giving the expected results.

Emerging Diseases and Pathogens: A wide range of diseases and pathogens are emerging with no conventional curative agent, including the most recent one, Covid-19 that ethnomedicines offer great potential in their prevention, control and management (Yang, 2020; Aprilio & Wilar, 2021).

Ethnopractitioners Working Under Fear: Quite a good number of ethnopractitioners work under fear based on:- 1. intimidation from conventional practitioners from conventional health facilities, 2. lack of clear legal framework that promotes the ethnopractices of health, 3. being ridiculed and labelled quacks and witch doctors, 4. their clients being chased away from hospitals once confirmed that they were attended to by ethnopractitioners before coming to hospital, 5. government statutory bodies like Pharmacy and Poisons Board (PPB) in Kenya, threatening to arrest them, 6. church leaders always preaching against them in the society, and 7. lack of any formal training to show as evidence of understanding ethnomedicines in the society. It therefore follows with logical necessity that surely ethnopractitioners have no space and or freedom of operation and practice under such environment.

Biological Evolution and Invasive Alien Species Concepts: These two concepts have the potential of initiating the emergence of new species whose value and impacts are unknown in the new environment. For instance, biological evolution may either cause extinction of existing species or emergence of new ones in some very unique ways (Vandebroek *et al.*, 2004; Santoro *et al.*, 2018) depending on the prevailing circumstances of operating mechanisms (McElreath & Strimling, 2008).

The Invasive Alien Species (IAS) assessment conducted by Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) underscores the fact that invasive alien species is a one of the five main direct drivers of biodiversity loss, with 1 million species of plants and animals now at risk of extinction (IPBES, 2023). This threatens the survivalhood of ethnomedicine industry.

Biopiracy and Bioprospecting: These two malpractices are the worst enemies in the ethnomedicines industry today. Biopiracy (scientific colonialism) is strategic theft, lawless, unethical, unlawful, illegal, illegitimate or unauthorized utilization of ethnoknowledge and associated biological or genetic resources without prior consent and permission from the associated native and/or indigenous people and includes an uncompensated collection of people's genetic resources for profitable determinations (George, 2011; Imran *et al.*, 2021). While bioprospecting (biodiversity prospecting) is biopiracy with a less negative connotation, referring to the exploration of natural resources for finding useful molecules and or genes for development into commercially valuable products in the society (George, 2011; Newman & Cragg, 2016; Atanasov *et al.*, 2021), thus providing new and unique opportunities for growth and development of ethnomedicines industry in the contemporary world (Saslis-Lagoudakis *et al.*, 2012; Sysoev *et al.*, 2021). It is important to note that, sometimes, the materials under considerations may not have been in use before ethnically. By commercial companies and individuals

involved in bioprospecting and patenting the new natural molecules, they actually infringe on the intellectual property rights of the original users (native and/or indigenous people) of these molecules, thus refusing purposively to recognize the ABS in accordance with Nagoya Protocol as a supplementary agreement to the CBD on access to genetic resources and the fair and equitable sharing of benefits arising from their utilization. As much as CBD demands that bioprospecting should not be conducted without the consent of the host country, individuals' collective responsibilities and political good-will together with the enacted appropriate laws in the member states and governments remain supreme followed by common sense, empowerment and capacity building in ensuring that native and or indigenous people are not exploited in any ways. For instance, the International Cooperative Biodiversity Group (ICBG) a network of bioprospecting projects funded by the US government ensures that 50% of the royalties accruing from the utilization of people's ethnoknowledge and associated biological and or genetic resources are invested into the community development funds managed by appropriate native and or indigenous people. However, the contrary has been noted albeit the development and implementation of such honorably noted ethical practices and enactment of international laws, guidelines and agreements, that are all geared towards ethical practices such as the General Agreement on Tariffs and Trade (GATT), Trade-Related Intellectual Property Rights (TRIPS), United Nations Industrial Development Organization (UNIDO), the World Intellectual Property Organization (WIPO), the African Regional Intellectual Property Organization (ARIPO) and the World Trade Organization (WTO). Nevertheless, global incidents of biopiracy and bioprospecting are just rampant and continue to threaten and undermine the survivalhood of ethnomedicines industry (Maina & Thuo, 2020; Imran *et al.*, 2021; Rose, 2021). While Intellectual Property (IP) rights, which include, patents, copyright and related rights, industrial design and integrated circuits, trademarks, plant varieties' rights, trade dress, geographical indications, and sometimes trade secrets, were created to promote and reward creativity of mind, particularly at an individual level, they actually end up benefiting multinational companies (Shiva, 2016). For instance, in Kenya, legal framework has been advanced towards containing all avenues of infringement of IP rights but still the malpractices are widespread (Maina & Thuo, 2020; Imran *et al.*, 2021), implying the efforts are not yet exhaustive. For instance, the support, protection, promotion and enforcement of IP rights are enshrined in Article 40 (5) of the constitution of Kenya 2010, through bodies such as the Kenya Industrial Property Institute (KIPI), the Kenya Copyright Board (KECOBO), Kenya Plant Health Inspectorate Services (KEPHIS), the Kenya Animal Genetic Resources Centre (KAGRC) and the Anti-Counterfeit Agency (ACA), each with its own Act of Parliament and generally focused on trademarks, patents, plant varieties, animal resources, industrial designs and copyright. Similar provision of Intellectual Property is echoed in Articles 11 (2) (c) and 69 (1) (c) of the constitution of Kenya, just probably to approve the significance of IP rights in the Kenyan society. However, the type of court cases related to IP rights witnessed in Kenya indicates that the enforcement of IP rights is yet to be done and or not yet comprehensive as it should be (Maina & Thuo, 2020).

From the aforementioned, one would ask, which way forward for the enforcement of all these international and national laws in order that the intended purpose is realized on the Planet Earth? The greatest challenge encountered so far has been the enforcement of these laws across neighboring countries and determination of IP rights for neighboring native and or indigenous people and or communities. Additionally, there is need to identify various forms of IP that require commercialization and institute a rigid IP legal framework that can help safeguard the interest of the native and or indigenous people in particular (Maina & Thuo, 2020). Bioprospecting conflicts with the conservation of the very nature it depends on and is affected by biopiracy a great deal while loopholes in the international and national laws make the risk of biopiracy much higher than expected in the society (Amarasinghe, 2018). Repudiating to adhere to the rules and regulations governing CBD and associated protocols by individuals and institutions involved in bioprospecting and biopiracy, is a critical challenge to the growth and development of ethnomedicines industry, particularly in developing parts of the world such as Africa (Ageh & Lall, 2019). Further, biopiracy and bioprospecting are silently practiced and remain unmonitored in laboratories of different institutions in time and space worldwide and henceforth, perplexing to notice and make follow ups appropriately (Imran *et al.*, 2021), henceforth, an individual self-respect and commitment to the adherent of the law in any one given society is supreme. Nevertheless, the global biopiracy and bioprospecting being practiced through DNA-fingerprinting and international etiquette (Nybom *et al.*, 2014) are indeed challenging and just a force to reckon with for loopholes in the laws are utilized by the same biopirators and bioprospectors who initially participated in developing and implementing the same laws, thus presenting a very complex state of affairs in the society.

In Kenya, it is now 31 years since United Nations (UN) created CBD and its supplementary protocols but the government, as a member state, has not so far put in place a comprehensive implementation process of the law that safeguards native and or indigenous people against biopiracy and bioprospecting malpractices and permit the lawful practice of ethnomedicines. However, some advancements have been made so far by putting in place Health Act 2017 that recognizes ethnomedicines but with one single regulatory body through an Act of Parliament to regulate health products and technologies of both conventional medicine and ethnomedicines (Oduor, 2018). These two aspects of health are indeed independent knowledge systems, which requires each to have its own regulatory body so as to be effective and efficient in service delivery. This therefore demands the enactment of Ethnomedicines Act of Parliament that can be able to address adequately all related issues of health without conflicts. Many sections in PTK&CE Act 2016 addressing ethnomedicines should also be removed and brought in the proposed Ethnomedicines Act so that appropriate rules, regulations, norms, standards and any other additional legislations required are enacted by Parliament to help ethnopractitioners offer adequate health services to their clients. Nevertheless, the greatest challenges squarely lie in truthfully fighting the inherent corruption, tribalism, nepotism,

favourism etc in our societies during the time of development and implementation of the required laws (Imran *et al.*, 2021).

Safety, Standardization and Application Regimes: This has remained one of the greatest challenges of ethnomedicine industry. Other than oral transmissions in human history and recent scientific studies, safety of ethnomedicines is not really known and many people do not therefore trust what the ethnopractitioners do as a useful profession to humanity. Standard methods of preparation and administration of many agents in ethnomedicines are elusive in public domain. There is limited knowledge about both the general safety and the interface perspective of these ethnomedicines (Heinrich, 2010). It is indeed very expensive to conduct classical scientific studies on sub-traction bioassays in order to identify the specific chemical agent in the multi-component mixtures responsible for the observed biological effect(s) so that standards and application regimes can be developed on evidence-based scientific studies. Even if the compound is identified, synergism effect may not allow for its isolation and subsequent development as a potential pharmacological agent for use independently.

Critical terminologies to position Ethnomedicines in research and academia

It is indeed important to define and explain a few of the terms frequently encountered in literature of the Ethnomedicines with controversies so that as a new field in research and academia, it is well understood and shaped in time and space. Nevertheless, terminologies are bound to change in future in order to suit the prevailing circumstances, while considering the foundations of originality. Therefore, for the purpose of this publication, an explanation of the following critical terminologies as used was carefully considered: -

Anthropology: As considered in this publication, it is the study of human societies, customs and beliefs.

Council of Elder: Together with other people in the society, comprise the main governing body of many culturally defined ethnic groupings and the source of ethnoknowledge and henceforth, ethnomedicines at all levels. The misunderstanding about the definition of this terminology is always the norm in our society to mean prominent persons in the society. Nevertheless, in real sense, this is a person, either man or woman, young or old, ancestrally and/or elderly ordained and bestowed with ethnic powers and authority to keep the instruments of power and authority of that particular ethnic grouping (at the level of an individual, a family, community, sub-clan, clan, sub-tribe, tribe, nation etc.) and by customary laws, authoritatively performs, advices and guides on all matters concerning cultural ethnopractices of that particular ethnic grouping (including those of ethnomedicines) in the society.

Culture: A set of ideas, taboos, customs, rules, norms, beliefs and ways of behaving and living of a particular ethnic organization of group of people.

Customs: Refers to established age-old ancient methods and mechanisms of civilizations, accepted rules and principles, beliefs and or stories considered together for survivalhood of a particular person, group and or family in the society for sustainable existence.

Disease: An illness that that affects physical, mental (psychological), social, spiritual and physiological balance and well-being of humans as well as that of animals and plants, especially one that is caused by infection.

Divination: The practice of finding out about the future life by receiving signs from the spiritual world. While the Diviner is the person who finds out about the future life by receiving signs from the spiritual world.

Ethno: A prefix used in the formation of compound words in English language to mean the inherent study of races, people, cultures, tribes, caste systems, nations, societal classes and societies with a common and distinctive origin and evolution in terms of language, communication, cultural practices, nutrition, norms, beliefs, taboos, traditions, skills, technologies, innovations and just the entire livelihood from its inherently ancient times to current. Examples include: Ethnomusicologist-someone who studies the music of different societies and cultures, Ethnocentric-believing that the people, customs, and traditions of your own race or nationality are better than those of other races and Ethnology-the study of different societies and cultures (Wanzala & Walingo, 2019).

Ethnomedicines: People's inherent cultural concepts, beliefs and ethnopractices for provision of health care services to promote the wellbeing of the entire livelihood of humanity, *animalia*, *plantae* and environment. The terminology is always in plural format with "s" at the end because it exists in form of many different sets of complex mixed compounds, involving both known and unknown elemental materials as extracts, tinctures, concoctions, etc., unlike the conventional medicine, which exists in purified format with known compounds in known proportions. Ethnomedicines work holistically, providing remedy beyond the target aetiologic agent once applied, with focus on spiritual, mental, psychological and social wellbeing other than physical wellbeing. Nevertheless, the exact definitions of either ethnomedicines or conventional medicine is cumbersome and perplexing because of the diversity of the theories and practices involved and because the boundaries between ethnomedicines and conventional medicine overlap, are porous and ever undergoing evolution (Kasper *et al.*, 2015), and treatments considered alternative in one location may be considered conventional in another (Nissen & Manderson, 2013).

Ethnopractitioner: A culturally ordained person who is recognized by the community in which he/she lives as competent enough to provide healthcare services by using plant, animal, soil, mineral, water and air substances and certain other methods such as saying special words, *spells* and or doing special actions based on the social, cultural and religious background as well as on the ethnoknowledge, attitudes and beliefs that are

prevalent in the patient's community regarding physical, mental and social well-being and the causation of disease, ill-health condition and disability of any kind.

Ethnoveterinary medicine (sometimes also called veterinary anthropology): Is a discipline dealing with folk beliefs, knowledge, skills, methods and practices pertaining to the health care of animals and has been practiced whenever and wherever people and animals have co-existed ever since "*dark days*." "Dark days"- refers to the days before the underlying science, following observations and formulated theories/hypotheses, could be explained and interpreted in the light of existing scientific evidence of factual knowledge.

Genetic resources: The United Nation CBD contains 42 Articles and is an international legal framework entity to promote the adoption of all measures aimed at ensuring (i) conservation of biodiversity, (ii) sustainable use of its components, and (iii) the fair and equitable sharing of benefits arising from the use of genetic resources. As per Article 2 of CBD "Genetic material" means any material of plant, animal, microbial or other origin containing functional units of heredity. "Genetic resources" means genetic material of actual or potential value. The CBD refers to ABS in relationship to utilization of genetic resources, but the exact scope of this term has not been fully determined. For instance, some laws and experts understand the concept to include not only genetic information but also the biochemical substances in the biological systems of living organisms. How valid is this understanding? How about the case of fossil records? More interpretation is needed at the international level to make it a little bit more specific and clearer than what is currently in order to help member states and governments to develop relevant and appropriate laws.

Healing: Is a process involving methods of diagnosing, treating and eliminating illness/disease in which physical and spiritual mechanisms and methods are uniquely applied in a holistic manner so that the normal health status of the affected person is restored and or improved.

Health: A state of physical, mental (psychological), social and physiological well-being of humans (human health) as well as that of animals (animal health) and plants (plant health).

Herbal Medicines: Preparations made from plant species to maintain the optimal health state of living organisms including: - herbs, herbal materials, herbal preparations and finished herbal products.

Finished herbal products: Consist of herbal preparations made from one or more herbs. If more than one herb is used, the term mixture herbal product can also be used. Finished herbal products and mixture herbal products may contain excipients in addition to the active ingredients. However, finished products or mixture products to which chemically defined active substances have been added, including synthetic compounds and/or isolated constituents from herbal materials, are not considered to be herbal.

Herbal materials: Include, in addition to herbs, fresh juices, gums, fixed oils, essential oils, resins and dry powders of herbs. In some countries, these materials may be processed by various local procedures, such as steaming, roasting, or stir-baking with honey, alcoholic beverages or other materials.

Herbal preparations: Are the basis for finished herbal products and may include comminuted or powdered herbal materials, or extracts, tinctures and fatty oils of herbal materials. They are produced by extraction, fractionation, purification, concentration, or other physical or biological processes. They also include preparations made by steeping or heating herbal materials in alcoholic beverages and/or honey, or in other materials.

Herbs: Herbs include crude plant material such as leaves, flowers, fruit, seed, stems, wood, bark, roots, rhizomes or other plant parts, which may be entire, fragmented or powdered.

Illness: The state of feeling ill, unwell and or having a disease that affects physical, mental (psychological), social, spiritual and physiological/biochemical balance and well-being of humans as well as that of animals and plants, especially one that is caused by an infection.

Indigenous knowledge/medicines (Indigenous people): Inherently defined to originate and henceforth belong to a given particular ethnic grouping. Was developed within that particular ethnic grouping, secretly protected and handed down from generation to generation, through lineages to the current generation, either intact and/or with modifications.

Local knowledge/medicines (Local people): Reference is made to people with originally different ethnic backgrounds henceforth with very different and diversified Indigenous knowledge/medicines living and practicing different cultures in the same geographical location and at the same time.

Medicine: The study and practice of diagnosing, treating, eliminating or preventing illnesses/ill-health conditions and injuries affecting the physical, mental (psychological), and physiological/biochemical balance and well-being of humans (human medicine) as well as that of animals (animal medicine) and plants (plant medicine).

Native knowledge/medicines (Native people): The terminology “native” is commonly used as a noun as well as an adjective, referring to the first to be known and/or associated with in life; may be indigenous and/or non-indigenous but localized and being used in life as the norm. Therefore, “native” may as well as mean “local” and/or “indigenous” depending on the circumstances and context of reference in time and space.

Religion: A system of beliefs in the existence of God and or a god or gods that has its own specific and special practices, ceremonies and rituals.

Ritual medicines: As previously defined and discussed by Wanzala and Walingo (2019). However, some authors describe it as magic and/or magico-religious medicines (Martin *et al.*, 2001).

Theology: The study of God and religion and or a set of religious beliefs by humanity.

Traditional: From the English point of view, the terminology, “traditional” it means something that is repeatedly done in life from time to time whenever there is need for it, and that now becomes an established norm of reference in the society. Ethnomedicines was referred to as “traditional” and defined by it simply because by then, it was the only point of reference and henceforth in continuous use in the society from time to time to provide for any solutions for all the problems of healthcare services were concerned, regardless of geographical location, time, ethnicity and or culture of origin. By this understanding and definition, and by the dynamism nature of Ethnomedicines, therefore, the conventional medicine such as, “Panadol” for instance, soon, in time and space, may be defined as “traditional medicines” because this is what is becoming inherently and culturally referred to, defined and believed to be the norm practice for medication to alleviate any simple health-related problems in the society. To avoid this confusion of mixing conventional medicine and Ethnomedicines in the near future by way of using old-fashioned terminology, the name “traditional” should be abolished in use in all circles referring to “traditional medicines” and/or “traditional knowledge”, and instead the prefix, “Ethno” be adopted to mean inherently built-in from within a human lineage and, evolutionarily and culturally belonging to an ethnic grouping (in this case to form “Ethnomedicines” and “Ethnoknowledge”, respectively). This strategic interpretation will help provide continued clarity and henceforth, maintain consistency and avoid confusion in the health industry in the society due to advancement in evolutionary processes of biological entities and accumulative civilization being experienced (Constitution of Kenya 2010: Article 11(1)). However, in the context of ethnoknowledge, the terminology is considered as a very old custom of methods and mechanisms of civilizations, accepted rules and principles, beliefs and or stories considered together for survivalhood of a particular person, group and or family in the society for sustainable existence. By this definition, still the context of the meaning as stated above does not change in any ways.

Zoopharmacognosy: As previously defined and discussed by Wanzala and Walingo (2019).

Merits and Demerits of Ethnomedicines

Form the aforementioned discussions and analysis, the most notable merits and demerits of ethnomedicine industry are outlined below but not limited to: -

Positive aspects of ethnomedicines

1. It was developed by humans on humans and existed with humanity from the very beginning of mankind; hence the traditional medicines have withstood the test of time.

2. *Holistic in nature* i.e. one single application of a traditional remedy takes care of physical, mental (psychological), social, spiritual and physiological imbalance and ill health of the victim (patient).
3. Available in remote local areas where conventional/contemporary medicines are not available and or if available, not available on regular basis, very expensive, with many side effects and require the knowledge of external personnel before use/application.
4. *Socially and culturally acceptable*. Practiced using methods based on the social, cultural and religious background as well as on the knowledge, attitudes and beliefs that are prevalent in the community regarding physical, mental (psychological), social, spiritual and physiological balance and well-being of humans as well as that of animals and plants and focuses on the causes of diseases and disabilities.
5. The providers of traditional healthcare services (traditional healers) are easily accessible for consultations as each community has its own professional healers.
6. African traditional medicines are less costly compared to conventional counterpart and sometimes, the form of payment is in the form of barter trade, a case that is not feasible and acceptable in the conventional sense.
7. The fact that traditional medicines are administered and handled by the traditional healers themselves and not left to the patients unless otherwise, they offer fewer opportunities for toxicities and or poisoning.
8. African traditional medicines are very effective, and at times, offer herbal drug remedies for such conditions as herpes zoster for which modern medicines have no cure.
9. African traditional medicines are environmentally friendly.
10. Communal traditional remedies are known to everybody in a given community and are generally used without consultation from Health ethnopractitioners.
6. Safety: It has alleged low quality of care because of lack of regulatory mechanisms including control and licensing.
7. Efficacy has been doubted at all levels.
8. Maintaining its current low cost.
9. It keeps no written registers of patients hence difficult to evaluate. This is especially so for African system.
10. It experiences loss of knowledge or errors occasioned by large numbers of herbs and other pharmacopoeia; and diseases to be treated are many.
11. Currently lack wider and uniform acceptability and hence application across each African community.
12. The rational use of traditional medicine is not well defined; it relies on mysticism and intangible forces, for example, witchcraft.
13. Some aspects of are based on spiritual and moral principles which are difficult to explicate.
14. The possible misuse of its non-material aspects.
15. The practice of sorcery and quackery within ethnomedicine industry.
16. Lack of legal framework for its practice and limitations.
17. Ethnopractitioners lack a prerequisite robust training and standard for which the training has to be considered.

The very real negative aspects are not peculiar to ethnomedicine, but could be found even in contemporary medicine. It would therefore be necessary, moreover, to make the ethnopractitioners aware of the limits of their skills and techniques and to encourage them to cooperate more effectively and dynamically with conventionally trained doctors to enhance effective PHC.

Milestone Achievements in Ethnomedicine Industry

In authors' views, the following are considered to be some of the most recent and notable achievements so far made in the ethnomedicine industry: -

The Case of international community's achievements

1. The acceptance and recognition of ethnomedicine industry by World Health Organization (WHO) and subsequent provision of advice, evidence, data, guidelines and standards to member countries to help them enact national laws upon which their regulatory frameworks, standards and policies can be anchored for safe, cost-effective and equitable utilization of ethnomedicines; was one of the greatest achievements in the history of humanity. Guidelines were developed on registration of Traditional Medicines by WHO in 2004, updated in 2010.
2. The commemoration of the African Traditional Medicine Day every year, 31st August to honour the integral role of ethnomedicine in the health and welfare of generations of African people on the continent. On 31st August 2000, the African Ministers of Health adopted the relevant resolution at the 50th session of the World Health Organization Regional Committee for Africa in Ouagadougou, Burkina Faso.

The compelling reason, however, is its ability to meet "the four criteria of: - accessibility, availability, acceptability and dependability." However, research is required to discover more about the role of ethnopractitioners in their respective communities as the initial step towards formulating effective policies regarding their role in primary health care systems.

Negative aspects of ethnomedicines

Although the negative features of traditional medicines had been exaggerated by its adversaries who had too often magnified them out of all proportion and used them as arguments for refusing it all credibility, it has to be admitted that some aspects of traditional medicines call for corrective measures if it is to be incorporated in the official national healthcare delivery services. They include but not limited to: -

1. The imprecise nature of the ethnodiagnosis.
2. It does not keep up with scientific and technological advantage.
3. Its methods, techniques, medicines and even training are often kept secret.
4. It is difficult to ethnodiagnose chronic illness in time.
5. The lack of precision in dosage and combination of herbal medicines used is not known.

3. WHO traditional medicine strategy: 2002–2005, based on countries' progress and current new challenges in the field of traditional medicine.
4. The continental implementation of WHO Regional Strategies on Promoting and Enhancing the Integral Role of Traditional Medicine in National Health Systems, 2001–2010 and 2013–2023, (Document AFR/RC63/6) as well as the Plans of Action for the First (2001–2010) and Second (2011–2020) African Union Decades of African Traditional Medicine Programmes following the implementation of the decision of the Lusaka Summit of Heads of states and governments (AHG/DEC.164 (XXXVII)).
5. The WHO traditional medicine strategy: 2014–2023 has two key goals: to support Member States in harnessing the potential contribution of traditional and complementary medicine to health, wellness and people-centred health care, and to promote the safe and effective use of traditional and complementary medicine through the regulation of products, practices and practitioners.
6. In Africa, 40 countries have developed ethnomedicine policies, 30 countries have integrated ethnomedicines into national policies, 39 countries have established ethnomedicines regulatory frameworks for ethnopractitioners and 26 countries have 34 research institutes on ethnomedicines research with 12 countries making allocations of research funds while 17 with frameworks for the protection of intellectual property rights (IPRs) and ethnomedical knowledge in the society (Moeti, 2022).
7. Eight countries in Africa now cultivate medicinal and aromatic plant species on a larger scale while 9 do manufacture ethnomedicines with regulatory frameworks and enlisting them on the national health systems (Moeti, 2022).
8. Enhancement of robust capacity building in ethnomedicines training and education and collaboration between ethnopractitioners and conventional practitioners with the development of legal framework and Codes of Ethics and Practice for the ethnopractitioners to ensure safety, efficacy and standards of service delivery in health sector (Moeti, 2022).
9. Since the year 2014, 11 interregional training sessions have been organized on traditional, complementary and integrative medicine (TCIM), involving 350 government-nominated officers while WHO also collaborated with partners on the Self-Care Readiness Index⁴ and the Global Review of Osteopathic Medicine and Osteopathy.
10. On 22nd July, 2020, the Launch of the WHO Regional Expert Advisory Committee on African Traditional Medicine with the establishment of the Regional Expert Advisory Committee on Traditional Medicine for COVID-19 for the African Region in the year 2020.
11. On 17th September, 2021 in Abuja, Nigeria, World Health Organization (WHO) affirmed support for COVID-19 ethnomedicine research while on 19th September, 2020, in Brazzaville, the WHO Regional Expert Panel endorsed a protocol for COVID-19 herbal medicine clinical trials, thus WHO reaffirming its previous call to support scientifically-proven ethnomedicines.
12. WHO Regional Office for Africa working towards universal health coverage by advancing the development and use of Traditional Medicines in Africa (Kasilo *et al.*, 2019).
13. On 25th March 2022, WHO and the Government of India signed an agreement to establish and develop the WHO Global Centre for Traditional Medicine (GCTM) as a knowledge centre for ethnomedicine. The onsite launch of the new Centre in Jamnagar, Gujarat, India took place on April 21st, 2022. As part of WHO's overall ethnomedicine strategy, it has a strategic focus on evidence and learning, data and analytics, sustainability and equity, and innovation and technology to optimize the contribution of ethnomedicines to global health and sustainable development. At the same time, respect for local heritages, resources and rights as a guiding principle.
14. On 6th February, 2023, WHO developed Global strategy on traditional medicine (EB152(18)).
15. Preliminary findings from the World Health Organization (WHO) Global Survey on Ethnomedicine 2023 shared at the first-ever WHO Ethnomedicine Global Summit 2023 indicated that around 100 countries have national policies and strategies to help implement the operationalization process of traditional, complementary and integrative medicine (TCIM).
16. The first-ever inaugural Health Day at the 28th UN Climate Change Conference of Parties (COP28), the United Arab Emirates (UAE) Declaration on Climate Change and Health, where more than 40 million health professionals from around the world joined the call to action by the World Health Organization (WHO) and civil society organizations, to prioritize health in climate negotiations at COP28 (WHO, 2023b), thus emphasizing: - 1., the critical role of the United Nations Framework Convention on Climate Change (UNFCCC), 2., the fulfillment of the Paris Agreement and 3., comprehensive collaboration and partnership to confront the issues of health and climate crisis.

The case of Kenya's achievements

1. Promulgation of new Kenya Constitution on 27th August, 2010; that recognizes, promotes and protects culture, where ethnomedicines is inherently anchored and rooted for comprehensive practice.
2. Article 69 (1) of the Laws of Kenya: Obligations in respect of the environment. It recognizes protection and enhancement of intellectual property rights (IPRs) and indigenous knowledge of biodiversity and the subsequent genetic resources of the indigenous and local communities, where ethnomedicines are deeply rooted.
3. Article 11 (2) and (3) of the Laws of Kenya: Culture. Emphasizes the promotion and protection of ethnoknowledge where ethnomedicines are deeply rooted.
4. Kenya Health Policy 2014–2030 recommended the ministry responsible for health to put in place measures to regulate traditional and complementary medicines.
5. Enactment of the Health Act 2017 (No. 21 of 2017) by the Parliament of Kenya on 21st June, 2017; that promotes, regulates, documents, standardizes and makes referrals of cases involved in the use and application of ethnomedicines (sections 74–79) and needs additional attention.
6. The National Policy on Culture and Heritage (2019) in section 3.4, recognizes that Traditional Knowledge also

referred to as Indigenous Knowledge, which includes “medical knowledge associated with genetic resources or other components of biological diversity and know-how of traditional architecture”, needs to be developed.

7. Health Laws (Amendment) Act 2019 (No. 5 of 2019) recognizes traditional and alternative medicine as “health product”.
8. The Pharmacy and Poisons Act, Cap 244 (revised edition 2012) is an Act of Parliament to make better provision for the Control of the Profession of Pharmacy and trade in drugs and poisons, while section 3A of the Act restricts the importation or manufacture of foreign traditional medicine of any description without the approval of the Registrar of the Pharmacy and Poisons Board (PPB) in writing.
9. The development of the Pharmacy and Poisons (Conduct of Clinical Trials) Rules, 2022 for the conduct of clinical trials involving traditional or alternative medicines in Kenya.
10. Drafted guidelines by the Pharmacy and Poisons Board (PPB) for the Registration of Herbal and Complementary products to ensure that “only good quality, safe and efficacious herbal and complementary products pass the threshold and are available in Kenya”.
11. Development of draft regulations and standards for the implementation of The Protection of Traditional Knowledge and Cultural Expressions Act 2016 (No. 33 of 2016) in 47 counties in Kenya.
12. Initiation of the amendment of the Witchcraft Act 1925 (Chap 67) whose commencement date was 12th November, 1925 as Act No. 23 of 1925 by the Kenya Law Reform Commission so that it is in line with the new Constitution following the promulgation of the Constitution in August, 2010. This is to help people make informed choices and make a difference between what is witchcraft and what is ethnomedicines for many people are in a state of confusion about these two issues in the society. However, the Kenya Law Reform Commission has ever since put on halt the entire process of reforming the witchcraft laws in Kenya until such time as the majority of Kenyans, living in rural as well as urban areas, grow out of their beliefs and fears in witchcraft (KLRC, 2014). We, however, echo the sentiments of many people that in determining whether or not the majority of the indigenous and local people have grown out of the fears and beliefs in witchcraft, formal Western-type of education should not, *per se*, be the criterion, instead, the process should proceed and be completed.
13. Drafted a Traditional and Alternative Health Practitioners Bill 2020. The Bill aims to make provisions for the training, registration and licensing of traditional and alternative health practitioners; to regulate their practice and professional conduct, to provide for the establishment, powers and functions of the Traditional and Alternative Health Practitioners Council (TAHPC). Once established, the Council will supervise and regulate the training and registration of ethnomedicine practitioners and institutions, information dissemination and integration of ethnomedicine into the national health system (Trust for Indigenous Culture and Health, 2021).
14. Traditional and Alternative Medicine Policy (2021) in Kenya as directed by the Health Act No. 21 of 2017. The policy

draft is still under discussion and is yet to be finalized and subsequent adoption for implementation by stakeholders (Trust for Indigenous Culture and Health, 2021).

15. The on-going post National Task Force (for the development of guidelines, regulations, standards and revision of the PTK & CE Act 2016) pilot programme on digitalization process of culture and various ethnoknowledge aspects in some ethnic groupings in 13 selected counties, organized by the State Department of Culture and Heritage. In this exercise, all aspects of ethnomedicines are also recorded for digitalization.

OPPORTUNITIES

The challenges stated above present clear opportunities for extensive and intensive research, documentation, enactment of appropriate international and national laws, considerable investment into research, capacity building at all levels, and clear understanding the market value-chain of the ethnomedicine industry.

Opportunities exist for the discovery of new molecules with unique properties and biological effects guided by ethnomedical knowledge in the society (Fabricant & Farnsworth, 2001). New genetic resources will be identified and conserved for integration into ethnomedicine industry in future.

The development and evolution of digital technology with the ability to record and spread information, knowledge and wisdom quickly and widely, presents both opportunities and concerns in the ethnomedicine industry. It has already been noted in the society that digital tools and devices such as drones, Geographic Information Systems, block chain technology, smartphones are both good and bad, for they are both destructive and useful in same measures (Marrie, 2019). From the aforementioned therefore, opportunities exist for conducting global research and enacting stringent legal frameworks for both guidance and regulation of ethical digital use and digital sovereignty in our rapidly evolving societies.

Specific opportunities exist for critical management of invasive alien species (IAS) in our environments as presented by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) (Sankaran *et al.*, 2023).

Under the guidance of WHO and UNESCO, opportunities exist for the member governments and states to develop appropriate national laws that can help them develop a robust local ethnomedicine industry that is responsive to the needs and demands of primary healthcare services of national healthcare systems.

WAY FORWARD

Ethnomedicines must work for our prosperity and be put to a sustainable practical development framework that is agreeable with the set norms, taboos and cultural ethnopractices in our respective evolving ethnic societies. In reality, ethnomedicines

should be acknowledged without suspicion of any kind and developed as an independent ethnoknowledge system on its own, away from the conventional one. It is time therefore, developed legal frameworks for ethnomedicines of different governments and states are put in place to guide the expert-led implementation process of the ethnopractices, technical validation studies, capacity building, commercialization processes etc., of the entire ethnomedicines industry worldwide. Governments and states must support and protect the promotion of its resources, skills, ethnotechnologies and ethnoknowledge content in its original format and further increase its dependency at the local levels in the society.

Nevertheless, there is a growing consensus and school of thought in contemporary world that conventional medicine and ethnomedicines should be considered as one thing without a boundary. It is philosophically being advised for people world all over, to consider medicine that is effective and that which is ineffective only, as expressions commonly used such as “conventional medicine”, “alternative medicine”, “traditional medicine”, “complementary medicine”, “integrative medicine” and “holistic medicine” do not refer to any medicine at all (Fontanarosa & Lundberg, 1998; Angell & Kassirer, 1998).

Imran *et al.* (2021) have suggested the establishment of honest and transparent Private-Public-People partnerships together with International Barcode Certification as a way of sustainably fighting to contain biopiracy that adversely affects ethnomedicine industry.

The government of Kenya need to enact an Indigenous Languages Act of Parliament, co-developed with Indigenous and local Peoples with a view to ensuring the preservation, protection and revitalization of ethnoknowledge of all kinds, and with special focus on youth, that they transfer the ethnoknowledge to future generations (Marrie, 2019). By constitutional promotion of indigenous and local languages, this is one of the means of the most robust way of preserving, conserving and protecting ethnoknowledge as well as ethnomedicines in its original format from undergoing erosion and ensuring that it is transmitted to the future generations in an intact format.

We can achieve greatest and improve our livelihoods a great deal by integrating science into ethnoknowledge without losing the latter.

From the aforementioned, an ethnomedical syncretism should be encouraged amongst people as it holistically involves the fusing of more than one ethnomedical practice to achieve sustainable wellness, such as fusing spiritual and ethnobiomedical practices.

To enrich ethnomedicine industry in Kenya, the national and county governments must develop constitutional institutions and structures and henceforth, sponsor explorations ethnically conducted in a legal framework that is in tandem with the national laws, sessional papers and policies in order that evidence-based information is provided to be integrated in the existing national and county healthcare systems.

AUTHOR CONTRIBUTIONS

The two authors (Wycliffe Wanzala and Sheila Iminza Minyoso) both equally contributed in sourcing the literature review materials, writing and editing the manuscript.

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